PROGRAMME

DOCTOR OF MEDICINE AND MASTER OF SURGERY

FACULTY OF MEDICINE



Ordinance- V (46)

(Approved by Academic Council and applicable from 2018-2019)

SWAMI VIVEKANAND SUBHARTI UNIVERSITY,

Meerut

ORDINANCE V(46) MD/MS

1. This ordinance may be called the "ordinance relating to M.D./M.S. course and syllabus"
2. It shall come into force with immediate effect.

EXAMINATION REGULATIONS

The examinations shall be of formative as well summative types. Formative examinations shall be under the following categories:

- Weekly assessment through the presentations/participation in the seminars and Journal Clubs
- Assessment on the basis of regular undergraduate practical demonstrations and participation
- The examinations shall be organized on the basis of grading or marking system to evaluate and certify candidate's level of knowledge, skill and competence at the end of the training and obtaining a minimum of 50% marks in theory as well as practical separately shall be mandatory for passing the wholeexamination

The following procedures are per as the regulations of the MCI shall be followed:

a) For all Post Graduate Examinations, the minimum number of Examiners shall be four, out of which at least two (50%) shall be External Examiners, who shall be invited from other recognized universities from outside the State. Two sets of internal examiners may be appointed one for M.D. /M.S. and one fordiploma.

b) Under exceptional circumstances, examinations may be held with 3 (three) examiners provided two of them are external and Medical Council of India is intimated the justification of such action prior to publication of result for approval. Under no circumstances, result shall be published in such cases without the approval of Medical Council of India.

c) In the event of there being more than one centre in one city, the external examiners at all the centers in that city shall be the same. Where there is more than one centre of examination, the University shall appoint a Supervisor to coordinate the examination on itsbehalf.

(3) Number ofexaminations

The university shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations.

(a) Thesis

Every candidate shall carry out work on an assigned research project under the guidance of a

recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis.

Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature. Thesis shall be submitted at least six months before the theoretical and clinical / practicalexamination.

The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical; and on the acceptance of the thesis by two examiners, the candidate shall appear for the final examination.

(b) Theory

(i) There shall be four theorypapers.

(ii) Out of these one shall be of Basic Medical Sciences and one shall be of recentadvances.

(iii) The theory examinations shall be held sufficiently earlier than the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the start of the Clinical/Practical and Oral examination.

Provided that after five years from the commencement of these regulations, there shall be one theory paper of 'multiple choice questions'; unless any institution wants to havesuch paperearlier.

(c) Clinical / Practical andOral

(i) Clinical examination for the subjects in Clinical Sciences shall be conducted to test the knowledge and competence of the candidates for undertaking independent work as a specialist/Teacher, for which candidates shall examine a minimum one long case and two shortcases.

(ii) Practical examination for the subjects in Basic Medical Sciences shall be conducted to test the knowledge and competence of the candidates for making valid and relevant observations based on the experimental/Laboratory studies and his ability to perform such studies as are relevant to hissubject.

(iii) The Oral examination shall be thorough and shall aim at assessing the candidate knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of theexamination.

A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical including clinical and viva voce examination.

The Guidelines for the appointment of post graduate examiners shall be as per the Guidelines of MCI as follows:

POST GRADUATEEXAMINATION

GUIDELINES ON APPOINTMENT OF POST GRADUATE EXAMINERS

- No person shall be appointed as an examiner in any subject unless he fulfills the minimum requirements for recognition as a Post Graduate teacher as laid down by the Medical Council of India and has teaching experience of 8 (Eight) years as a Lecturer / Asst. Professor out of which he has not less than 5 (Five) years teaching experience after obtaining Post Graduate degree. For external examiners, he should have minimum three years experience of examinership for Post Graduate diploma in the concerned subject. Out of internal examiners, one examiner shall be a professor and Head of Department or Head of Department.
- There shall be at least four examiners in each subject at an examination out of which at least 50% (Fifty percent) shall be external examiners. The external examiner who fulfils the condition laid down in clause – 1 above shall ordinarily be invited from another recognized university, from outside the State: provided that in exceptional circumstances examinations may be held with 3 (three) examiners if two of them are external and Medical council of India is intimated whit the justification of such examination and the result shall be published in such a case with the approval of Medical council ofIndia.
- An external examiner may be ordinarily been appointed for not more than three years consecutively. Thereafter he may be reappointed after an interval of twoyears.
- The internal examiner in a subject shall not accept external examinership for a college from which external examiner is appointed in hissubject.
- The same set of examiners shall ordinarily be responsible for the written, practical or part ofexamination.
- In the event of there being more than one centre in one city, the external examiners at all the centers in the city shall be thesame.
- There shall be a Chairman of the Board of paper – setters who shall be an external examiner and shall moderate the question papers.

- Where there is more than one centre of examination, there shall be coordinator appointed by the University who shall supervise and Co-ordinate the examination on behalf of the University with independent authority.
- The Head of the Department of the institution concerned shall ordinarily be one of the internal examiners and second internal examiner shall rotate after every two year.

FACULTY OF MEDICINE

M.D. Anatomy

(Programme code – MM-2)

Year of Implementation: 2010 – 2011

Curriculum and Syllabus

DEPARTMENT OF ANATOMY

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN ANATOMY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

These guidelines would help to achieve a uniform level of training of MD Anatomy to post graduate students throughout the country. The student, after undergoing the training, should be able to deal effectively with the needs of the medical community and should be competent to handle all problems related to the specialty of Anatomy and recent advances in the subject. The post graduate student should also acquire skills in teaching anatomy to medical and para-medical students and be able to integrate teaching of Anatomy with other relevant subjects, while being aware of her/hislimitations.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading"competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

The **Goal** of MD Anatomy is to train a doctor to become a competent teacher and researcher in Anatomy who:

1. Is aware of *contemporary advances and developments* in the field ofAnatomy.

2. Has *acquired the competencies* pertaining to the subject of Anatomy that are required to be practiced at all levels of health system.

3. Is able to discharge responsibilities and participate in National Health Education Programme.

4. Is oriented to the *principles of researchmethodology*.

5. Has acquired *skills in educating* medical and paramedicalprofessionals.

6. Has acquired *skills in effectively communicating* with the students and colleagues from various medical and paramedicalfields.

7. Has acquired skills of integrating anatomy with other disciplines as and when needed.

8. Has acquired qualities of a good teacher capable of innovations in teaching methodology**.**

9. Has been able to demonstrate adequate management skills to function as an effective leader of the team engaged in teaching andresearch.

After completing the three year course in MD Anatomy the student should have achieved competence in the following:

1. Knowledge of Anatomy

1.1. Acquire competencies in gross and surface anatomy, neuroanatomy, embryology, genetics, histology, radiological anatomy, applied aspects and recent advances of the above-mentioned branches of anatomy to clinical practice. These are given in detail in subsequentsections.

2. Practical and Proceduralskills

2.1 Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.

3. Training skill in ResearchMethodology

3.1 Acquire skills in teaching,research methodology, epidemiology & basic informationtechnology.

3.2 Acquire knowledge in the basic aspects of Biostatistics and research methodology.

3.3 Has knowledge to plan the protocol of a thesis, carry out review of literature, executionof research project and preparation ofreport.

3.4 Has ability to use computer applications Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochranereviews).

3.5 Acquire skills in paper & poster preparation, writing research papers and Thesis.

4. Professionalism, attitude and communicationskills:

4.1 Develop honest work ethics and empathetic behavior with studentsand colleagues.

4.2 Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way ofduty.

4.3 Acquire attitude and communication skills to interact withcolleagues, teachers andstudents.

5. TeachingAnatomy

5.1 Practicing different methods ofteaching-learning.

5.2 Making presentations of the subject topics and researchoutputs.

6. ProblemSolving

6.1 Demonstrate the ability to identify applied implications of the knowledge of anatomy and discuss information relevant to the problem, using consultation, texts, archival literature and electronicmedia.

6.2 Demonstrate the ability to correlate the clinical conditions to the anatomical/ embryological/hereditaryfactors.

6.3 Demonstrate the ability to evaluate scientific/clinical information and critically analyze conflicting data andhypothesis.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the student should have acquired following competencies:

A. Cognitive domain

1. Describe gross anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinalcord.

2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She/He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficitsencountered.

3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and appliedanatomy.

4. Demonstrate knowledge about the sequential development of organs and systems along

with its clinical anatomy; recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. She/He should be able to explain developmental basis of variations and congenital anomalies.

5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtualmicroscopy.

6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.

7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation andproliferation.

8. Describe structure, number, classification, abnormalities and syndromes related to humanchromosomes.

9. Describe important procedures in cytogenetics and molecular genetics with its application.

10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-mendelian inheritance, mitochondrial inheritance, genome imprinting and parentaldisomy.

11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics andpharmacogenetics.

12. Demonstrate knowledge about reproduction genetics, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.

13. Explain principles of gene therapy and its appliedknowledge.

14. Describe immune system and cell types involved in defense mechanisms of the body. Also explain gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in thebody.

15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibilitytesting.

16. Demonstrate applications of knowledge of structure & development of tissue- organ system to comprehend deviations fromnormal.

17. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problemsolving.

18. Explain collection, maintenance and application of stem cells, Cryobanking and principles of organ donation from recently deadbodies.

19. Demonstrate knowledge about surface marking of all regions of thebody.

20. Able to interpret various radiographs of the body, normal CT Scan, ultrasound andMRI.

21. Demonstrate knowledge about different anthropological traits and use of related instruments.

22. Demonstrate knowledge about outline of comparative anatomy of whole bodyand basic humanevolution

23. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application ofanatomy

B. Affective domain

1. Demonstrate self-awareness and personal development in routine conduct. (*Self-awareness*)

2. Communicate effectively with peers, students and teachers in various teaching- learning activities.(*Communication*)

3. Demonstrate

a. Due respect in handling human body parts & cadavers during dissection. (*Ethics &Professionalism*)

b. Humane touch while demonstrating living surface marking in subject/patient. (*Ethics &Professionalism*)

4. Acquire capacity of not letting his/her personal beliefs, prejudices andlimitations come in the way ofduty.

5. Appreciate the issues of equity and social accountability while exposingstudents to early clinical exposure. (*Equity and socialaccountability*)

C. Psychomotordomain

At the end of the course the student should be able to:

1. Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with livinganatomy.

2. Acquire mastery in dissection skills, embalming, tissue preparation and staining and museumpreparation.

3. Locate and identify clinically relevant structures in dissectedcadavers.

4. Locate and identify cells & tissues under themicroscope.

5. Identify important structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI andultrasonography.

6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.

7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medicaldoctor.

8. Demonstrate different methods of teaching-learning and make presentations ofthe subject topics and research outputs.

Specific practice-based competencies:

Name/Description of practice-based competencies	
1.	**Grossanatomy:**
(i)	Procurement, Embalming and Preservation of humancadavers
(ii)	Preparation of tanks for preserving bodies
(iii)	Dissection ofcadaver
(iv)	Window dissection of importantregions
(v)	Preparation of specimens for museum withdisplay
a.	Softparts
b.	Models
c.	Charts

d.	Preparation and preservation of human bones / skeleton as assigned by the faculty
2.	**Histology**
(i)	Preparation of common fixatives embalming fluid 10% formalin, Bouin's fluidetc
(ii)	Making paraffin blocks and section cutting andmounting
(iii)	Preparation of staining set for H and E staining and staining paraffin sections with the stain
(iv)	Making celloidin, araldite, gelatin blocks and their sectioncutting
(v)	Processing hard tissues, decalcification of bones, block making and sectioning, preparation of ground sections of calcifiedbones.
(vi)	Frozen section cutting on freezing microtome andcryostat
(vii)	Honing and Stropping of microtome knives, including sharpening by automatic knifesharpener
(viii)	Histology file in which LM and EM pictures of all the organs and tissues ofthe

3.	**HistochemicalMethods**
3.1	Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase,acid phosphatase, andcalcium
4.	**Cytogenetics**
4.1	Preparation of media, different solutions, stainsetc.
4.2	Preparation of buccal smear for sexchromatin Human chromosome preparation from peripheral blood and karyotyping.
4.3	Banding techniques (G andC)
4.4	Making of Pedigree charts for study of patterns ofinheritance.
4.5	ChromosomalAnalysis.
5.	**Neuroanatomy:**
5.1	Dissection of brain and spinal cord for teaching and learningpurpose
5.2	Preparation of brain and spinal cord macroscopic and microscopic sections and identificatic different parts inthem.
5.3	Discussions on clinical problems related to neurological disorders andanatomicalexplanatior same.

Syllabus

A post graduate student, after three years of training in M.D. (Anatomy) shouldhave acquired knowledge in the following aspects ofanatomy:

Gross anatomy Section - I

Gross Anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord

Section - 2

Developmental anatomy/embryology

- General embryology: gametogenesis, fertilization, implantation and placenta, early human embryonic development.
- Systemic embryology: development of organ systems and associated common congenital abnormalities with teratogenesis.
- Physiological correlations of congenital anomalies.

Section - 3

Histology and histochemistry Cell Biology:

- Cytoplasm - cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
- Nucleus - nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
- Cell cycle - mitosis, meiosis, cell renewal.
- Cellular differentiation and proliferation.
- Microscopic structure of the body:
- Principles of light, transmission and scanning, electron, fluorescent, confocal and virtual microscopy.
- The systems/organs of body - Cellular organization, light and electron microscopic features, structure - function correlations, and cellular organization.

Section-4 Neuroanatomy:

- Brain and its environment, Development of the nervous system, Neuron and Neuroglia, Somatic sensory system, Olfactory and optic pathways, Cochleovestibular and gustatory pathways, Motor pathways, Central autonomic pathways, Hypothalamo-hypophyseal system, Limbic system, Basal ganglia, Reticular system, Cross Sectional anatomy of brain and spinal cord.
- Detailed structure of the central nervous system and its applied aspect.

Section - 5 Genetics

- Human Chromosomes - Structure, number and classification, methods of chromosome preparation banding patterns. Chromosome abnormalities, Autosomal and Sex chromosomal abnormalities syndromes, Molecular and Cytogenetics.
- Single gene pattern inheritance: Autosomal and Sex chromosomal pattern of inheritance, Intermediate pattern and multiple alleles, Mutations, Non- Mendelian inheritance, Mitochondrial inheritance, Genome imprinting, parentaldisomy.
- Multifactorial pattern of inheritance: Criteria for multifactorial inheritance, Teratology, Structure gene, Molecular Screening, Cancer Genetics - Haematological malignancies, Pharmacogenetics.
- Reproduction Genetics - Male and Female Infertility, Abortuses, Assisted reproduction, Preimplantation genetics, Prenatal diagnosis, Genetic Counseling and Ethics ofGenetics.
- Principles of Gene therapy and its appliedknowledge.

Section - 6 Immunology

- Immune system and the cell types involved in defense mechanisms of the body. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in thebody.
- Biological and clinical significance of the major histocompatibility complex of man including its role in transplantation, disease susceptibility/resistance and genetic control of the immuneresponse.
- Common techniques employed in cellular immunology and histocompatibility testing.
- Molecular hybridization and PCR technology in immunology research particularly mechanism of antigen presentation, structural and functional relevance of the T cell receptor, genetic control of the immune response. Molecular basis of susceptibility todisease.

Section - 7

Applied anatomy and recent advances

- Clinical correlations of structure and functions of human body. Anatomical basis and explanations for clinicalproblems.
- Applications of knowledge of development, structural (microscopy), neuro anatomy to comprehend deviations fromnormal.
- Recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problemsolving.
- Collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently deadbodies.

Section - 8

Surface marking andRadiology

Surface markings of all regions of the body. Interpretation of normal radiographs of the body including special contrast procedures including barium studies, cholecystrography, pylography, salphingography. Normal CT scan, MRI and Ultrasound.

- **Anthropology**

Different anthropological traits, Identification and use of Anthropological instruments.

Forensic Medicine:

- Identification of human bones from their remains and determination of sex, age, and heightfor medico legal application of Anatomy.
- Outline of comparative anatomy of the whole body and basic human evolution

Departmental Resources:

It is mandatory for the department of Anatomy to develop at least three of the following laboratories, in addition to the other facilities. The laboratory should be involved in active research in at least one well defined field.

1. Histology
2. Immunology
3. Electronmicroscopy / Fluorescence microscopy/ confocal and other formsof microscopylaboratories
4. Developmentalanatomy
5. Anthropometry
6. Neuroanatomy
7. Cytogenetics
8. Imaging technique for RadiologicalAnatomy

TEACHING AND LEARNING METHODS

Teaching methodology

During the course, students should have formal training in teaching and research. The sessions should be in the form of:

1. **DidacticTeaching** Topics in grosssurface and cross-sectionalanatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics taught by faculty members.

2. **Training in c**ommunication skills - journal club, seminars, demonstrations, tutorials, lectures, quizzing.
3. Hands-on experience - techniques in microanatomy, neuroanatomy, gross anatomy, embryology, histochemistry, genetics, microscopy. Embalming and preservation ofcadavers
4. Teaching: participate in the teaching and training programmeof undergraduatestudents andinterns.
5. Participate in seminars, symposia, group-discussions and Journalclubs.
6. Educationaltechnology - preparation of Audio-Visual aids for teaching, posters/manuscripts for presentation in conferences/workshops and publication in journals.
7. Participation in formulating evaluation methods: Setting objective questions, Short Answer Questions, Multiple Choice Questions and Objective Structured Practical Examination (OSPE).
8. Prepare teaching modules and museumspecimens.
9. Participation in organization ofsymposia/workshops
10. Explain and interpret normal radiological anatomy and sectional anatomy of thehuman body as studied by various imagingtechniques.
11. Comprehend and demonstrate surface and living anatomy of the humanbody.
12. Relate forensic anatomy to the study with medico-legal aspects of bone in particular.
13. Explain the general principles of Anatomy Act and Organ Transplantation Act.
14. Comprehend ethical aspects of biomedical research
15. Comprehend the basis of disposal of biomedical waste.
16. Comprehend horizontal integration of various subdivisions of anatomy with relevant physiology and biochemistry.
17. **Log Book:** Every student should maintain a logbook in which a record of the practical exercises completed should be entered. The Log books shall be checked and assessed periodically by the faculty members imparting the training.
18. A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination
19. Department should encourage e-learningactivities.

ASSESSMENT

FORMATIVE ASSESSMENT:

Formative assessment should be continual and should assess medical knowledge, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

During the three-year training period,

- A record of all theoretical, practical and experimental work done by the post graduate student and its assessment will be kept and shall be available for examiners at the time of the final practical and viva voce examinations.

- There will be periodical examinations during the course of training. The pre- final theory and practical examination will be conducted by the faculty ofthe concerned college. During last six months the post graduate student will have weeklyassessment tutorials conducted by the faculty. All activities will be evaluated.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advanceslearning**
2. **Patient based /Laboratory or Skill basedlearning**
3. **Self directed learning andteaching**
4. **Departmental and interdepartmental learningactivity**
5. **External and Outreach Activities /CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT:

The summative examination would be carried out as per the Rules giveninPOSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate examination will be in three parts:

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for theTheoryand Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory:

The examinations shall be organized on the basis of ‘Grading’or ‘Marking system’ to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in ‘Theory’ as well as ‘Practical’ separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's trainingperiod**.**

There shall be four theory papers.

Paper I: Gross Anatomy

Paper II: Embryology, Microscopic Anatomy and Genetics

Paper III: Neuroanatomy

Paper IV: Applied Human Anatomy and recent advances in anatomical Sciences

Theory Papers:

PaperI: Gross Anatomy

a. Gross Anatomy of whole human body i.e. upper limb, lower limb thorax, abdomen, pelvis, head andneck

b. Method of preservation of human body and its parts, radiologicalanatomy, sectionalanatomy.

PaperII: Embryology, Microscopic Anatomy andgenetics

a. General Principles of genetics, Cytogenetic as applicable to medicine and different genetic disorders, genetherapy.

b. General Embryology, Systemic Embryology, methods of experimental embryology, clinically oriented embryology andteratology

c. Histology (including fine structure) of tissues and organs of thebody.

d. Principles of light, transmission and scanning electron microscopy, confocal, virtualmicroscopy.

PaperIII: Neuroanatomy

Neuroanatomy - gross and applied aspects

Paper IV: Applied Human Anatomy and recent advances in medical sciences

a. Clinical and applied aspect of Anatomy

b. Recent advances in the application of knowledge of anatomy on human body.

c. Collection, maintenance and uses of stemcells

d. Cryobanking

e. Basics of principles of organ donation from recently deadbodies.

3. Practical: spread over a minimum of 2 days

First Day Practical:

a. GrossAnatomy

Dissection and related viva voce

b. Histology

Spotting (10 spots) and viva voce

Techniques paraffin block making, section cutting. Staining (H and E) stain) with related viva

Second Day Practical:

a. Microteaching of a short topic to assess teaching skills

b. A short synopsis of the thesis work should be presented by the post graduate student

c. Grand viva including Gross anatomy, cross sectional anatomy, radiological Anatomy, Surface Anatomy, Embryology

Practical and Oral/Viva-Voce Examination

Practical Examination to be organized as per details given below:

Dissection on cadaver Histology spotting Histological techniques Surface Marking Radiology

Teaching ability

Thesis presentation

Oral/Viva-voce Examination Grand viva

On dissected parts of the whole human body including nervous system, and Embryology models, teratology, skeletal system including short bones, embalming techniques and genetics, radiographs,

MRI, CT &ultrasonographs.

Recommended reading:

Books (latest edition)

Gross Anatomy:

1. Susan Strandring: Gray's Anatomy: The anatomical basis of clinicalpractice, Churchill LivingstoneElsevier.

2. Dutta A.K. Human Anatomy vol. I-III CurrentPublisher.

3. Dutta A.K. Principle of General Anatomy. CurrentPublisher.

4. Romanes. Cunningham's Manual of Practical Anatomy vol. I-III,Oxford.

5. Keith and Moore Clinical Oriented Anatomy. Lippincot Williamsand Willkins.

6. R.S Snell. Clinical Anatomy by regions. LippincotWilliams andWilkins.

7. J.V. Basmajin. Grant's Method of Anatomy. Williams andWilkins.

8. R.J. Last. Anatomy Regional and Applied. ChurchillLivingston.

9. Lee McGregar. Surgical Anatomy. K.M.Varghese.

10. A.G. R Deckeg, D.J du Pless Lee. Mc Gregor's Synopsis ofSurgical Anatomy. Varghese PublishingHouse.

11. Snell. Clinical anatomy by regions. Lippincotts, Williams andWilkins.

12. S. Chummy Sinnatanmy. Last's Anatomy Regional and Applied.Churchill Livingston.

13. Hollinshed W Henry. Anatomy for surgeons. Vol. I-III Lippincotts, Williams andWilkins.

14. Vishram Singh. Clinical and Surgical Anatomy.Elsevier.

15. Vishram Singh. Textbook of general anatomy.Elsevier.

16. Frank H. Netter. Atlas of Human Anatomy. SaundersElsevier.

Histology:

1. Young B. and Heath J. Wheater's Functional Histology.Churchill Livingstone.

2. M.H. E Ross. Histology: A textbook and atlas. Williams and Wilkins.

3. V. Bharihoke. Text book of human histology. DelhiAITBS.

4. Difiore's. Atlas of histology with functionalco-relation.

5. Bloom and Fawcett. Text book ofhistology.

6. Carlton's. HistologyTechnique.

7. E.C. Clayden. Practical of section cutting andstaining.

8. D W Cormack. Ham's Histology. Lippincotts, Williams andWilkins.

9. Bloom and Fawcett. Textbook ofHistology.

Genetics:

1. J.S Thompson and Thompson. Genetics in medicine. W.B. Saunders and Co. Philadelphia, London.

2. George Fraser and Oliver Mayo. Text book of Human Genetics.Blackwell Scientific Publications London, Oxford Edinburg, Melbourne.

3. Hann Sellwerger and Jame Simpson. Chromosomes of Man.Sparsher's International MedicalPublications.

Embryology:

1. Hamilton, Boyd and Mossman. HumanEmbryology.

2. TWSadler.Langman'sMedicalEmbryology.Lippincotts, Williams and Wilkins.

3. Keith L Moore and T.V.N. Persaud. The Developing Human.Saunders.

4. Rani Kumar. Text book of embryology. I.K. International NewDelhi

Neuroanatomy:

1. Richard S. Snell. Clinical Neuroanatomy for Medical Students. Williamsand Wilkins.

2. A. Parent. Carpenter's Human neuroanatomy. William's andWilkins.

3. Vishram Singh. Clinical Neuroanatomy.Elsevier.

4. A. K. Dutta. Essentials of Neuroanatomy. Current booksinternational.

5. John A. Kiernan. Barr's the human nervous system, Lippincott, Williams and Wilkins.

Statistics:

1. David E. Matthews and Vernon T Farewell. Using and Understanding Medical Statistics Karger.

Radiology:

1. T.B. Moeller et.al. Sectional Anatomy CT and MRI Vol. I, II, III New York. Theme Stuttgart.

2. J.B. Walter et.al. Basic Atlas of Sectional Anatomy withcorrelated imaging. SaundersElsevier.

Surface anatomy:

1. SP John, Lumley editors. Surface Anatomy, The Anatomical basis ofclinical examination. London: ChurchillLivingstone.

2. A. Halim and A.C. Das. Surface Anatomy Lucknow. ASI, KGMC.

Journals:

1. 03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. Physiology
(Programme code – MM-3)
Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHYSIOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of the training in Physiology is to produce experts with necessary knowledge, skills and attitude to impart education and to carry out research in Physiology, be able to serve the community as competent physiologists and render appropriate advice/service to the clinicians as and when it is required.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

Programme Objectives

Goal:

The goal is to have uniform standards in the teaching of Physiology at Postgraduate level throughout the country. The guidelines will help achieving such standards which will in ensure availability of competent physiologists equipped with required skills for teaching and applied research.

Learning Objectives:

A post graduate student having qualified the MD (Physiology) examination should be able to:

- Understand and deal with all aspects of general, systemic and applied Physiology.
- Teach effectively the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) affecting various organ systems and the physiological basis of their management to undergraduate medical, paramedical and all other basic science students.
- Understand general principles of medical education (use of appropriate teaching techniques and resources).
- Explain how the knowledge of physiology can be effectively used in various clinical settings to solve diagnostic and therapeutic problems.

- Interpret and evaluate research publications critically.
- Use the library facilities (Literature database using computer, CD ROM, internet search and any other available newer techniques).
- Conduct relevant clinical/experimental research which may have significant bearing on human health and patient care.
- Interpret the research findings in the light of its basic and applied significance.
- Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering.
- Interact with the allied departments and render services in advanced laboratory investigations.
- Serve as interface with society at large.
- Acquire administrative skills to set up concerned department / laboratories and initiate purchase procedure and procure necessary items for running such laboratories.
- Function as a member of a teaching or research team.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain:

1. Able to teach the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) and their management to undergraduate medical and paramedical students.

2. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.

3. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.

4. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.

5. Contribute to society by imparting physiological understanding of health problems.

6. Plan a research study and conduct basic and clinical systemic investigations.

B. Affective domain

- Demonstrate self-awareness and personal development in routine conduct. (*Self-awareness*)
- Communicate effectively with peers, students and teachers in various teaching-learning activities. (*Communication*)
- Demonstrate

- Due respect in handling human body parts & cadavers during dissection (*Ethics & Professionalism*)
- Humane touch while demonstrating living surface marking in subject/patient (*Ethics & Professionalism*)
- Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
- Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (*Equity and social accountability*)

C. Psychomotor Domain

The student should acquire competencies in the following tasks:

I. Hematology Experiments

1. Estimation of hemoglobin

2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)

3. Determination of Total Leucocytes (WBC) Count: TLC

4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC

5. Determination of Arneth Count

6. Determination of Bleeding Time (BT) and Clotting Time (CT)

7. Determination of Blood groups (A,B,O and Rh system)

8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)

9. Determination of Osmotic Fragility of Red Blood Cells

10. Determination of Platelet Count

11. Determination of Reticulocyte Count

12. Determination of Absolute Eosinophil Count

13. Study of Haemopoietic Cells Present in the Bone Marrow

II. Animal Experiments (All animal experiments must be compliant with Govt. of India Regulations, notified from time to time). Experiments in Amphibian/Dog/Cat should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines.

A. ***Amphibian (Frog) Experiments***

1. Effect of temperature on simple muscle twitch.
2. Effect of two successive stimuli (of same strength) on skeletal muscle.
3. Effect of increasing strength of stimuli on skeletal muscle.
4. Effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Effect of free load and after load on skeletal muscle.
6. Effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study of isometric contraction in skeletal muscle.
8. Determination of conduction velocity of sciatic nerve and effect of variables on it.
9. Properties of cardiac muscle – Refractory period, All-or-None Law, extra-systole and compensatory pause, beneficial effect.
10. Regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Effect of physiological and pharmacological variables on intact frog's heart.
12. Perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.
13. Perfusion of blood vessels in the frog.
14. Capillary circulation (Frog Web).
15. Postural and protective reflex in the frog.

B. ***Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)***

1. General management of mammalian experiments.
2. Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.
3. Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.
4. Effect of stimulation and distension of carotid sinus on blood pressure and respiration.
5. Effect of stimulation of splanchnic nerve.
6. Effect of stimulation of peripheral somatic nerve (sciatic nerve).
7. Study of hypovolemic shock and its reversal.
8. Perfusion of isolated mammalian heart and study the effects of drugs and ions.
9. Recording of Isolated Intestinal movement and tone and studying the effect of drugs and ions.

10. Study of various stages of menstrual cycle, cervical smear and vaginal smear.

Human Physiology

Clinical Physiology

- Physiological principles of clinical examination.
- General Physical examination, physiological basis of some clinical symptoms and signs.
- General principles of Inspection/Palpation/Percussion/Auscultation.

Nerve muscle physiology

- Ergography and hand grip spring dynamography and study of human fatigue.
- Recording of electromyography (EMG) and its application.
- Recording of nerve conduction.

Cardiovascular system (CVS)

- Clinical examination of CVS.
- Examination of arterial & venous pulses.
- Measurements of arterial blood pressure and effect of head-up/head-down tilt.
- Recording of 12 lead Electrocardiography (ECG) and its interpretation.
- Measurement of blood flow.

Respiratory system

- Clinical examination of respiratory system.
- Stethography – study of respiratory movements and effect of various factors.
- Assessment of respiratory functions (spirometry, vitalography, and gas analysis).
  - Measurement of BMR.
  - Cardio pulmonary resuscitation (CPR) and Artificial respiration.

Gastrointestinal system: Clinical examination of abdomen.

Integrative Physiology / Excretory system

- Recording of body temperature/effect of exposure to cold and hot environment
- Studies in stimulated environment - microgravity; high altitude; hot and cold environment.
- Human studies involving sweat, salivation and urine.

Reproductive system

- Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
- Semen analysis: sperm count and motility.

Nervous System including Special senses

- Clinical examination of the nervous system and its physiological basis.
- Examination of higher mental functions.
- Examination of cranial nerves.
- Examination of sensory system.
- Examination of motor system including reflexes.
- Clinical examination of special senses:
  - **(i)** Smell and Taste
  - **(ii)** Test for hearing to deafness
  - **(iii)** Physiology of eye:
    - **(a)** Clinical examination of the eye and pupillary reflex
    - **(b)** Visual acuity
    - **(c)** Perimetery – mapping out of visual field and blind spot
    - **(d)** Accommodation
    - **(e)** Fundoscopy
    - **(f)** Colour vision and colour blindness
- Reaction (visual and auditory) and reflex time.
- Electroencephalography (EEG) and Polysomnography
- Autonomic Nervous System (ANS) Testing.
- Neuro-electrodiagnostic techniques:
  - **(i)** Nerve conduction study.
  - **(ii)** Visual evoked potential (VEP).
  - (iii) Brainstem auditory evoked potential (B.A.E.P).
  - **(iv)** Somato-sensory evoked potential (SEP).
  - **(v)** Motor evoked potential (MEP).

Others

- Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.
- Tests for physical fitness: Cardio – respiratory responses to steady state exercise using
  - **(i)** Harvard step test
  - **(ii)** Bicycle Ergometry
  - **(iii)** Treadmill test for determination of VO_2 max

Syllabus

Course contents:

Paper-I: General and Cellular Physiology including Genetic Basis and Historical perspectives:

- Physiology of cell, various cellular mechanisms and genetic control mechanisms.
- Various principles of Physics and Physical Chemistry involved in physiological phenomenon e.g. haemo-dynamics, bio-electrical potentials, body fluids, methods of measurements.
- History of Physiology.
- Biostatistics, Biophysics, Biochemistry, Micro-anatomy.
- Growth and Development including aging.
- Excretion, pH, water and Electrolyte balance.

Paper-II: Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology.

- Blood and Immunity.
- Cardiovascular System.
- Respiratory System.
- Gastro- Intestinal Tract (GIT) and dietary requirements.

Paper-III: Systemic Physiology (system concerned with procreation, regulation andneural control)

- Nerve-Muscle Physiology including muscle mechanics
- Endocrine Physiology
- Nervous System (Central, peripheral and autonomic)
- Special Senses
- Reproduction & family planning/foetal& neonatal Physiology

Paper-IV: ***Applied Physiology including recent advances***

- Patho-physiology pertaining to systemic Physiology
- Physiological basis of various clinical investigation tests
- Interaction of human body in ambient environment- high altitude, space and deep sea
- Sports physiology
- Yoga and Meditation
- Recent advances relevant to Physiology

- Social responsibilities of physiologists

Departmental resources

It is to be mandatory for the department to establish and develop the following laboratories. In addition to teaching, these laboratories should be involved in active research and in-patient care services in one or more well defined fields.

Clinical Neurophysiology Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- Electroencephalography
- Evoked potential recording
- Electromyography
- Nerve conduction studies
- Autonomic nervous system (ANS) testing
- Any other newer technology

Cardio-Respiratory Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- Electrocardiography
- Blood-gas Analysis
- Computerized multifunctional spirometry
- Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)
- Whole-body plethysmography
- Laboratory for Blood flow measurements (Impedance plethysmograph/Laser flow meter/ Doppler flow meter)

Exercise Physiology Laboratory

The department should generate liaison with ports authorities and clinical departments to provide services for testing and grading exercise and physical efficiency for health monitoring and diagnostics (disease). This should be done by using the following techniques:

(i) Two step test exercisers

(ii) Bicycle Ergometery

(iii) Tread mill

(iv) Respiratory gas analysis and measurement of basal metabolic rate (BMR)

Metabolic/Endocrinology/Reproductive Bio-medicine laboratory

This laboratory should perform various tests pertaining to gastrointestinal, renal, metabolic, endocrinal and reproductive bio-medicine. The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease).

(i) Spectrophotometer

(ii) PH meter

(iii) Elisa Reader/Washer

(iv) Luminometer

(v) Semi-autoanalyzer

Post graduate students should be posted in the above laboratories and extend the required services on routine basis.

The Department should be equipped with general facilities like PG resource room with internet access and a departmental library with books especially those related to pertinent higher studies in Physiology and field of research. The college/department should make important journals available (at least four Indian journals and two international journals).

TEACHING AND LEARNING METHODS

Teaching Methodology

Based on the above laboratory facilities the department can prepare a list of post-graduate experiments pertaining to basic and applied physiology. Active learning should form the mainstay of postgraduate training.

- There should be seminars (at least 30 per year) along with symposia, group-discussions and weekly Journal clubs. Each Journal Club should run for 4 weeks (4 turns) and discuss articles published in indexed journals focusing on their new methodology, interesting results etc. PG student should attend at least six such journal clubs every year.
- The Post graduate student should attend at least, 2 symposia every year and weekly group discussions.
- The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease) and for periodical posting of Physiology PGs in clinical settings.
- The PG students should render special investigative services in their respective area of specialization. In consultation with the concerned clinical departments a 3 month

roaster should be made for the post-graduate students to attend the ward rounds of selected cases of pathophysiologic interest for PG teaching.

- A postgraduate student in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- The PG students should pay formal and scheduled visits to various hospital laboratories of interest for the purpose of learning.
- The student should be trained to generate teaching resource material for UG and develop problem solving modules.
- Department should encourage e-learning activities.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

Rotation:

Each post graduate student should undergo minimum of six terms training spread over a period of 03 years. The postings should be as under: -

- **I semester**: Department of Physiology to cover (i) General aspects of UGteaching, (ii) Selection of thesis topics and collection of relevant references
- **II Semester**: (i) submission of thesis synopsis (ii) Posting in departmental UG

PG laboratories

- **III semester**: Posting in clinical departments: Medicine and allied disciplines.
- **IV, V & VI** semesters: (i) UG-PG teaching (ii) thesis work.

Note: UG, PG teaching and thesis work to continue throughout the course.

- 50% of time during III and IV Semester should be spent in the department of Physiology.

ASSESSMENT

FORMATIVE ASSESSMENT ie., during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly Assessment during the MD training programme should be based on:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in

POST GRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The post-graduate examinations should be conducted in 3 parts:

- **Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

- **Theory Examination**

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be 4 theory papers:

Paper I: General Physiology including history of Physiology

Paper II: Systemic Physiology (system providing transport, nutrition and energy)

Paper III: Systemic Physiology (system concerned with regulation, neural control and procreation)

Paper IV: Applied Physiology including recent advances

- **Practical and oral examination**

Practical examination should be spread over two days and include the following components:

1. Objective Structured Practical Exam (OSPE)/ Spotting
2. Problem solving exercises pertaining to Clinical Physiology
3. Performing and reporting two special laboratory investigations
4. Two animal experiments (one long and one short) illustrating mechanisms, physiological concepts and their applications to humans. (Subject to current regulation of Government of India regarding animal usage). This is optional. It is advisable to use simulated experiments for this purpose.
5. Two human experiments (one long and one short), dealing with clinical physiology as would have significant bearing on human health and patient care.
6. Micro-teaching session for assessing communication skills. Viva-voce examination should include the following components:
   - **(i)** Theoretical discussion (General and systemic Physiology)
   - **(ii)** Teaching techniques
   - **(iii)** Thesis
   - **(iv)** Eminent Physiologists (Foreign/Indian)
   - **(v)** Journals (Indian/Foreign)
   - **(vi)** Recent advances

Recommended Reading

Books (latest edition)

- A.C. Guyton – Text book of Medical Physiology
- W.F. Ganong – Review of Medical Physiology
- Vernon B. Mountcastle– Medical Physiology Vol. I & II
- William's Textbook of Endocrinology
- J.E. Cotes- Respiratory Physiology
- D.T. Harris – Experimental Physiology
- Wintrobe's – Clinical Hematology
- Brown B.L. – Cell signaling, Biology and medicine of signal transudation
- Berne and Levy- Medical Physiology
- Textbook of Medicine by Harrison
- API Textbook of Medicine

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. Biochemistry

(Programme code – MM-4)

Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING FOR MD IN BIOCHEMISTRY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The student who has obtained MD degree in Biochemistry should be well-versed in basic concepts and recent advances in the subject and should have acquired skills and expertise in various laboratory techniques applicable to metabolic and molecular aspects of medicine and in research methodology. Training during the course should equip the student with skills to become an effective teacher, able to plan and implement teaching programmes for students in medical and allied health science courses, set up/manage a diagnostic laboratory, generate, evaluate and interpret diagnostic laboratory data, interact with clinicians to contribute to more effective patient care and carry out a research project and publish its results.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SPECIFIC LEARNING OBJECTIVES

At the end of the MD training programme in Biochemistry, the post graduate student should have acquired competencies in the following areas, as detailed below.

1. **Acquisition of knowledge**

   The student should be able to explain clearly concepts and principles of biochemistry and cell biology, including correlations of these with cellular and molecular processes involved in health and disease.

2. **Teaching and training**

   The student should be able to effectively teach undergraduate students in medicine and allied health science courses so they become competent health care professionals and able to contribute to training of postgraduate post graduate students.

3. **Diagnostic services**

   The student should be able to set up/supervise/manage a diagnostic laboratory in

Biochemistry in a hospital, ensuring quality control, and providing a reliable support service. The student should be able to provide clinicians with consultation services for diagnostic tests in biochemistry and in interpretation of laboratory results.

4. Research

The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

SUBJECT SPECIFIC COMPETENCIES

The student during the training programme should acquire the following competencies:

Cognitive domain

Describe and apply biochemical principles to explain the normal state, abnormal disease conditions and mechanism of action used in the perception, diagnosis and treatment of diseases.

Explain energy transactions in a living system, and describe importance of biomolecules in sustaining the life process.

Describe pathways of the intermediary metabolism along with their individual and integrated regulation and apply that in understanding the functioning of the body.

Describe and apply the concept of nutrition in health and disease, micro- and macro-nutrition and essential nutrients, and interlinks of nutrients with metabolism and functions of a living system.

Apply and integrate knowledge of molecular and metabolic conditions in normal and disease states for clinical problem solving and research

Acquire knowledge on application of various aspects of genetic engineering in medicine

Acquire knowledge and apply the principle of statistics, biostatistics and epidemiology to the evaluation and interpretation of molecular and metabolic disease states.

Evaluate, analyze and monitor disease states by applying relevant biochemical investigations and interpreting the clinical and laboratory data.

Able to integrate principles of immunology in biochemistry.

Demonstrate knowledge of basics of research methodology, develop a research protocol, analyze data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.

Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, prepare modules for PBL, organize and conduct PBLs, case discussions, small group discussions, Seminars, Journal club and research presentations

Demonstrate knowledge of principles of Instrumentation.

Demonstrate knowledge about recent advances and trends in research in the field ofclinical biochemistry.

Affective domain

Effectively explain to patients from a variety of backgrounds, the molecular and metabolic basis of disease states and lifestyle modifications.

Communicate biochemical reasoning effectively with peers, staff and faculty, and other members of the health care team.

Demonstrate empathy and respect towards patients regardless of the biochemical nature of their disease.

Demonstrate respect in interactions with patients, families, peers, and other healthcare professionals.

Demonstrate ethical behavior and integrity in one's work.

Demonstrate effective use of nutrition, lifestyle and genetic counseling.

Be aware of the cost of diagnostic tests and economic status of patients.

Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills and expertise

Psychomotor domain

- Able to select, justify, and interpret the results of clinical tests in biochemistry.
- Develop differential diagnoses for molecular and metabolic causes of diseases.
- Suggest preventive, curative, and/or palliative strategies for the management of disease.
- Predict effectiveness and adverse effects associated with disease intervention.
- Demonstrate skills for clinical diagnosis, testing, understanding of biochemical conditions and diagnostic service.
- Perform important biochemical, immunological and molecular biology techniques.
- Observed working of important advanced techniques.
- Demonstrate standard operating procedures of various methods and techniques used in clinical biochemistry.
- Determination of enzyme activity and study of enzyme kinetics. Ideally it should be accompanied by purification (partial) of the enzyme from a crude homogenate to emphasize the concepts of specific activity, yield and fold purification

- Demonstrate and report routine investigations in hematology and microbiology
- Demonstrate presentation skills at academic meetings and publications.

By the end of the course, the post graduate student should have acquired practicalskills in the following:

- Performance of reactions of carbohydrates, amino acids &proteins and lipids.
- Experiment to demonstrate constituents of milk.
- Experiments to demonstrate normal and abnormal constituents of urine.
- Determination of iodine number and saponification number of fats.
- Estimation of ammonia and amino acids by Sorenson formal titration.
- Estimation of nitrogen estimation in a given amino acid solution by micro Kjeldahl method.
- Estimation of phosphorus by Fiske Subbarao method.
- Estimation of ascorbic acid in lime.
- Estimation of calcium content in milk.
- Estimation of proteins by Folin's method and dye binding method.
- Two-dimensional paper chromatography for separation of amino acids
- Preparation and estimation of starch, glycogen, cholesterol, casein (phosphorus in casein) and hemoglobin from biological samples.
- Determination of enzyme activity and study of enzyme kinetics, using any 2 suitable enzymes (e.g. catalase from rat liver and acid phosphatase from potatoes).
- Estimation of clinical analyses as detailed below:
- Blood glucose, glycated hemoglobin; performance of glucose tolerance test
- Electrolytes, arterial blood gas analysis
- Cholesterol, triglycerides, free fatty acids, phospholipids, Lp (a), urea,creatinine, uric acid, ammonia, microalbuminuria
- Parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time)
- Calcium, magnesium, copper (and ceruloplasmin), serum iron, TIBC and ferritin
- Markers of myocardial damage (CK, CK MB, troponins, LDH)
- Other enzymes of diagnostic relevance (e.g. phosphatases, amylase etc)
- Vitamins D and B_{12} and folate
- Electrophoresis of serum proteins
- Electrophoresis of lipoprotein *(Optional)*

- Electrophoretic separation of LDH isozymes or any other isoenzymes Clearance tests
- CSF analysis
- Thyroid function tests and other hormone assays by ELISA/RIA Preparation of buffers.

Clinical Laboratory

Taking any one parameter, students should prepare a Levy Jennings chart and plot inter-assay and intra-assay variation for the laboratory.

Implementation of Westgard rules.

Optional:

Determination of reference values for any one parameter for the clinical laboratory

In addition, all efforts should be made to ensure that students at least see a demonstration of the following techniques.

- Separation of peripheral blood lymphocytes using FicollHypaque
- Sub-cellular fractionation/marker enzymes for organelles to demonstrate fractionation
- Ultracentrifugation
- Isolation of high molecular weight DNA from tissues/blood
- Isolation of RNA; synthesis of cDNA by reverse transcription; PCR (both conventional and real-time)
- Isolation of plasmids and agarose gel electrophoresis for proteins and nucleic acids
- Basic techniques in cell culture
- High performance liquid chromatography (HPLC)

SYLLABUS

The course contents are outlined below:

Paper I:

Biomolecules, cell biology, biochemical techniques, biostatistics and research methodology, basics of medical education in teaching and assessment of biochemistry.

Biomolecules:

- Properties of water
- Concept of an acid, a base, pH, pK, buffer and buffering capacity
- Classification, structure and functions of amino acids and peptides
- Structural organization of proteins and relationship with their functions
- primary, secondary, tertiary and quaternary structure of proteins
- protein folding and denaturation

- Structure-function relationship of proteins
- Structure and functions of hemoglobin and myoglobin
- Structure and function of collagen
- Structure and function of immunoglobulin
- Classification, properties and importance of lipids
- Fatty acids - nomenclature, classification, properties, reactions
- Mono, di- and triacylglycerols
- Trans fats
- Cholesterol - structure, properties and functions
- Phospholipids - definition, types, properties, s and importance
- Glycolipids - definition, types, functions, examples.
- Lipoproteins - definition, structure, types, functions, role of apoproteins, importance in health and disease.
- Biological membranes - structure, function, properties and importance.
- Micelles and liposomes
- Nucleotides and nucleic acids
- Purine and pyrimidine bases in DNA and RNA
- Nucleosides and nucleotides
- Physiologically important nucleotides
- Synthetic analogues of purine/pyrimidine bases and nucleosides used astherapeutic agents (anti-cancer drugs, anti-viral drugs)
- Watson and Crick model of DNA structure
- Structure and functions of different types of RNA.

Cell biology

- Structure of the cell and different sub-cellular organelles
- Structure and functions of cell membrane, solute transport across biological membranes
- Intracellular traffic and sorting of proteins
- Intracellular signaling pathways, membrane receptors and second messengers Extracellular matrix: composition, importance and biomedical importance, cellular adhesion molecules and intercellular communication
- Cytoskeleton, muscle contraction and cell motility
- Cell cycle, mitosis, meiosis and mechanisms of cell death

- Red and white blood cells

Analytical techniques in biochemistry

- Spectrophotometry (UV and visible spectrophotometry)
- atomic absorption spectrophotometry
- Flame photometry
- Fluorometry
- Turbidimetry and nephelometry
- Gravimetry
- Electrochemistry (pH electrodes, ion-selective electrodes, gas-sensingelectrodes)
- Chemiluminescence
- Water testing
- Electrophoresis (principle, types, applications; isoelectric focusing capillary electrophoresis; 2-D electrophoresis)
- Chromatography (principle, types [including high performance liquidchromatography and gas chromatography])

Techniques in molecular Biology: Blotting techniques, polymerase chain reaction (PCR), DNA and protein sequencing, microarrays and DNA chip technology, cloning techniques, genomics, proteomics and metabolomics

Nanotechnology and microfabrication

Techniques to study in vivo metabolism - NMR, SPECT, PET scans, etc

Radioisotope-based techniques and its applications

Biostatistics and research methodology

- Basic concepts of biostatistics as applied to health science
- Statistical tests: t-test, analysis of variance, chi-square test, non-parametric tests, correlation and regression
- Statistical methods of validation of diagnostic tests
- Basics of epidemiological study designs and sampling methodologies
- Meta-analysis and systematic reviews.

Basics of medical education in teaching and assessment of biochemistry

Principles of adult learning, taxonomy of learning, educational objectives, principles of assessment and question paper setting, methods of assessing knowledge, appropriate use of media, microteaching, small group teaching.

Environmental Biochemistry: Health and pollution.

Paper II:

Enzymes, bioenergetics, biological oxidation, intermediary metabolism and regulation, inborn errors of metabolism and nutrition

Enzymes:

Properties, classification, mechanism of action, coenzymes and cofactors, kinetics of enzyme activity, regulation of enzyme activity, isoenzymes, diagnostic and therapeutic enzymes, principles of assays of enzymes, enzymes as therapeutic targets of drugs.

Biological oxidation

- Basic concepts of thermodynamics and its laws, as applied to living systems,
- Exergonic and endergonic reactions and coupled reactions, redox potential
- High energy compounds
- Classification and role of oxidoreductases
- Cytochromes; cytochrome P450 system

Respiratory chain and oxidative phosphorylation

Components, complexes and functioning of the respiratory chain Process of oxidative phosphorylation

Mechanisms of ATP synthesis and regulation mitochondrial transport systems and shuttles Inhibitors, uncouplers and ionophores OXPHOS diseases

Overview of metabolism and intermediary metabolism

Metabolism of carbohydrates

- Digestion and absorption
- Glycolysis and TCA cycle, including regulation
- Glycogen metabolism and its regulation
- Cori cycle, gluconeogenesis and control of blood glucose
- Metabolism of fructose and galactose
- Pentose phosphate and uronic acid pathways and their significance
- Polyol pathway
- Regulation of blood glucose levels
- Diabetes mellitus (including gestational diabetes mellitus) – classification, pathogenesis, metabolic abnormalities, diagnostic criteria, principles of treatment, pathogenesis of complications, laboratory tests
- Metabolism of ethanol

Metabolism of lipids

- Digestion and absorption, including role of bile salts
- Biosynthesis and oxidation of fatty acids
- Ketone bodies – formation, utilization and regulation
- Metabolism of unsaturated fatty acids and eicosanoids
- Metabolism of triacylglycerol; storage and mobilization of fats
- Metabolism of cholesterol
- Metabolism of lipoproteins
- Metabolism in adipose tissue
- Role of liver in lipid metabolism
- Role of lipids in atherogenesis
- Metabolism of phospholipids and associated disorders

Metabolism of amino acids and proteins

- Digestion and absorption
- Pathways of amino acid degradation - transamination, oxidative deamination
- Transport and metabolism of ammonia
- Metabolism of individual amino acids.
- Plasma proteins

Metabolism of nucleotides

- De novo synthesis of purine nucleotides
- Salvage pathway for purines
- Degradation of purines
- De novo synthesis of pyrimidine nucleotides
- Degradation of pyrimidine
- Synthetic analogues of purine/pyrimidine bases and nucleosides used as therapeutic agents

Metabolism of haem

- Biosynthesis of heme and associated disorders
- Degradation of heme and associated disorders

Metabolism in individual tissues and in the fed and fasting states Liver, adipose tissue, brain, RBCs

Nutrition

- Principal food components
- General nutritional requirements

- Energy requirements
- Biological value of proteins
- Thermogenic effect of food
- Balanced diet, diet formulations in health and disease, mixed diet
- Nutritional supplements
- Food toxins and additives
- Parenteral nutrition
- Disorders of nutrition, obesity, protein and protein energy malnutrition, dietary fibers, under-nutrition, laboratory diagnosis of nutritional disorders
- National Nutrition Programme.

Vitamins

Classification, biochemical role, sources, RDA and deficiency state of each vitamin (including diagnostic tests for deficiency and treatment)

Minerals

Classification, biochemical role, sources, requirement and deficiency state of each mineral (including diagnostic tests for deficiency and treatment)

Metabolism of xenobiotics

Free radicals and anti-oxidant defense systems in the body and associations with disease processes

Paper III:

Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body

Structure and organization of chromosomes and chromatin re-modeling DNA replication

- DNA replication in prokaryotes and eukaryotes (including important differences between the two):
- Roles of DNA polymerase, helicase, primase, topoisomerase and DNA ligase
- Replication fork
- Okazaki fragments and its importance in replication.
- Overview of role of major DNA repair mechanisms – mismatch repair, base excision repair, nucleotide excision repair and double strand break repair.
- Diseases associated with abnormalities of DNA repair systems
- DNA recombination

Transcription

- Structure of a gene - exons and introns, promoter, enhancers/repressors and response elements.
- Process of transcription in prokaryotes and eukaryotes – initiation, elongation and termination (including important differences).
- Post-transcriptional processing – capping, tailing and splicing.

Genetic code and mutations

- Characteristics of the genetic code
- Molecular basis of degeneracy of the genetic code (Wobble hypothesis)
- Mutagens- examples of physical, chemical and biological mutagens.
- Types of mutations – point mutations and chromosomal mutations
- Relationship of mutations with specific diseases

Translation

- Basic structure of prokaryotic and eukaryotic ribosomes.
- Structure of tRNA (diagram of clover leaf model of tRNA structure) and its function in protein synthesis.
- Function of aminoacyl tRNA synthase.
- Process of protein synthesis (translation) – initiation, elongation and termination (including important differences between prokaryotic and eukaryotic translation).
- Inhibition of prokaryotic translation by antibiotics.
- Post-translational modifications

Regulation of gene expression in prokaryotes and eukaryotes

- The operon concept in prokaryotes
- Role of general and gene specific transcription factors
- Small interference RNA (siRNA) and micro RNA (miRNA).
- Other modes of regulation of gene expression: alternative splicing, alternative promoter usage, DNA methylation, Histone acetylation / deacetylation, RNA editing, alterations of RNA stability

Recombinant DNA technology and its applications in modern medicine

- Concepts of recombinant DNA, genetic engineering, biotechnology and cloning.
- Restriction endonucleases.
- Vectors for cloning – plasmids and phages.
- Genomic and cDNA libraries.

- Applications of recombinant DNA technology in medicine.
- Gene therapy
- Diagnosis of genetic diseases and genetic counseling
- DNA fingerprinting
- DNA sequencing
- Microarrays
- Fluorescent in situ hybridization (FISH)
- DNA vaccines
- Transgenic animals
- Application of molecular techniques in forensic investigation and medico-legal cases

Overview of Human Genome Project

Basics of bioinformatics

Principles of human genetics

- Alleles, genotypes and phenotypes
- Patterns of inheritance: monogenic and polygenic inheritance
- Population genetics
- Genetic factors in causation of diseases
- Types of genetic diseases: Chromosomal, monogenic and polygenic disorders, mitochondrial disorders, nucleotide repeat expansion disorders, imprinting disorders
- Screening for genetic diseases and prenatal testing
- Ethical and legal issues related to medical genetics

Stem cells in clinical medicine

- Basic concepts regarding stem cells
- Types of stem cells: embryonic and induced pleuripotent stem cells (IPSC)
- Potential applications in the clinical medicine
- Ethical and legal issues related to use of stem cells in medicine

Cancer

- Carcinogens: physical, chemical and biological
- Clonal origin of cancers
- Genetic basis of carcinogenesis
- Role of oncogenes and tumour suppressor genes
- Familial cancer syndromes

- Cancer stem cells
- Epigenetic regulation in cancer
- Gene expression profiling in cancer
- Cancer cell biology: cell cycle abnormalities, telomerase activity, proliferative capacity and decreased apoptosis
- Metastasis
- Tumor markers
- Biochemical basis of cancer chemotherapy and drug resistance
- New methods of anti-cancer therapy: targeted cancer therapy, cancer immunotherapy.

Immunology

- Innate and acquired immunity
- Humoral and cell-mediated immunity
- Cells and organs of the immune system - T and B cells, macrophages, dendritic cells, NK cells, granulocytes
- Antigens, epitopes and haptens
- Immunoglobulin classes, isotypes, allotypes, idiotypes, monoclonal antibodies, organization and expression of immunoglobulin genes, immunoglobulin gene rearrangement, class switching
- Antigen-antibody interaction - immunochemical techniques
- Major histocompatibility complex, antigen processing and presentation,
- T cell and B cell receptor, toll like receptors
- T cell maturation/activation/differentiation
- B cell generation/activation/differentiation
- Cytokines
- Complement system, cell
- Immune response to infections
- Hypersensitivity reactions
- Vaccines
- Immuno-deficiency syndromes
- Autoimmunity
- Transplantation immunology
- Cancer and immune system,

- Immunodiagnostics
- Immunotherapy

Paper IV

Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry

Basic principles and practice of clinical biochemistry

Units of measure, reagents, clinical laboratory supplies, basic separation techniques, laboratory calculations, specimen collection and processing, safety in the laboratory, clinical utility of laboratory tests (including sensitivity, specificity, ROC curves, etc), analysis in the laboratory, selection and evaluation of methods (including statistical techniques), evidence-based laboratory medicine, establishment and use of reference values, pre-analytical variables and biological variations, quality management, c1inical laboratory informatics

Analytical techniques and instrumentation

Principles of basic techniques used in a clinical biochemistry laboratory (spectrophotometry, electrochemistry, electrophoresis, osmometry, chromatography, mass spectrometry, immunochemical techniques, molecular techniques, automation, point of care testing,

Clinical correlates and analytical procedures

- Amino acids, peptides and proteins; non-protein nitrogenous compounds
- enzymes
- carbohydrates
- lipids, lipoproteins and apolipoproteins and other cardiovascular risk factors
- electrolytes
- blood gases and pH
- hormones and associated disorders
- Catecholamines and serotonin
- vitamins; trace and toxic elements
- hemoglobin, and bilirubin
- Porphyrins and associated disorders
- bone and mineral metabolism
- Tumour markers
- assessment of organ functions (hypothalamus and pituitary, adrenal glands, gonads, thyroid, parathyroid, liver, kidney, heart, stomach, pancreas, intestine, etc) and associated disorders
- pregnancy and maternal and fetal health

- reproduction related disorders – infertility
- newborn screening
- inborn errors of metabolism
- hemostasis
- therapeutic drug monitoring
- clinical toxicology
- molecular diagnostics
- body fluid analyses

Regulation of fluid and electrolyte balance and associated disorders

Regulation of acid-base balance and associated disorders

Biochemistry of the endocrine system

- Classification and general mechanism of action of hormones
- Biosynthesis, secretion, regulation, transport and mode of action of hypothalamic peptides, adenohypophyseal and neurohypophyseal hormones, thyroid and parathyroid hormones, calcitonin, pancreatic hormones, adrenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, parahormones.
- Biochemistry of conception, reproduction and contraception
- Endocrine interrelationship and their involvement in metabolic regulation
- Neuro-modulators and their mechanism of action and physiological significance
- Biochemical aspects of diagnosis and treatment of endocrinal disorders:

Hematopoietic disorders

- Iron deficiency and other hypoproliferativeanemias - iron metabolism, laboratory tests of iron status, iron therapy
- Anemia of chronic disease, anemia of renal disease
- Hemoglobinopathies - sickle cell anemia, methaemoglobinemias, thalassemia syndromes, Megaloblastic anemia
- RBC membrane and metabolism
- Hemolytic anemia - inherited defects in RBC membrane and enzymes (G6PD deficiency), immunologic causes of hemolysis
- ABO blood group system - biochemical basis, transfusion biology.
- Plasma cell disorders - multiple myeloma.

Hemostasis and thrombosis

Biochemical mechanisms, related laboratory tests, antiplatelet/anticoagulant/fibrinolytic therapy

Cardiovascular system

Atherosclerosis - pathogenesis, risk factors, prevention and treatment

Cardiac failure, acute coronary syndrome, cardiac biomarkers

Respiratory system

Gaseous exchange in lungs - physiological features and disturbances, arterial blood gases

Pathogenesis of cystic emphysema, alpha-1 anti-trypsin deficiency

Kidney

Kidney function tests; pathophysiology, biochemistry, laboratory findings and management in acute kidney injury and chronic kidney disease; estimation of GFR; glomerular diseases - pathogenesis and mechanisms of glomerular injury, nephrotic syndrome, diabetic nephropathy; tubular disorders - renal tubular acidosis, proteinuria, nephrolithiasis, kidney transplant; biochemical aspects of renal stones.

Gastrointestinal system

- Gastric physiology
- Pathophysiology of peptic ulcer disease, including role of H. pylori; gastric function tests; Zollinger-Ellison syndrome
- Digestion and absorption of nutrients; evaluation of malabsorption (steatorrhea, lactose intolerance)
- Celiac disease
- Inflammatory bowel disease
- Protein losing enteropathy
- Regulatory peptides in the gut
- Neuroendocrine tumors

Liver

- Liver function tests
- Hyperbilirubinemias
- Viral hepatitis
- Serologic/virologic markers
- Alcoholic liver disease, fatty liver, chronic liver disease, cirrhosis and its complications
- Pathogenesis of ascites
- Hepatic encephalopathy
- Metabolic diseases affecting liver
- Reye's syndrome

- Diseases of gall bladder/bile ducts - pathogenesis of gallstones
- Pancreas - acute and chronic pancreatitis, cystic fibrosis, pancreatic function tests.

Bone and mineral metabolism

Bone structure and metabolism; metabolism of calcium, phosphate and magnesium; regulation and abnormalities of bone metabolism; vitamin D; parathyroid hormone; calcitonin; parathyroid hormone-related (PTHrP); osteoporosis – pathophysiology; markers of bone turnover

Nervous system

- Neurotransmitters and their receptors
- Ion channels and channelopathies
- Neurotrophic factors
- Protein aggregation and neurodegeneration
- Alzheimer's disease, Parkinson's disease, Huntington's disease, multiple sclerosis
- Prions and prion diseases
- Guillain-Barre syndrome – immunopathogenesis
- Myasthenia gravis – pathophysiology
- Hereditary myopathies - Duchenne muscular dystrophy
- Inherited disorders of muscle energy metabolism
- Mitochondrial myopathies
- Pathophysiology of psychiatric disorders such as anxiety, depression and schizophrenia

TEACHING AND LEARNING METHODS

Teaching methodology

Active and interactive learning should be the mainstay of the program. The following methods are to be used to facilitate learning by and training of MD students.

1. **Interactive lectures, tutorials, problem-based learning, case discussions, seminars, guest lectures, E-learning**

The above teaching learning methods should be employed for the post graduate students to acquire updated knowledge on various aspects of basic and clinical biochemistry, immunology and molecular biology, and their application in modern medicine and also to learn to communicate effectively.

2. **Journal club**

Journal club sessions should be used by post graduate students to learn to search medical literature, to learn how scientific data is to be disseminated, to develop skills in presentation of research papers,

to critically analyze and evaluate data, to become familiar with research methodologies, to keep oneself updated on new developments/emerging trends in biochemistry and to learn to communicate effectively

3. Practical exercises

These exercises should be used by post graduate students to equip themselves with knowledge and hand-on skills in various techniques used for laboratory bench-work in biochemistry and molecular biology and in a diagnostic laboratory, and to learn to analyze and interpret data obtained.

4. Thesis

Under the supervision of a Professor or Associate Professor in the Department of Biochemistry, each PG student is expected to generate a hypothesis/research question and design a research protocol to test/answer it. The protocol should have clearly defined objectives and a work plan. The post graduate student will carry out the experimental research work proposed, analyze data, interpret results and write athesis/dissertation based on the work done and results obtained.

5. Presentation of work done on thesis to peers

A post graduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

6. Teaching of undergraduates

Postgraduate students in Biochemistry shall be required to participate in teaching and training programmes of undergraduate students. They should learn how to organize, conduct and co-ordinate UG laboratory teaching in practical classes, to participate in clinical case-based teaching sessions and small group discussions (as part of a team that includes faculty members and senior residents of the department), to develop skills of self-directed learning, effective communication and leadership. They should learn how to work as part of a team and to facilitate learning by students.

7. Horizontal and vertical integration of teaching of Biochemistry with other pre-clinical, para-clinical and clinical departments

The post graduate students should take part in integrated teaching of undergraduates by participation in joint teaching sessions and seminars with different departments, participation in clinical rounds for discussing cases of interest and by small group discussions ofcase-based problems.

8. Training in the basics of medical education and technology

The post graduate students may be provided with training in the basics of medical education and technology through workshops at the departmental and/or institutional level.

9. Development of communication skills

The post graduate students should develop effective communication skills by making presentations at seminars and journal club sessions and by teaching undergraduates.

10. Training in clinical Biochemistry:

The post graduate students should receive hands-on training in a diagnostic laboratory in Biochemistry; such training should be extensive and rigorous enough for each post graduate student to acquire adequate skills and expertise to manage and supervise such a laboratory. The post graduate students should be posted in all sections of the laboratory in the institution, starting from sample collection and processing. They should become proficient in working with the auto-analyzers in the laboratory, in quality control methods, setting up of a clinical biochemistry laboratory, specialized assays and statistical analysis of data. It would also be desirable for them to acquire experience in running a 24-hours diagnostic laboratory; towards this end, it would help if they are posted in the laboratory out of regular hours as well.

11. Rotation in clinical departments

It would be desirable for the post graduate students to be posted in clinical departments after their training period in the diagnostic laboratory, for up to 3 months of the course. Suggested departments and durations of postings are as follows:

General medicine (1 month which includes endocrinology and intensive care units), Hematology (1 month),

Routine Microbiology (1 month),

Pediatrics (10 days)

These postings will help post graduate students get a better perspective on diagnostic tests in clinical practice and will enable them to contribute more effectively to patient care.

12. Log Book

All post graduate students should maintain a log book that documents all the work that they have done during their years of training. This log book should be checked and assessed periodically by the faculty members involved in the training programme.

13. Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance, therefore skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

Formative assessment during the training

FORMATIVE ASSESSMENT, ie., during the training

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning and teaching**
4. **Departmental and interdepartmental learning activity**
5. **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT at the end of training,

The summative examination will be carried out as per the Rules given in:

POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The postgraduate examination shall be in three parts.

1. **Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized post-graduate teacher. The results of the work done shall be written up and submitted in the form of a thesis. The aim of doing a thesis is to contribute to development of aspirit of enquiry, to familiarize the post graduate students with research methodology, literature searches, laboratory techniques, analysis of data, interpretation of results and skills in scientific writing.

The thesis shall be submitted at least six months before the theory and clinical / practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for theory and clinical examinations. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by the examiners.

2. **Theory examination**

The examinations shall be organized on the basis of a ‘Grading’or ‘Marking’ system to evaluate and certify a post graduate student's level of knowledge, skills and competence at the end of the training.

Obtaining a minimum of 50% marks in 'Theory' and 'Practical' examinations separately shall be mandatory for passing the examination as a whole. The examination for MD/MS shall be held at the end of the 3rd academic year.

There shall be 4 theory papers each of three hours duration:

Paper I: Biomolecules, cell biology, biochemical techniques, biostatistics and researchmethodology, basics of medical education in teaching and assessment ofbiochemistry

Paper II: Enzymes, bioenergetics, biological oxidation, metabolism of biomolecules, intermediary metabolism and regulation, inborn errors of metabolism and nutrition

Paper III: Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body

Paper IV: Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry

3. Practical and oral/viva voce examination:

This should be held over two days.

Practical examination

The practical examinations will be held over 2 days; one day will be mainly for the practical exercises and the second day for the oral/ viva voce. The practical examinations will have the following components:-

A. A clinical case for which an actual patient or a paper-based case may be used, as per the facilities available in each institution running the course. The clinical features of the patient and relevant laboratory investigation of biochemical abnormalities present will be discussed

B. Identification the carbohydrate/amino acid provided and confirm of its identity by paper chromatography, Urine analysis.

C. Performance of an electrophoresis for serum proteins and discussion of electrophoretic pattern.

D. Quality Control, its interpretation and Method validation

Viva-voce Examination

E. Thesis presentation (of about 15 mins duration)

F. Pedagogy (20 mins duration plus 10 mins for questions)

Suggested reading material:

Books (latest edition)

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox. W H Freeman & Co (Sd).

2. Biochemistry (Stryer), Jeremy M. Berg , John L. Tymoczko , LubertStryer, W. H. Freeman.

3. Biochemistry (Voet&Voet), Donald Voet , Judith G. Voet, John Wiley & Sons Inc.

4. Textbook of Biochemistry with Clinical Correlations, Thomas M. Devlin, John Wiley & Sons.

5. Kuby Immunology, Judy Owen, Jenni Punt , Sharon Stranford, W. H. Freeman.

6. Clinical Chemistry: Principles, Techniques, and Correlations, Michael L Bishop, Edward P Fody, Larry E Schoeff, Lippincott Williams and Wilkins.

7. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, Carl A. Burtis, Edward R. Ashwood, Saunders.

8. Harpers Illustrated Biochemistry, Victor W. Rodwell , David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil , McGraw-Hill Education / Medical.

9. Biochemistry (Lippincott's Illustrated Reviews), Denise R Ferrier, Lippincott Williams and Wilkins.

10. Harrison's Principles of Internal Medicine, Dennis L. Kasper, Anthony S.Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, Joseph Loscalzo, McGraw-Hill Education / Medical.

11. Davidson's Principles and Practice of Medicine, Walker, Elsevier Health Sciences – UK.

12. Clinical Biochemistry: Metabolic and Clinical Aspects, William J. Marshall &Márta Lapsley & Andrew Day & Ruth Ayling, Imprint - Churchill Livingstone.

13. Biochemistry: A Case-oriented Approach, Rex Montgomery, Thomas W. Conway, Arthur A. Spector, David Chappell, Mosby.

14. Interpretation of Diagnostic tests, Jacques Wallach, Lippincott Williams & Wilkins.

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. Pathology

(Programme code – MM-5)

Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PATHOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize Pathology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in teaching and resultantly creating suitable manpower with appropriate expertise. The post graduate student should be trained in handling and processing histopathology, clinical pathology, microbiology, biochemistry and transfusion medicine samples with knowledge of general principles and methodology.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

The learning objectives in the cognitive, psychomotor and affective domains are:

Cognitive Domain

Diagnose routine and complex clinical problems on the basis of histopathology (surgical pathology) and cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).

Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.

Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.

Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metabolic causes).

Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.

Plan, execute, analyze and present research work.

Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.

Capable of safe and effective disposal of laboratory waste.

Able to supervise and work with subordinates and colleagues in a laboratory.

Affective Domain

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor Domain

Able to perform routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, and staining.

Able to collect specimens by routinely performing non-invasive out-patient procedures such as venipuncture, finger-prick, fine needle aspiration of superficial lumps and bone-marrow aspirates, and provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.

Perform an autopsy, dissect various organ complexes and display the gross findings.

Should be familiar with the function, handling and routine care of equipments in the laboratory.

SUBJECT SPECIFIC COMPETENCIES

Cognitive domain

A post graduate student upon successfully qualifying in the MD (Pathology) examination should have acquired the following broad theoretical competencies and should be:

Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis and overall wellbeing of the ill.

Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.

Capable of pursuing clinical and laboratory-based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

Affective domain

The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.

The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.

The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

Psychomotor domain

At the end of the course, the student should have acquired skills, as described below:

Surgical pathology Skills

Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose at least 80% of the lesions received on an average day from the surgical service of an average teaching hospital.

A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies,

muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.

The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and Co-relate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day.

Be conversant with automatic tissue processing machine and the principles of its running.

Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.

Stain paraffin sections with at least the following:

a. Haematoxylin and eosin

b. Stains for collagen, elastic fibers and reticulin

c. Iron stain

d. PAS stain

e. Acid fast stains

f. Any other stains needed for diagnosis.

Demonstrate understanding of the principles of:

a. Fixation of tissues

b. Processing of tissues for section cutting

c. Section cutting and maintenance of related equipment

d. Differential (special) stains and their utility

Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical data provided.

Demonstrate the understanding of the utility of various immuno-histochemical stains especially in the diagnosis of tumour subtypes.

Cytopathology Skills

Independently prepare and stain good quality smears for cytopathologic examination.

Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.

Independently be able to perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a given case.

Given the relevant clinical data, he/she should be able to independently and correctly:

Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive.

- Demonstrate ability in the technique of screening and dotting the slides for suspicious cells.
- Indicate correctly the type of tumor, if present
- Identify with reasonable accuracy the presence of organisms, fungi and parasites

Hematology Skills

Correctly and independently perform the following special tests, in addition to doing the routine blood counts:

- Hemogram including reticulocyte and platelet counts.
- Bone marrow staining including stain for iron
- Blood smear staining

- Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, etc.
- Hemolytic anemia profile including HPLC, Hb electrophoresis etc.
- Coagulation profile including PT, APTT, FDP.
- BM aspiration and BM biopsy

Demonstrate familiarity with the principle and interpretation of results and the utility in diagnosis of the following:

- Platelet function tests including platelet aggregation and adhesion and PF3 release
- Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III)
- Immunophenotyping of leukemia
- Cytogenetics
- Molecular diagnostics.

Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.

Laboratory Medicine Skills

Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.

Demonstrate familiarity with and successfully perform:

- Routine urinalysis including physical, chemical and microscopic, examination of the sediment.
- Macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
- A complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid.
- Semen analysis.
- Examination of peripheral blood for commonly occurring parasites.

Independently and correctly perform at least the following quantitative estimations by manual techniques and/or automated techniques.

- Blood urea
- Blood sugar
- Serum proteins (total and fractional)
- Serum bilirubin (total and fractional)

Demonstrate familiarity with the following quantitative estimations of blood/ serum by Automated Techniques:

Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOTand SGPT), etc.

Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and buffers.

Explain the principles of Instrumentation, use and application of the instruments commonly used in the labs eg. Photoelectric colorimeter, Spectrophotometer, PH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, flow cytometer, PCR, chemiluminescence.

Transfusion Medicine Skills

The student should be able to correctly and independently perform the following:

Selection and bleeding of donors

Preparation of blood components i.e. Cryoprecipitate, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.

ABO and RH grouping.

Demonstrate familiarity with Antenatal and Neonatal work up.

- Direct antiglobulin test
- Antibody screening and titer
- Selection of blood for exchange transfusion

Demonstrate familiarity with principle and procedures involved in:

- Resolving ABO grouping problems.
- Identification of RBC antibody.
- Investigation of transfusion reaction.

Testing of blood for presence of:

- HBV (Hepatitis B Virus Markers).
- HCV (Hepatitis C Virus Markers)
- HIV (Human Immunodeficiency Virus Testing)
- VDRL
- Malaria

Immunohistochemistry Skills (desirable)

- Be able to perform immuno-histochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.

Syllabus

Course contents:

The study of Pathologic Anatomy includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology. Only the broad outlines are provided.

General Pathology:

- Normal cell and tissue structure and function.
- The changes in cellular structure and function in disease. Causes of disease and its pathogenesis.
- Reaction of cells, tissues, organ systems and the body as a whole to various sub-lethal and lethal injuries.

Systemic Pathology:

The study of normal structure and function of various organ systems and the etiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and functional correlation with clinical features.

Haematology

The study of Hematology includes all aspects of the diseases of the blood and bone marrow. This would involve the study of the normal, and the causes of diseases and the changes thereof.

Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology)

Transfusion Medicine (Blood Banking)

The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields.

i Immunopathology

ii Electron microscopy

iii Histochemistry

iv Immunohistochemistry

v Cytogenetics

vi Molecular Biology

vii Maintenance of records

viii Information retrieval, use of Computer and Internet in medicine.

ix Quality control, waste disposal

It is difficult to give a precise outline of the Course Contents for post graduate training. A post graduate is supposed to acquire not only the professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyze scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. A brief outline of what is expected to be learnt during the MD Course is given under each head.

Surgical Pathology

Knowledge

The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.

Should be able to identify problems in the laboratory and offer viable solutions.

Autopsy Pathology

Knowledge

- Should be aware of the technique of autopsy.
- Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.
- Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions. Correctly identify all major lesions which have **caused, or contributed to the patient'sdeath, on macroscopic examination alone and on microscopy in at least 90% of the autopsies in an average teaching hospital.**
- In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legal autopsies.
- Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.

Cytopathology

Knowledge

Should possess the background necessary for the evaluation and reporting of cytopathology specimens.

Demonstrate familiarity with the following, keeping in mind the indication for the test.

- Choice of site from which smears may be taken
- Type of samples
- Method of obtaining various specimens (urine sample, gastric smear, colonic lavage etc.)
- Be conversant with the principles and preparation of solutions of stains

Hematology

Knowledge

Should demonstrate the capability of utilizing the principles of the practice of Hematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow.

Should be conversant with various equipments used in the Hematology laboratory.

Should have knowledge of automation and quality assurance in Hematology. Correctly plan a strategy of investigating at least 90% of the cases referred for special investigations in the Hematology Clinic and give ample justificationfor each step-in consideration of the relevant clinical data provided.

Laboratory Medicine

Knowledge

Possess knowledge of the normal range of values of the chemical content of body fluids, significance of the altered values and its interpretation.

Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.

- Renal function tests
- Liver function tests
- Pancreatic function tests
- Endocrine function tests
- Tests for malabsorption

Know the principles, advantages and disadvantages, scope and limitation of automation in the laboratory.

Know the principles and methodology of quality control in the laboratory.

Transfusion Medicine (Blood Banking)

Knowledge

- The student should possess knowledge of the following aspects of Transfusion Medicine.
- Basic immunology ABO and Rh groups
- Clinical significance of other blood groups
- Transfusion therapy including the use of whole blood and RBC concentrates
- Blood component therapy
- Rationale of pre-transfusion testing Infections transmitted in blood.
- Adverse reactions to transfusion of blood and components
- Quality control in blood bank

Basic Sciences (in relation to Pathology)

Immunopathology Knowledge

Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.

Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology.

- ELISA techniques
- Radioimmunoassay
- HLA typing

Interpret simple immunological tests used in diagnosis of diseases and in research procedures.

- Immunoelectrophoresis
- Immunofluorescence techniques especially on kidney and skin biopsies
- Anti-nuclear antibody (ANA)
- Anti-neutrophil cytoplasmic antibody (ANCA)

Electron Microscopy Knowledge

Demonstrate familiarity with the principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM and SEM)

Recognize the appearance of the normal sub-cellular organelles and their common abnormalities (when provided with appropriate photographs).

Enzyme Histochemistry Knowledge

Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, and Chloroacetate Esterase).

Immunohistochemistry Knowledge

Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-anti-peroxidase) and AP-AAP (Alk. Phosphatase-anti-Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) systems; employing monoclonal and polyclonal antibodies.

Be aware of the limitations of immuno-histochemistry.

Molecular Biology Knowledge

Should understand the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests.

Should be conversant with the principle and steps and interpretation of Polymerase Chain Reaction (PCR), Western Blot, Southern Blot, Northern Blot and Hybridization) procedures.

Cytogenetics Knowledge

Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridization (FISH).

Tissue Culture Knowledge

Demonstrate familiarity with methods of tissue culture.

Principles of Medical Statistics Knowledge

Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies.

TEACHING AND LEARNING METHODS

Post Graduate Training

Teaching methodology

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied Pathology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem solving modules. Department should encourage e-learning activities.

Rotation:

Postings to laboratories/assignments

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 35 months. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken.

	Section/Subject	Duration in months
1.	Surgical Pathology and Autopsy and Pathology Technique	12
2.	Hematology and Laboratory Medicine	10
3.	Cytopathology	08
4.	Transfusion Medicine/Blood Bank	02
5.	Museum techniques and record management	01
6.	Electron microscopy, Molecular Biology,	0
7.	Research Techniques and cytogenetics etc	02
	Total	**35**

The training programme should be designed to enable the student to acquire a capacity to learn and investigate, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programmes and scheduling of postings must provide the student with opportunities to achieve the above broad objectives. Much of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic department that usually revolves around three equally important basic functions of teaching, research and service. As mentioned earlier, the emphasis recommended under a PG training programme is of learning while serving/working.

The following is a rough guideline to various teaching/learning activities that may be employed.

- Collection of specimens including Fine Needle Aspiration of lumps.
- Grossing of specimens.
- Performing autopsies.
- Discussion during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- Clinico-pathological conferences.

- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club.
- Research Presentation and review of research work.

A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

- Participation in workshops, conferences and presentation of papers etc.
- Laboratory work.
- Use and maintenance of equipment.
- Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules givenin **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

Post Graduate Examination

The Post Graduate examination shall be in three parts: -

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory:

The examinations shall be organized based on 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

Paper I: General Pathology, Pathophysiology, Immunopathology and Cytopathology

Paper II: Systemic Pathology

Paper III: Hematology, Transfusion Medicine (Blood Banking) and Laboratory Medicine

Paper IV: Recent advances and applied aspects

3. Practical /Clinical and Oral/viva voce Examination:

The practical/clinical examination should consist of the following and should be spread over two days.

a. Clinical Pathology:

Discussion of a clinical case history Plan relevant investigations of the above case and interpret the biochemistry findings.

Two investigations should be performed including at least one biochemistry exercise/clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.

b. Hematology:

Discuss hematology cases given the relevant history. Plan relevant investigations Perform complete hemogram and at least two tests preferably including one coagulation exercise

Identify electrophoresis strips, osmotic fragility charts etc. Interpretation of data from auto analyzers, HPLC and flow cytometry.

Examine report and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.

4. Transfusion Medicine:

Perform blood grouping

Perform the necessary exercise like cross matching. Coomb's test, gel cards interpretation.

5. Histopathology:

Examine report and discuss 12-15 cases histopathology and 5-8 cytopathology cases,

given the relevant history and slides.

Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section.

Should be conversant with histopathology techniques including cryostat.

a. Autopsy:

Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in a autopsy case.

6. Gross Pathology

Describe findings of gross specimens, give diagnosis and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners for evaluation.

7. Basic Sciences:

10-15 spots based on basic sciences be included Identify electron micrographs

Identify gels, results of PCR, immunological tests including interpretation of Immunofluorescence pictures.

Identify histochemical and immuno-histochemistry stains Teaching exercise 10 min

All practical exercises are to be evaluated jointly by all the examiners.

An oral question-answer session should be conducted at the end of each exercise.

- Viva on dissertation and research methodology
- General Viva-Voce

Recommended Reading:

Books (latest edition)

- Rosai and Ackerman's Surgical Pathology
- Atlas and Text of Hematology by Tejinder Singh
- Orell's Atlas of Aspiration Cytology
- Lever's Dermatopathology
- Novak's Gynecologic and Obstetric Pathology with Clinical and Endocrine Relations by Edmund R. Novak
- Bone Pathology by H. Jaffe
- MacSween's Pathology of the liver
- Iochim's Lymph Node Pathology
- Text Book on Breast Pathology by Tavasoli
- Text Book on Thyroid Pathology by Geetha Jayaram
- Theory and Practice of Histological Techniques by Bancroft
- Gray's Diagnostic Cytopathology
- Sternberg's Diagnostic Surgical Pathology
- Dacie's Practical Haematology
- Wintrobe's Haematology
- Heptinstall's Pathology of the Kidney
- Enzinger's Soft Tissue Tumours

FACULTY OF MEDICINE

M.D. Microbiology

(Programme code – MM-6)

Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATETRAINING PROGRAMME FOR MD IN MICROBIOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of preparing these Guidelines is to standardize Microbiology teaching at Post Graduate level throughout the country so that it will achieve uniformity in undergraduate teaching as well.

This document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

A post graduate student upon successfully qualifying in the MD (Microbiology) examination should be able to:

- Demonstrate competence as a clinical microbiologist
- Interact effectively with the allied departments by rendering services in basic as well as advanced laboratory investigations
- Demonstrate application of microbiology in a variety of clinical settings to solve diagnostic and therapeutic problems along with preventive measures.
- Play a pivotal role in hospital infection control, including formulation of antibiotic policy and management of biomedical waste.
- Acquire skills in conducting collaborative research in the field of Microbiology and allied sciences.
- Conduct such clinical/experimental research as would have significant bearing on human health and patient care
- Demonstrate effective communication skills required for the practice of clinical microbiology and while teaching undergraduate students
- Establish good clinical microbiological services in a hospital and in the community in the fields of bacteriology, virology, parasitology, immunology and mycology.
- Plan, execute and evaluate teaching assignments in Medical Microbiology.Plan, execute, analyze and present the research work in medical microbiology.
- To acquire various skills for collaborative research.
- To participate is various workshops/seminars/journal clubs/demonstration in the allied departments
- Uphold the prestige of the discipline amongst the fraternity of doctors.

Post-graduate training

The post graduate training should include the following components for a holistic approach.

- Laboratory and Diagnostic skills in Clinical Microbiology

- Teaching Skills
- Research Methodology
- Communication and attitudinal skills

a. Laboratory and Diagnostic skills in Clinical Microbiology:

Based on the available facilities, the department should prepare a list of Post Graduate experiments pertaining to basic, diagnostic and applied Microbiology. Active learning should form the mainstay of the postgraduate training. There should be lectures for the postgraduate students (at least 20 per year) along with seminars/symposia/group discussions and journal clubs. The postgraduate student should also attend a minimum of 20 ward rounds, discuss with the faculty, and maintain a log book for the same. They should be able to render consultative and investigative services in microbiology.

b. Teaching Skills

The Medical Education Department/Unit of the institution should be able to sensitize the postgraduate students in basic concepts of medical education like domains of learning, teaching skills, teaching - learning methods, learning resource material, evaluation techniques etc. The postgraduate students should attend all undergraduate lectures in the subject of Microbiology and participate actively in the undergraduate teaching programme including tutorials, demonstrations and practical.

c. Research Methodology

The postgraduate students should be able to plan, design and conduct research in microbiology, as well as collaborate with other departments, analyze data and become familiar with basic biostatistics. They should also be able to write a research paper. All this can be achieved by writing a thesis on a current and relevant topic in Microbiology.

d. Communication and attitudinal skills

The post graduate student should be able to communicate effectively with patients, their relatives, peers, and consultants for better clinical correlation of laboratory findings as well as research. They should work as an effective team member and leader. They should also demonstrate right kind of attitude while handling clinical material and reports.

SUBJECT SPECIFIC COMPETENCIES

Cognitive Domain:

At the end of the course, the student should have acquired knowledge in the following theoretical competencies:

General Microbiology

(a) Important historical events and developments in microbiology

(b) Basic as well as advanced knowledge in various microscopes and microscopic techniques used in diagnostic microbiology

(c) Various bio-safety issues including physical and biological containment, universal containment, personal protective equipment for biological agents

(d) Various isolation precautions including standard and transmission-based precautions

(e) In-depth knowledge about various method of Sterilization, disinfection and lyophilization

(f) Nomenclature, classification and morphology of bacteria as well as other microorganisms

(g) Various types and significance of normal flora of human body in health and disease states.

(h) Requirements for growth and nutrition of bacteria along with bacterial metabolism

(i) Various types and role of bacterial toxins and bacteriocins

(j) Microbiology of air, milk, water as well as hospital environment

(k) Various types of host-parasite relationship and their significance

(l) Various antimicrobial agents and mechanisms drug resistance

(m) Bacterial genetics, bacteriophages and molecular genetics relevant for medical microbiology

(n) Applications of quality assurance, quality control in microbiology and accreditation of laboratories.

Immunology

1. A Components of immune system, types of immunity (Innate, acquired, mucosal, humoral and cell mediated immunity) and immune response

2. Describes and identifies uses of various antigens, immunoglobulins (antibodies) and antigen and antibody reactions

3. Complement system and Cytokines

4. Various disorders like hypersensitivity, immunodeficiency and auto-immunity involving immune system

5. MHC complex, Immune tolerance, Transplantation and Tumor immunity

- Various types, techniques, advances, and applications of vaccines and immunotherapy
- Measurement of immunological parameters
- Immunological techniques and their applications in diagnostic microbiology as well as research
- Mechanisms and significance of immune-potentiation and immune-modulation

Systemic bacteriology

1. Demonstrate knowledge and skills in various techniques for isolation and identification of bacteria

2. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major bacterial pathogens of medical importance given below-

3. Gram positive cocci including *Staphylococcus*, *Micrococcus,Streptococcus*, anaerobic cocci etc.

4. Gram negative cocci including *Neisseria, Branhamella, Moraxella* etc.

5. Gram positive bacilli including Lactobacillus, Coryneform bacteria, Bacillus and aerobic bacilli, Actinomyces, Nocardia, Actinobacillus and other actinomycetales, Erysipelothrix, Listeria, Clostridium and otherspore bearing anaerobic bacilli etc.

6. Gram negative bacilli including Vibrios, Aeromonas, Plesiomonas,Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas and othernon-fermenters, Pasteurella, Francisella, Bacteroides, Fusobacterium,Leptotrichiaand other anaerobic gram negative bacilli etc.

7. Helicobacter, Campylobacter, Calymmatobacterium, Streptobacillus, Spirillum and miscellaneous bacteria

8. Enterobacteriaceae

9. Mycobacteria

10. Spirochaetes

11. Chlamydia

12. Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasmaand other Mycoplasmas.

13. Rickettsiae, Coxiella, Bartonella etc.

Mycology

1. Explain general characteristics including morphology, reproduction and classification of fungi

2. Demonstrate knowledge and skills for isolation and identification of fungi

3. Explain tissue reactions to fungi

4. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major fungal pathogens of medical importance given below-

- Yeasts and yeast like fungi including Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces etc.
- Mycelial fungi including Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and otherhyalohyphomycetes etc.
- Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffeietc.
- Dermatophytes
- Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis and Otomycosis.
- Pneumocystis jiroveciiinfection
- RhinosporidiumseeberiandLacazialoboi(formerly namedLoboaloboi)
- Pythium insidiosum
- Prototheca
- Able to identify laboratory contaminant fungi
- Explain Mycetism and mycotoxicosis along with agents involved
- Demonstrates knowledge about antifungal agents and perform *in vitro* antifungal susceptibility tests.

Virology

(a) Demonstrates knowledge about general properties, classification, morphology, virus replication and genetics of viruses

(b) Explain pathogenesis of viral infections

(c) Demonstrates knowledge about isolation and identification of viruses

(d) Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major

DNA viruses of medical importance including *Pox virusesHerpes viruses, Adeno viruses, Hepadna virus, Papova viruses* and *Parvo viruses* etc.

(e) Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major RNA viruses of medical importance including *Enteroviruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses, Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human Immunodeficiency Virus, Arbo viruses, Corona viruses, Calci viruses* etc.

(f) Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major *Hepatitis viruses*

(g) Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of unclassified viruses and slow viruses including prions

(h) Demonstrate knowledge about viral vaccines and anti-viral drugs.

Parasitology

(a) Demonstrate knowledge about general characters, classification and methods of identification of parasites.

(b) Demonstrate knowledge about epidemiology, morphology, antigenic nature, life cycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of Protozoan parasites of medical importance including *Entamoeba,Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Microsporidium, Cyclospora Isospora, Babesia, Balantidium,* etc.

(c) Demonstrate knowledge about epidemiology, morphology, antigenic nature, life cycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of helminths of medical importance including those belonging to Cestoda (*Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipyllidium,Multiceps*etc.), Trematoda (*Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus, Clonorchis, Opisthorchis* etc.) and Nematoda(*Trichiuris, Trichinella, Strongyloides, Ancylostoma, Necator, Ascaris,Toxocara, Enterobius, Filarial worms, Dracunculus*etc.)

(d) Demonstrate knowledge about common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis of medical importance.

(e) Demonstrate knowledge about anti-parasitic vaccine and drugs.

Applied Microbiology

(a) Demonstrate knowledge about epidemiology of infectious diseases

(b) Demonstrate knowledge about antimicrobial prophylaxis and therapy

(c) Demonstrate knowledge about hospital acquired infections

(d) Demonstrate knowledge about management of biomedical waste

(e) Effectively investigate an infectious outbreak in hospital and community

(f) Demonstrate knowledge about infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicemia, endocarditis, hemorrhagic fever etc.

(g) Demonstrate knowledge about opportunistic infections

(h) Demonstrate knowledge about various sexually transmitted diseases

(i) Demonstrate knowledge about principles, methods of preparation, administration and types of vaccines

(j) Effectively use information technology (Computers) in microbiology

(k) Demonstrate knowledge and applications of Automation in Microbiology

(l) Demonstrate knowledge and applications about molecular techniques in the laboratory diagnosis of infectious diseases

(m) Demonstrate knowledge in statistical analysis of microbiological data and research methodology

(n) Demonstrate knowledge in animal and human ethics involved in microbiology

(o) Demonstrate knowledge in safety in laboratory and Laboratory management

Affective Domain:

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopts ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and students for effective teaching.

Psychomotor domain:

- Collection/transportation of specimens for microbiological investigations
- Preparation, examination and interpretation of direct smears from clinical specimens
- Plating of clinical specimens on media for isolation, purification, identification and quantification purposes.
- Preparation of stains viz. Gram, Albert's, ZiehlNeelsen (ZN), Silver impregnation stain and special stains for capsule and spore etc.
- Preparation and pouring of media like Nutrient agar, Blood Agar, Mac-Conkey agar, Sugars, Kligler iron agar/Triple sugar iron agar (TSI), Robertson's cooked meat broth, Lowenstein Jensens medium, Sabouraud's dextrose agar etc.
- Preparation of reagents-oxidase, Kovac etc.
- Quality control of media, reagents etc.
- Operation of autoclave, hot air oven, filters like Seitz and membrane filters etc
- Care and operation of microscopes
- Washing and sterilization of glassware (including plugging and packing)

- Care, maintenance and use of common laboratory equipments like autoclave, hot air oven, water bath, centrifuge, refrigerators, incubators etc.
- Aseptic practices in laboratory and safety precautions. Selection of Personal Protective Equipment according to task and donning (gloves, mask, eye protection, gown etc).
- Sterility tests
- Identification of bacteria of medical importance up to species level (except anaerobes which could be up to generic level).
- Techniques of anaerobiosis
- Tests for Motility: hanging drop, Cragie's tube, dark ground microscopy for *spirochaetes*
- Routine and Special tests - Catalase test, Oxidase test, slide and tube coagulase tests, niacin and catalase tests for *Mycobacterium*, bile solubility, chick cell agglutination, sheep cell haemolysis, satellitism, CAMP test, and other biochemical tests.
- Preparation of antibiotic discs; performance of antimicrobial susceptibility testing e.g. Kirby-Bauer, Stoke's method, Estimation of Minimal Inhibitory/Bactericidal concentrations by tube/plate dilution methods.
- Tests for ß-lactamase production.
- Screening of gram-negative isolates for ESBL and MBL
- Screening of *Staphylococci* for Methicillin Resistance.
- Screening of *Enterococci* for Vancomycin resistance.
- Testing of disinfectants.
- Quantitative analysis of urine by pour plate method and semi quantitative analysis by standard loop tests for finding significant bacteriuria
- Disposal of contaminated materials like cultures
- Disposal of infectious waste
- Bacteriological tests for water, air and milk
- Maintenance and preservation of bacterial cultures

Syllabus

Course contents:

Paper I: General Microbiology

- History of microbiology
- Microscopy
- Bio-safety including universal containment, personal protective equipment for biological agents
- Physical and biological containment
- Isolation precautions including standard precautions and transmission based precautions
- Sterilization, disinfection and lyophilization
- Morphology of bacteria and other microorganisms
- Nomenclature and classification of microorganisms
- Normal flora of human body
- Growth and nutrition of bacteria

- Bacterial metabolism
- Bacterial toxins
- Bacteriocins
- Microbiology of hospital environment
- Microbiology of air, milk and water
- Host-parasite relationship
- Antimicrobial agents and mechanisms drug resistance
- Bacterial genetics and bacteriophages
- Molecular genetics relevant for medical microbiology
- Quality assurance and quality control in microbiology
- Accreditation of laboratories

Immunology

- Components of immune system
- Innate and acquired immunity
- Cells involved in immune response
- Antigens
- Immunoglobulins
- Mucosal immunity
- Complement
- Antigen and antibody reactions
- Hypersensitivity
- Cell mediated immunity
- Cytokines
- Immunodeficiency
- Auto-immunity
- Immune tolerance
- MHC complex
- Transplantation immunity
- Tumor immunity
- Vaccines and immunotherapy
- Measurement of immunological parameters
- Immunological techniques
- Immunopotentiation and immunomodulation

Paper II: Systematic bacteriology

- Isolation and identification of bacteria
- Gram positive cocci of medical importance including *Staphylococcus, Micrococcus, Streptococcus, anaerobic cocci* etc.
- Gram negative cocci of medical importance *including Neisseria, Branhamella,Moraxella* etc.

- Gram positive bacilli of medical importance including *Lactobacillus, Coryneform organisms, Bacillus and aerobic bacilli, Actinomyces, Nocardia, Actinobacillus and other actinomycetales, Erysipelothrix, Listeria, Clostridium* and otherspore bearing anaerobic bacilli etc.
- Gram negative bacilli of medical importance including *Vibrios, Aeromonas,Plesiomonas, Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas and other non-fermenters, Pasteurella, Francisella, Bacteroides, Fusobacterium, Leptotrichia and other anaerobic gram-negative bacilli* etc.
- *Helicobacter, Campylobacter, Calymmatobacterium, Streptobacillus, Spirillum* and miscellaneous bacteria
- *Enterobacteriaceae*
- *Mycobacteria*
- *Spirochaetes*
- *Chlamydia*
- *Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.*
- *Rickettsiae, Coxiella, Bartonella* etc.

Mycology

1. General characteristics and classification of fungi

2. Morphology and reproduction of fungi

3. Isolation and identification of fungi

4. Tissue reactions to fungi

5. Yeasts and yeast like fungi of medical importance including *Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces* etc.

6. Mycelial fungi of medical importance including *Aspergillus, Zygomycetes,Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes*etc.

7. Dimorphic fungi including *Histoplasma, Blastomyces, Coccidioides,Paracoccidioides, Sporothrix, Penicillium marneffei*etc.

8. *Dermatophytes*

9. Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis and Otomycosis.

10. *Pythium insidiosum*

11. *Prototheca*

12. *Pneumocystis jirovecii infection*

13. *Rhinosporidiumseeberi and Lacazialoboi (Loboaloboi)*

14. Laboratory contaminant fungi

15. Mycetism and mycotoxicosis

16. Antifungal agents and *in vitro* antifungal susceptibility tests.

Paper III: Virology

(i) General properties of viruses

(ii) Classification of viruses

(iii) Morphology: Virus structure

(iv) Virus replication

(v) Isolation and identification of viruses

(vi) Pathogenesis of viral infections

(vii) Genetics of viruses

(viii) DNA viruses of medical importance including Pox viruses, Herpes viruses, Adeno viruses, Hepadna virus, Papova and Parvo viruses etc.

(ix) RNA viruses of medical importance including Enteroviruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses,

(x) Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human immunodeficiency virus, Arbo viruses, Corona viruses, Calci viruses etc.

- Slow viruses including prions
- Unclassified viruses
- Hepatitis viruses
- Viriods, prions
- Vaccines and anti-viral drugs.

Parasitology

- General characters and classification of parasites.
- Methods of identification of parasites
- Protozoan parasites of medical importance including *Entamoeba, Free livingamoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Microsporidium, Cyclospora Isospora, Babesia, Balantidium,* etc.
- Helminthology of medical importance including those belonging to Cestoda (*Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipyllidium, Multiceps* etc.), Trematoda (*Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides,Paragonimus, Clonorchis, Opisthorchis* etc.) and Nematodaetc.
- Entomology: common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis.
- Anti-parasitic agents.

Paper IV: Applied Microbiology

- Epidemiology of infectious diseases
- Antimicrobial prophylaxis and therapy
- Hospital acquired infections
- Management of biomedical waste
- Investigation of an infectious outbreak in hospital and community
- Infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicemia, endocarditis, hemorrhagic fever etc.
- Opportunistic infections
- Sexually transmitted diseases

- Vaccinology: principles, methods of preparation, administration of vaccines, types of vaccines
- Information technology (Computers) in microbiology
- Automation in Microbiology
- Molecular techniques in the laboratory diagnosis of infectious diseases
- Statistical analysis of microbiological data and research methodology
- Animal and human ethics involved in microbiological work.
- Safety in laboratory and Laboratory management

TEACHING AND LEARNING METHODS

The training programme should be designed to enable the student to acquire a capacity to learn and investigate, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programme and scheduling of postings must provide the student with opportunities to achieve the above broad objectives. Much of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic department that usually revolves around three equally important basic functions of teaching, research and service. As mentioned earlier, the emphasis recommended under a residency programme is of learning while serving/working.

Post Graduate Training programme

Teaching methodology

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied microbiology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem-solving modules.

Rotation:

Postings to laboratories/assignments

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 35 months. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken.

Suggested schedule of rotation:

Within Department

- Bacteriology
- Mycobacteriology
- Serology/Immunology
- Mycology
- Virology

- Parasitology
- Media preparation

Other Departments

- Clinical Pathology
- Clinical Biochemistry
- Skin & VD
- ICTC & RNTCP

Practical training

Practical training should be imparted by posting the students in various sub-specialties (sections) as detailed in the intrinsic and extrinsic rotation. The student should be actively involved in day to day working of all the sections. He/she should be trained under the guidance of teachers in all the aspects of Clinical Microbiology and applied aspects of laboratory medicine including collection and transport of specimens, receiving of samples, preparation of requisite reagents, chemicals, media and glassware, processing of specimens, performing required antimicrobial susceptibility testing and reporting on the specimens, interpretation of results, sterilization procedures, bio-safety precautions, infection control practices, maintenance of equipments, record keeping and quality control in Microbiology.

Skills & performance

The student should be given graded responsibility to enable learning by apprenticeship. The faculty throughout the year should assess performance of the student in skills. Area of improvement/remarks should be mentioned for the skill and student should be re-assessed for the skills which are not acquired. To go to the next level, it should be mandatory for the student to acquire lower level skills satisfactorily, i.e only on satisfactory completion of assisted/performed with assistance skills should the student be permitted to perform the skill independently.

Emergency duty

The student should be posted for managing emergency laboratory services in Microbiology. He/she should deal with all the emergency investigations in Microbiology.

Training in research methodology

Training in research methodology should be imparted by planning of a research project by the student under the guidance of a recognized guide to be executed and submitted in the form of a thesis.

The thesis is aimed at training the post graduate student in research methods and techniques. It should include identification of a research question, formulation of a hypothesis, search and review of relevant literature, getting acquainted with recent advances, designing of research study, collection of data, critical analysis of the results and drawing conclusions. The thesis should be completed and submitted by the student six months before appearing for the final university examination.

Communication and attitudinal skills

Post-graduate student is expected to imbibe professional attributes of honesty, integrity, accountability, honor, humanism and excellence and demonstrate the same in the day-by-day conduct and dealings with the teacher, peers, the nursing and paramedical staff and most-

importantly patients. To ensure that student is able to acquire these attributes, their personal conduct should be keenly observed by the teachers and student should be counselled as and when required. Personal attributes of the student should be regularly assessed by peers, senior, and junior students and Head of the Unit/ In charge.

The following is a rough guideline to various teaching/learning activities that may be employed:

1. Collection of specimens, smear examination, culture and sensitivity analysis

2. Discussion during routine activities such as during signing out of cases.

3. Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.

4. Clinico-microbiological conferences, active involvement with hospital infection control committee

5. Intradepartmental and interdepartmental conferences related to case discussions.

6. Conferences, Seminars, Continuing Medical Education (CME) Programme.

7. Journal Club.

8. Research Presentation and review of research work.

9. A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

10. Participation in workshops, conferences and presentation of papers etc.

11. Laboratory work.

12. Use and maintenance of equipment.

13. Maintenance of records. **Log books** should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.

14. Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

15. Department should encourage e-learning activities.

a. **During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., assessment during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The

Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD programme should be based on:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning and teaching**
4. **Departmental and interdepartmental learning activity**
5. **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in

POST GRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The post-graduate examinations should be in three parts:

Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the

post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

The examinations shall be organized on the basis of ‘Grading’ or ‘Marking system’ to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in ‘Theory’ as well as ‘Practical’ separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

There should be four theory papers:

Paper I: General Microbiology and Immunology

Paper II: Systematic Bacteriology

Paper III: Virology Parasitology and Mycology

Paper IV: Applied Microbiology and Recent advances

Practical and Oral/viva voce Examination

Practical should be spread over **two** days and include the following components:

Bacteriology:

1. Identification of a pure culture.
2. Isolation and Identification of Bacteria from Clinical Samples

Serology:

Common Serological Tests like ELISA/VDRL/Widal/Brucella Agglutination test etc.

Virology:

1. Preparation of tissue cultures
2. Virus Titration
3. Haemagglutination and its inhibition test
4. Virus Neutralization Test
5. Other rapid tests for diagnosis of viral infections

Mycology

1. Identification of fungal cultures
2. Slide culture techniques
3. Examination of histopathology slides for fungi

Parasitology

1. Processing and Identification of ova and cysts in stool samples
2. Amoebic Serology
3. Microscopic Slides
4. Examination of histopathology slides for parasites
5. Spots: 10 spots

Oral/Viva-Voce Examination:

This must include a component of teaching session of not more than 15 minutes duration.

Recommended Reading:

Books (Latest edition)

- Forbes B, Sahm D, Weissfeld A. Bailey and Scott's Diagnostic Microbiology, Mosby, St. Louis.
- Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn WC. ColorAtlas and Textbook of Diagnostic Microbiology, J.B. Lippincott, Philadelphia.
- Murray PR, Baron EJ, Pfaller MA, Tenover FC, Yolken RH. Manual of ClinicalMicrobiology, American Society for Microbiology.
- Garcia LS, Bruckner DA. Diagnostic Medical Parasitology, American Society for Microbiology.
- Wiedbrauk DL, Johnston SLG. Manual of Clinical Virology, New York, Raven Press.
- Bailey and Scott's Diagnostic Microbiology.

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. Pharmacology

(Programme code – MM-7)

Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHARMACOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Pharmacology consists of both the experimental (basic) and clinical sciences. Experimental pharmacology is essential to understanding of drug action in diseases as well as for the pharmaceutical industry for drug discovery and development. Clinical pharmacology is essential for prescribing practice in medicine, adverse drug reactions, clinical trial and pharmacovigilance. The job prospects for a medical pharmacologist are in academics, pharmaceutical industry/clinical research organization, government research institutions, in regulatory bodies and as scientific writer or science manager. Accordingly, a post graduate (MD) student in Pharmacology should be competent to meet the job requirements at all these places.

The applied nature of the discipline, the move towards integrated course structures, the widening of discipline boundaries and increasing number of students seeking post graduation degree raise issues concerning maintaining and improving competency as along with maintenance of academic standards. These issues also necessitate integration with other biomedical and clinical disciplines. A pragmatic approach to postgraduate pharmacology teaching in India is an important step towards addressing the aforesaid challenges and facilitating a fresh curriculum design.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of the MD training programme in Pharmacology, the student should acquire competencies in the following areas:

Acquisition of knowledge

The student should be able to explain clearly concepts and principles of Pharmacology and therapeutics. The student should also be able to explain the drug development processes. S/he should be able to explain Drugs and Cosmetics Act, in addition to clinical trial procedures.

Teaching and training

The student should be able to effectively teach undergraduate students in medicine (MBBS) and allied health science courses (Dentistry and Nursing) so they become competent healthcare professionals and able to contribute to training of postgraduate trainees.

Research

The student should be able to carry out a research project (both basic and clinical) from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

SUBJECT SPECIFIC COMPETENCIES

The student during the training program should acquire the following competencies:

Cognitive domain

(a) Describe and apply pharmacological principles to explain the mechanism/s of the effects of drugs used in diagnosis, prevention and treatment of diseases of all systems of human body.

(b) Explain pharmacodynamics and pharmacokinetics of drugs.

(c) Describe mechanisms of drug-drug interactions and their clinical importance.

(d) Apply and integrate knowledge of pathophysiology of diseases and its modulation by drugs.

(e) Acquire knowledge on pharmacogenetics and pharmacogenomics

(f) Acquire knowledge on principles of Pharmacoeconomics

(g) Acquire knowledge on pharmacoepidemiology, including drug utilization studies.

(h) Acquire knowledge and understanding of principles of Good clinical practice (GCP) and Good laboratory practice (GLP) guidelines

(i) Acquire knowledge on essential medicines

(j) Acquire knowledge on pharma covigilance

(k) Acquire knowledge and apply the principle of biostatistics in the evaluation and interpretation of drug safety and efficacy studies

- Describe how to evaluate, analyze and monitor preclinical and clinical data in drug discovery.
- Able to integrate principles of immunology in biochemistry.
- Demonstrate knowledge of basics of research methodology, develop a research protocol, conduct the study, record experimental observations, analyze data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
- Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, modules for problem-based learning (PBL), case discussions, small group discussions, seminars, Journal club and research presentations
- Demonstrate knowledge about computer assisted learning (CAL) software and ability to use them efficiently to promote learning of pharmacology.
- Demonstrate knowledge of principles of Instrumentation.
- Demonstrate knowledge about recent advances and trends in research in the field of pharmacology and clinical pharmacology.
- Acquire knowledge on generic drugs and generic prescription.
- Acquire knowledge on rational use of drugs and prescription auditing
- Acquire knowledge about antimicrobial stewardship programs and strategies for containment of antibiotic resistance
- Acquire knowledge on animal toxicity studies

- Acquire knowledge on common poisoning
- Acquire knowledge on the legal and ethical issues involved in drug development and research.
- Acquire knowledge in Biostatistics including use of statistical software: Estimation Sample size for a clinical trial Scales of measurement, data display, measures of central tendency (mean, median, mode) Dispersion of data (variance, standard deviation) Selection of tests (of significance) and their applicability Correlation and regression analysis Basics of systematic reviews and meta-analysis

Affective domain

1. Effectively explain to patients, the effects and side effects of drugs, including the need for medication adherence.
2. Communicate effectively with pharmacological reasoning with students, peers, staff and faculty, and other members of the health care team on rational use of drugs and improving spontaneous reporting of adverse events.
3. Demonstrate respect in interactions with peers, and other healthcare professionals.
4. Demonstrate ethical behavior and integrity in one's work.
5. Demonstrate ability to generate awareness about the use of generic drugs in patients.
6. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills, expertise and perpetual professional development.

Psychomotor domain

1. Able to predict efficacy and adverse effects associated with use of drugs, along with causality assessment.
2. Demonstrate skills for prescription writing.
3. Perform major *in vivo* and *in vitro* animal experiments.
4. Observe and understand basic principles of working of important advanced techniques, like High Performance Liquid Chromatography (HPLC).
5. Demonstrate standard operating procedures of various methods and techniques used in clinical trials and research.
6. Determine levels of common poisons in blood
7. Demonstrate presentation skills at academic meetings, publications and writing research projects for funding agencies.
8. Be able to analyze and evaluate a research paper

By the end of the course, the trainee should have acquired practical skills in the following:

1. *In vivo* and *ex vivo* experiments, like organ bath, analgesiometer, physiography/polygraph, convulsiometer, plethysmograph, learning and memory, models for affective disorders.
2. Administration of drugs by various routes (subcutaneous, intravenous, intraperitoneal) in experimental animals
3. Collection of blood samples and oral gavage in experimental animals
4. Preparation and administration of a drug solution in appropriate strength and volume
5. Experiments to show dose response curve of agonists (in the presence or absence of an antagonist) on various biological tissues, like

- Isolated rabbit/rat/ guinea-pig intestine
- Isolated rat uterus

6. Determination of EC50, ED50, pD2 and pA_2 values of drugs

7. Perform in vivo experiments to study effect of mydriatics and miotics on rabbit eye.

8. Perform in vivo experiments to study effect of antiepileptic drugs using animal models of epilepsy.

9. Perform in vivo experiments to study effect of analgesics using animal models of analgesia

10. Perform in vivo experiments to study effects of drugs on learning, memory and motor coordination

11. Estimate toxic drug levels using chemical and biological tests (alkaloids, glycosides, steroids, barbiturates, salicylates) by commonly used methods)

12. Clinical pharmacology

i Prepare protocol for a clinical trial

ii Prepare Informed consent form and participant information sheet for research involving human participants

iii Report Serious Adverse Effect (SAE)

iv Evaluate promotional drug literature

v Prepare "Drug Information Sheet" (WHO criteria)

vi Interpret bioavailability parameters with the help of given pharmacokinetics data

vii Perform causality assessment and report ADR as per Pharmacovigilance Programme of India (PvPI)

Animal Experiments: All animal experiments must be compliant with Govt. of India regulations, notified from time to time. Amphibian/Dog/Cat experiments should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines

Syllabus

The **course contents** should cover the following broad topics:

(a) Basic and molecular pharmacology

(b) Drug receptors and Pharmacodynamics

(c) Pharmacokinetics (Absorption, Distribution, Metabolism and Excretion)

(d) Biotransformation

(e) Pharmacogenomics and Pharmacogenetics

(f) Autonomic Pharmacology

(g) Drugs acting on Smooth muscles

(h) Clinical pharmacology

(i) Drug development and Regulations

(j) Clinical Pharmacokinetics

(k) Drugs acting on Synaptic and Neuroeffector Junctional sites

(l) Drugs acting on Central Nervous System (Sedative, Hypnotics, Antiepileptics, General Anesthetics, Local Anesthetics, Skeletal Muscle Relaxants, Antipsychotic,

Antidepressants, Drugs used in Parkinson's disease and other neurodegenerative disorders, opioid agonists and antagonists, Drugs of abuse)

- Drugs modifying renal function
- Drugs acting on cardiovascular system and haemostatic mechanisms (Antihypertensives, Antianginal, Antiarrhythmics, Drugs used in heart failure, Drugs used in Dyslipidemias, Fibrionolytics, Anticoagulants, Antiplatelets
- Reproductive Pharmacology
- Agents effecting calcification and bone turnover
- Autacoids and related pharmacological agents (NSAIDs) and drugs used in Rheumatoid arthritis and Gout
- Gastrointestinal drugs
- Pharmacology of drugs affecting the respiratory system (drugs used in Bronchial Asthma and COPD)
- Antimicrobial, antiparasitics, disinfectants, antiseptics
- Chemotherapy of neoplastic disease
- Antiviral drugs
- Drugs used in Autoimmune disorder and Graft versus Host Disease)
- Dermatological pharmacology
- Ocular pharmacology
- Use of drugs in pregnancy
- Perinatal and Pediatric Pharmacology
- Geriatric Pharmacology
- Immunomodulators - immunosuppressants and immunostimulants
- Pharmacology of drugs used in endocrine disorders (drugs used in diabetes mellitus, hypothalamic and pituitary hormones, thyroid and antithyroid drugs, adrenocorticoid hormones and their antagonists, gonadal hormones and their inhibitors)
- Drug delivery systems
- Heavy metal poisoning
- Non-metallic toxicants - air pollutants, pesticides etc.
- Research methodology and biostatistics
- Literature search.
- Pharmacogenomics, Pharmacovigilance (ADR reporting), pharmacoeconomics (cost-effectiveness study) and pharmacoepidemiology
- Over the counter drugs
- Dietary supplements and herbal medicines
- Pharmacometrics - methods of drug evaluation.
- General screening and evaluation of:
- **A**nalgesics, antipyretics, anticonvulsants, anti-inflammatory drugs,antidepressants, antianxiety and antipsychotics, sedatives, muscle relaxants, antihypertensives,

hypocholesterolaemic agents, anti-arrhythmics, diuretics, adrenergic blocking drugs

Drugs used in peptic ulcer diseases/Prokinetic agents/ antiemetics Antitussives, /anti-asthma agents Local Anaesthetics Oxytocics, antifertility agents Antidiabetics Behavioral pharmacology models and evaluation of drugs affecting learning and memory

Bioassays

Bioassay methods

Animal experiments: Ethical considerations, ethical approval, applicable regulatory Guidelines (CPCSEA), humane animal research (principles of 3Rs) and alternatives to animal experimentation. General and statistical considerations Anesthetics used in laboratory animals

Principles of EC50, ED50, pD2 and pA_2 values of drugs Describe methods of bioassay for estimation of:

Acetylcholine, skeletal neuromuscular junction blockers, adrenaline, noradrenaline, histamine, 5 HT, hormones, insulin, vasopressin/oxytocin, estrogen, progestins, ACTH

Competitive antagonism - pA_2 values

Immunoassays: Concept, types of bioassays and their application/s

Animal experiments: Ethical consideration, ethical approval Regulatory Guidelines (CPCSEA) and alternatives to animal Experimentation

Biochemical Pharmacology

Basic principles and applications **o**f simple analytical methods

Principles of quantitative estimation of drugs, endogenous compounds and poisons using Colorimetry, Spectrophotometry, flame photometry, High Performance Liquid Chromatography (HPLC) and enzyme-linked immunosorbent assay (ELISA).

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

Teaching methodology

Learning in a PG program is primarily self-directed and in Pharmacology consists of laboratory and academic work. The formal sessions are merely meant to supplement thiscore effort. Acquisition of practical competencies thus becomes the cornerstone of postgraduate medical education in Pharmacology.

Formal teaching sessions

In addition to laboratory work, at least 6-hr of formal teaching per week is necessary. The departments may select a mix of the following sessions:

- **Journal club** **Once a week**
- **Seminar** **Once a week**
- **Practical** **Once a week**
- **Group Discussions** **Once a week**
- **Case discussions** **Once a month**
- **Interdepartmental case or seminar** **Once a month**

Note: These sessions may be organized as an institutional activity for allpostgraduates.

Attend accredited scientific meetings (CME, symposia, and conferences).

A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

Additional sessions on basic sciences, biostatistics, and research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to experimentation are suggested.

There should be a training program on Research methodology for existing faculty to build capacity to guide research and for keeping abreast with rapidly evolving methods and techniques in related disciplines.

The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

Log book: During the training period, the post graduate student should maintain aLog Book giving details of experimentation done and skills acquired. The log book shall be used to aid the internal evaluation of the student. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

Department should encourage e-learning activities.

The postgraduate student in M.D (Pharmacology) shall undergo a 3 - year (6 terms of 6 months each) training that will comprise of the following:

Theory: (lectures, seminars, group discussion, journal club) (at least 6 hours a week, daily 2 hours for 3 days)

Rotation:

Practical training in the following suggested areas: (8 hours a week, daily 4 hours for 2 days)

Experimental Pharmacology:

In vitro (including bioassays), *in vivo* (including common methods of drugevaluation) experiments, computer simulations and toxicity tests

Chemical Pharmacology:

Identification of drug/toxin by using chemical, biological and analytical tests. Quantitative estimation - Use of colorimeter, spectrophotometer and/or other advanced analytical equipments

Clinical Pharmacology:

- Evaluation of drugs in healthy volunteers as well as patients
- Critical evaluation of drug literature, pharmacoeconomics, pharmacovigilance and pharmacoepidemiology.
- Thesis on a suitable problem
- Training in undergraduate teaching
- Computer training

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT i.e., assessment during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The post graduate examination shall be in three parts**:**

Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory examination:

The examinations shall be organized on the basis of ‘Grading’or ‘Marking system’ to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in ‘Theory’ as well as ‘Practical’ separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

Paper I: General Pharmacology

Paper II: Clinical Pharmacology

Paper III: Systemic Pharmacology

Paper IV: Recent Advances in Pharmacology

Practical/clinical and Oral/viva voce examination Practical:

Long Experiment:

Demonstrating effects of drugs/interpretation of results in anesthetized animal Table exercise - Examples are given below:

(a) Calculating pharmacokinetic parameters

(b) Statistical exercise

(c) Critical appraisal of a published paper (abstract writing of a published paper)

(d) Evaluation of drug literature.

- **(i)** Protocol designing
- **(ii)** ADR reporting and causality assessment
- **(iii)** Assessment of preclinical toxicity data
- **(iv)** Analysis of rational and irrational formulations

Short experiment

a. Isolated tissue experiment (Bioassay of drugs) (as per Govt regulations)

Or

b. *In vivo* experiment

Spotting exercises : Various drug delivery systems, inhalers, insulin syringe, drip chamber, various tablets, etc.

Oral/Viva voce Examination

- Microteaching (teaching exercise)
- Discussion on dissertation
- Principles of general and systemic pharmacology
- Recent advances in pharmacology & drug therapy

Recommended Reading Material

Books (latest edition)

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics, ed. Laurence Brunton, Bruce A. Chabner, Bjorn Knollman.

2. Essentials of Medical Pharmacology, by KD Tripathi

3. Basic and Clinical Pharmacology, by Bertram G. Katzung and Anthony J. Trevor

4. Drug Discovery and Evaluation: Pharmacological Assays Editors: Vogel, Hans Clinical Pharmacology by Laurence, Bennett and Brown

5. Rang and Dale's Pharmacology by H.P. Rang

6. Koda Kimble and Youngs Applied Therapeutics by Brian K Alldredge and Robin L Corelli

Journals

03-05 international Journals and 02 national (all indexed) journals

59. Genetics in Medicine – J. S. Thompson and M.W. Thompson.

60. Research – How to plan, speak and write about it – C. Hawkins and M. Sorgi.

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.S. Otorhinolaryngology

(Programme code – MM-18)

Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS ENT is to standardize Otorhinolaryngology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent ENT Surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of postgraduate training the student should be able to:

1. Practice his specialty ethically keeping in mind the requirement of the patient, community and people at large.
2. Demonstrate sufficient understanding of basic sciences related to his specialty and be able to integrate such knowledge in his Clinical practice.
3. Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations)
4. Plan and advice measures for the promotive, preventive, curative and rehabilitative aspects of health and diseases in the specialty of ENT.
5. Should be able to demonstrate his cognitive skills in the field of ENT and its ancillary branches during the formative and summative evaluation processes.
6. Play the assigned role in the implementation of National Health Programs
7. Demonstrate competence in basic concepts of research methodology and writing thesis and research papers.
8. Develop good learning, communication and teaching skills.
9. Demonstrate sufficient understanding of basic sciences and the clinical applications related to the specialty to be able to integrate this knowledge into Clinical practice.Acquire in-depth knowledge in the subject including recent advances.
10. Demonstrate that he is fully conversant with the latest diagnostics & therapeutics available.

SUBJECT SPECIFIC LEARNING OBJECTIVES

1. **Theoretical Knowledge:**

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to ENT and be able to integrate such knowledge in his clinical practice. She/He should acquire in-depth knowledge of his subject including recent advances. She/He should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

2. **Clinical / Practical skills:**

A student should be adept at good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumber puncture etc. She/he should be able to choose the required investigations to enhance the attitude, communication skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and

therapeutic techniques in the subject of ENT.

3. Research:

She/He should know the basic concepts of research methodology plan a research project, plan and write a thesis and should know how to use library facilities. Basic knowledge of statistics is also required. Knowledge about use of internet resources is required.

4. Teaching:

The student should learn the basic methodology of teaching and assessment and develop competence in teaching medical/paramedical students and their assessment.

SUBJECT SPECIFIC COMPETENCIES

Cognitive Domain

At the end of training, the student should be able to demonstrate ability to practically apply knowledge gained during training period. This would include the following:

Basic Sciences related to Otolaryngology

Physiology- Mechanism of perception of smell and taste, mechanism of breathing and voice production, lacrimation, deglutition and salivation. Functional tests of the nose and paranasal sinuses, mechanism of cough and sneezing.

Physics of sound, theories of hearing, mechanism of perception of sound and speech production, physiology of equilibrium and cerebral function. Physiology of brain in connection with hearing, speech, smell and phonation. Audiologic tests like audiometry, impedance, evoked potentials, OAE, Speech audiometry.

Physiology of larynx, trachea-bronchial tree and oesophagus - Histology of mucous membranes, internal ear and other associated organs and structures, nose, PNS NPx, Larynx, Tracheo-Bronchial tree, Lymphoepithetical system. Mechanism of immune system/immunology and genetics.

Anatomy-Embryogenesis of ear, nose and throat including palate and the larynx, Oesophagus, trachea and lungs, tongue, salivary gland Head and Neck and skull base etc.

Para pharyngeal spaces in the neck including connective tissue barriers of larynx. Applied anatomy of the skull bones, accessory sinuses, external, middle and inner ears, nose, PNS, nasopharynx, meninges, brain, pharynx, larynx, trachea and bronchi, lungs, pleurae, oesophagus and the mediastinum.

Anatomy of all cranial nerves with their functions.

Principles and Practices of Otolaryngology, Audiology and Speech Pathology

Clinical Methodology as applied to ORL HN diseases in adult and children and the accessory sinuses, diagnosis and surgical treatment of diseases of nose, throat and ear in adult and children. Prevention

and treatment, infectious diseases of Otolaryngology and Head Neck region. Circulatory and nervous disturbances of the nose, throat and ear and their effects on other organs of the body.

Deformities, injuries sinus infections, polyps and the tumors of the nose, and paranasal sinuses.

Examination of the ear, deafness and allied diseases, complications of diseases of the ear. Injuries, tumors, nervous and circulatory neurological disturbances of the ear. Diagnosis and treatment of tinnitus and vertigo. Diagnosis and rehabilitation of the Hearing handicapped including, dispensing of hearing aid other vibrotatile aids.

- Surgical pathology of Otolaryngology and Head Neck region.
- Basic knowledge of anaesthesia as related to ENT.
- Examination of diseases of children (Paediatric ORL) in connectionwith throat and larynx. Neurological and vascular disturbances. Congenital and neonatal stridor.
- Pathology of various diseases of the larynx and throat, tracheo-bronchial tree and their causative organisms.
- Indications and various techniques of direct laryngoscopy, nasal endoscopy. Bronchoscopy, oesophagoscopy and microlaryngoscopic procedures.
- Reading of radiograms, scans, audiograms, nystagmograms and tympanograms in connection with ENT diseases/disorders.

Special apparatus for the diagnosis and treatment of the diseases of ear, nose and throat including audiometer, BERA, Speech analyser etc.

Recent advances in Otolaryngology and Head Neck surgery

Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases

The knowledge of the frontiers of the oto-laryngology and lateral skull base surgery

Rhinoplasty, endoscopic sinus surgery, and anterior cranial fossa surgery Knowledge of LASERS and fibre optics. Other methods of managing Hearing loss Implantable hearing aids cochlear implants Phonosurgery

Etiology and Managements of sleep apnoea/snoring Hypophysectomy and optic nerve decompressions Immunotherapy and modalities of the gene therapy

Newer techniques for Radiotherapy including, use of gamma knife for treatment of intracranial tumors and other malignancy, Chemotherapy of cancer

General Surgical Principles and Head-Neck Surgery

General Surgery, Head and Neck oncology, and Medicine as applicable to the ENT disorders/diseases.

Surgery of congenital deformities of nose, ear (Pinna) and trachea/oesophagus etc.

Radiology, Imaging – computed tomography and magnetic resonance imaging, (MRI) and intervention radiology and angiography as related to ENT

General Pathologic aspects such as wound healing and also pathology and Pathogenesis of ENT diseases, Pharmacology, molecular biology, genetics, cytology, hematology, and immunology as applicable to otolaryngology

General Principles of faciomaxillary traumatology and neck injury Plastic Surgery as applicable to Otolaryngology

Affective Domain

1. The student will show integrity, accountability, respect, compassion and dedicated patient care.
2. The student will demonstrate a commitment to excellence and continuous professional development.
3. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
4. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
5. The student should be able to choose the required investigations to enhance the attitude, communicative skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

Psychomotor Domain

By the end of the training, a student should be able to demonstrate his skills in:

Taking a good history and demonstrating good examination techniques.

arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

Should be able to perform and demonstrate the practical skills in the field of ENT including the following:

- Examination of the ear, nose and throat oral cavity examination
- Clinico-physiological examination and evaluation of the audio-vestibuloneurological system
- Examination of the larynx and the throat including flexible endoscopy,stroboscopy, voice

analysis and the clinico-physiological examination of the speech

- Examination of the otological and audiological system including Tuning forktesting, audiological evaluation, micro and otoendoscopy
- Clinical and physiological evaluation of the nose and paranasal sinusesincluding nasal endoscopy and olfactory evaluation
- Examination of the neck and its structures

Should demonstrate and perform various therapeutic skills related to the speciality such as:

- Tracheostomy
- Anterior/ posterior nasal packing
- Ear Packing and Syringing
- Foreign body removal from air nose and throat
- Airway management including basic life support skills, Cardiopulmonary resuscitation, intubation, homeostasis maintenance, IV alimentation and fluid, electrolyte maintenance and principles of blood transfusion alimentation including Nasogastric feeding, gastrostomy
- Wound suturing, dressings and care of the wounds
- Basic principles of rehabilitation
- Common procedures like FNAC, biopsy, aspiration from serous cavities, lumber puncture etc
- Should understand principles of and interpret X-rays/CT/MRI, audiograms, ENG, BERA, OAE, ultrasonographic abnormalities and other diagnostic procedures in relation to the speciality

- Should have observed/performed under supervision the various surgical procedures in relation to the speciality.

Syllabus

Course contents:

1. Anatomy and Physiology of Ear, Nose and Throat, Trachea and esophagus.

2. The generation and reception of speech

3. Radiographic anatomy of the ear, nose, throat and imaging.

4. Bacteriology in relation to Otorhinolaryngology

5. Allergy and rhinitis

6. Haematology in relation to Otolaryngology

7. Anaesthesia for Otolaryngology

8. Pharmacology of drugs used in ENT

9. Electrolyte, fluid balance/shock conditions

10. Use of teaching aids

11. Routine blood, urine testing

12. Preparation of slides

13. Facial nerve stimulation test

14. Audiometric tests like pure tone Audiometry, Impedance Audiometry, Free field Audiometry, Specialized tests of hearing including SISI, Tone decay, ABLB, Speech discrimination score etc.

15. Vestibular tests like caloric testing (Water and Air) stopping test, Fukuda's test,

16. Evoked response audiometry.

Ear:

- The physical and functional examination of the ear
- The functional and physical examination of the vestibular system.
- Tinnitus
- Affections of external ear
- Repair of deformities of the external ear.
- Congenital conditions of the middle ear cleft
- Traumatic conductive deafness
- Acute inflammation of the middle ear cleft
- Non-suppurative otitis media
- Chronic suppurative otitis media
- Management of chronic suppurative otitis media
- Complications of infections of middle ear.
- Tumors of the middle ear cleft and temporal bone
- Diseases of the otic capsule-otosclerosis
- Diseases of the otic capsule-other diseases
- The deaf child
- Acoustic neuroma
- Ototoxicity
- Presbycusis
- Diagnosis and management of sudden and fluctuant sensorineural hearing loss
- Meniere's disease

- Neurologic aspects of vertigo
- Facial paralysis
- Rehabilitation of adults with acquired Hearing loss-Hearing aids
- The cochlear Implants
- Nystagmus
- Otoacoustic emissions

Nose:

- Examination of the nose
- Conditions of the external nose
- Injuries of the facial skeleton
- Congenital diseases of the nose
- The nasal septum
- Foreign bodies in the nose, rhinolith
- Epistaxis
- Acute chronic inflammations of the nasal cavities
- Vasomotor rhinitis-allergic and non-allergic
- Nasal polyposis
- Abnormalities of smell
- Acute sinusitis
- Chronic sinusitis
- Nasal Allergy/Fungal allergic sinusitis
- Complications of acute and chronic sinusitis
- Tumors of nose and sinuses
- Facial pains
- Trans-ethmoidal hypophysectomy
- Functional endoscopic sinus surgery (FESS)

Throat:

- Methods of examination of the mouth and pharynx
- Diseases of the mouth
- Diseases of the salivary glands
- Pharyngeal lesions associated with general diseases

- Diseases of the tonsils and adenoids (excluding neoplasms)
- Tumors of the pharynx
- Hypopharyngeal diverticulum (Pharyngeal Pouch)
- Methods of examining and larynx and trachea-bronchial tree
- Congenital diseases of the larynx
- Laryngeal disorders in singers and other voice users
- Neurological affections of larynx and pharynx
- Intubation of the larynx, laryngotomy and tracheostomy
- Cervical node dissection
- Skin grafts in Otolaryngology and reconstructive methods including regional and distant flaps for repair of defects after excision of tumors or trauma.
- Micro laryngeal surgery/thyroplasty

Miscellaneous and head and neck:

- Cranial nerves
- Raised intracranial tension-causes, diagnosis, management with particular reference to otitis hydrocephalus
- Head injuries and I.C. Haemorrhage
- Pituitary gland, anatomy, physiology hypo - and hyper - pituitarism, new growths.
- Intracranial venous sinuses and their affections
- Osteology: skull, mandible cervical and thoracic vertebral sternum
- Cervical fascia, facial spaces in neck, retro-pharyngeal and parapharyngeal Abscesses
- Anatomy and physiology of thyroid gland, goiter, diseases of the thyroid and carcinoma of thyroid
- Large blood vessels in neck, thoracic duck development of major cervical and thoracic blood vessels.
- Head and neck reconstructive surgery

Drugs used in ENT:

- Antibiotics Antihistaminic
- Nasal vasoconstrictors
- Local anaesthetic

- Corticosteroids
- Cyto-toxic agents
- Antibiotics
- Radioactive isotopes
- Antifungal agents
- Vasopressive and other agents used in shock like states.

General:

Physiology of circulation, regulation of blood pressure, reactions of body to haemorrhage, path-physiology of shock, fluid balance, blood transfusion and its hazards, fluid replacement therapy, burns Agents used in shock like states

Desirable

- The ears and nasal sinuses in the aerospace environment
- Physiological consideration of pressure effects on the ear and sinuses in deep water diving
- The principles of cancer immunology with particular reference to head and neck cancer
- Principles of chemotherapy in head and neck cancer
- Recording of nystagmus by ENG and its interpretation

Ear:

- Traumatic lesions of the inner ear
- Inflammatory lesions of the vestibular and auditory nerve
- Vascular lesions of the inner ear
- Electronystagmography
- Skull base/Neurologic surgery

Nose:

- Cosmetic surgery of the nose
- Non-healing granuloma of the nose
- Surgery of the pterygopalatine fossa
- LASER Surgery

Throat:

- Esophageal conditions in the practice of ear, nose and throat surgery
- Disorders of speech

- Lower respiratory conditions in Otolaryngology

Miscellaneous and head and neck

- Functional Anatomy of cerebellum and brainstem
- Anatomy of mediastinum
- Pleura, plural cavity, broncho-pulmonary segments and their clinical importance
- Facial plastic surgery

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted. Exposure to newer specialized diagnostic/therapeutic procedures concerning ENT should be given.

Rotations:

A major portion of posting should be in ENT Department. It should include in-patients, out-patients, ICU, trauma, emergency room, specialty clinics including Vertigo Clinic, Rhinology Clinic, Otology Clinic, Cancer Clinic, Cadaveric dissection Lab, Audiology and speech therapy.

Inter-unit rotation in the department should be done for a period of up to one year. Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon / interesting cases involving multiple departments.

Log book: Each student must be asked to present a specified number of cases forclinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

Thesis writing and research: Thesis writing is compulsory.

The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper ata national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

(i) The student should know the basic concepts of research methodology plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.

(ii) Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include: Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

1. Journal based / recent advances learning

2. Patient based /Laboratory or Skill based learning

3. Self directed learning and teaching

4. Departmental and interdepartmental learning activity

5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisa form (Annexure I).

SUMMATIVE ASSESSMENT i.e., at the end of the training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination will be in three parts:

Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance f a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the for n of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit f enquiry, besides exposing the candidate to the techniques of research,

critical analysis, acquaintance with the latest advances in medical science and the manner f identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examinatio n. The thesis shall be examined by a minimum of three examiners; one internal and two extern l examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall e allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of t e Thesis by the examiners.

Theory

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and o certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passi g examination as a whole. The examination for MS shall be held at the end of 3rd academic year. A n academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences related Otolaryngology

Paper II: Principles and Practices of Otolaryngology

Paper III: Recent advances in Otolaryngology and Head Neck surgery.

Paper IV: General Surgical Principles and Head-Neck Surgery.

Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/ teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate students knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective Structured Clinical Examination (OSCE).

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

Scott-Brown's Otorhinolaryngology and Head and Neck Surgery Cummings Otolaryngology - Head and Neck Surgery

Otolaryngology, Otology &Neurotalogyby Paprella&Micheal

Glasscock-Shambaugh'sSurgery of the Ear

Essentials of Functional Sinus Surgery byHeinz Stammberger MD Color Atlas of Head & Neck Surgery by Jatin P Shah

Handbook of Clinical Audiologyby Jack Katz

Stell& Maran's Textbook of Head and Neck Surgery and Oncology

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.S. Ophthalmology

(Programme code – MM-18)

Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OPHTHALMOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of this programme is to standardize Ophthalmology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in post graduate and undergraduate teaching as well as result in creating competent ophthalmic surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

Programme Objectives

The clinical post graduate training programmes are intended at developing in a student a blend of qualities that of a clinical specialist, a teacher and a researcher. These programmes are organized such that a post graduate student should possess the following qualities, knowledge and skills:

The student should possess basic knowledge of the structure, function and development of the human body as related to ophthalmology, of the factors which may disturb these mechanisms and the disorders of structure and function which may result thereafter.

The student should be able to practice and handle most day-to-day problems independently in

ophthalmology. The student should recognize the limitations of his/her own clinical knowledge and know when to seek further help.

The student should understand the effects of environment on health and be familiar with the epidemiology of at least the more common diseases in the field of ophthalmology.

The student should be able to integrate the preventive methods with the curative and rehabilitative measures in the comprehensive management of the disease.

The student should be familiar with common eye problems occurring in rural areas and be able to deal with them effectively.

The student should also be made aware of Mobile Ophthalmic Unit and its working and components.

The student should be familiar with the current developments in Ophthalmic Sciences.

The student should be able to plan educational programmes in Ophthalmology in association with senior colleagues and be familiar with the modern methods of teaching and evaluation.

The student should be able to identify a problem for research, plan a rational approach to its solution, execute it and critically evaluate his/her data in the light of existing knowledge.

The student should reach the conclusions by logical deduction and should be able to assess evidence both as to its reliability and its relevance.

The student should have basic knowledge of medico-legal aspects of medicine.

The student should be familiar with patient counseling and proper consent taking.

SUBJECT SPECIFIC COMPETENCIES

A post graduate student upon successfully qualifying in the M.S. Ophthalmology) examination should be able to:

1. Offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services.
2. Periodically self-assess his or her performance and keep abreast with ongoing advances in the field and apply the same in his/her practice.
3. Be aware of her/his own limitations to the application of the specialty in situations, which warrant referral to more qualified centers or individuals.
4. Apply research and epidemiological methods during his/her practice. The post graduate student should be able to present or publish work done by him/her.

5. Contribute as an individual/group towards the fulfillment of national objectives with regard to prevention of blindness.

6. Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

At the end of the course, the student should have acquired knowledge in the following:

A. Cognitive domain

Basic Medical Sciences:

- Attain understanding of the structure and function of the eye and its parts in health and disease.
- Attain understanding and application of knowledge of the structure and function of the parts of Central Nervous System and other parts of the body with influence or control on the structure and function of the eye.
- Attain understanding of and develop competence in executing common general laboratory procedures employed in diagnosis and research in Ophthalmology.

Clinical Ophthalmology:

Given adequate opportunity to work on the basis of graded responsibilities in outpatients, inpatient and operation theatres on a rational basis in the clinical sections from the day of entry to the completion of the training programme, the students should be able to:

- Acquire scientific and rational approach to the diagnosis of ophthalmic cases presented.
- Acquire understanding of and develop inquisitiveness to investigate to establish cause and effect of the disease.
- To manage and treat all types of ophthalmic cases.
- To competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and muscle anomalies.
- To competently handle all ophthalmic medical and surgical emergencies.
- To be familiar with micro-surgery and special surgical techniques.
- To demonstrate the knowledge of the pharmacological (including toxic) aspects of drugs used in ophthalmic practice and drugs commonly used in general diseases affecting the eyes.

Refraction:

- Acquire competence in assessment of refractive errors and prescription of glasses for all types of refraction problems.

- Acquire basic knowledge of manufacture and fitting of glasses and competence of judging the accuracy and defects of the dispensed glasses.

Ophthalmic super-specialties:

- Given an opportunity to work on a rotational basis in various special clinics of sub-specialties of ophthalmology, if possible, the student should be able to:
- Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology and refer appropriate cases to neurology and neuro-surgery.
- Examine, diagnose and demonstrate understanding of management of (medical and surgical) complicated problems in the field of (a) lens, (b) glaucoma, c) cornea, (d) retina, (e) pediatric ophthalmology, (f) oculoplasty, (g) uvea, and (I) genetic problems in ophthalmology.
- To demonstrate understanding of the manufacture, and competence in prescription and dispensing of contact lenses and ocular prosthesis.

Ophthalmic pathological/microbiological/biochemical sciences

Be able to interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

Community Ophthalmology

Eye camps may be conducted where the PG students are posted for imparting training to according to a set methodology. The community and school surveys may also be conducted by the post graduate students.

The post graduate students are given an opportunity to participate in surveys, eye camps. They should be able to guide rehabilitation workers in the organization and training of the blinds in art of daily living and in the vocational training of the blind leading to gainful employment.

Research:

1. Recognize a research problem.

2. State the objectives in terms of what is expected to be achieved in the end.

3. Plan a rational approach with appropriate controls with full awareness of the statistical validity of the size of the material.

4. Spell out the methodology and carry out most of the technical procedures required for the study.

5. Accurately and objectively record on systematic lines results and observation made.

6. Analyze the data with the aid of an appropriate statistical analysis.

7. Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
8. Write a thesis in accordance with the prescribed instructions.
9. Write at least one scientific paper as expected of International Standards from the material of this thesis.

Affective Domain:

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

At the end of the course, the student should acquire following clinical skills:

Essential diagnostic skills:

Slit lamp Examination

1. Diffuse examination
2. Focal examination
3. Retro illumination – direct and indirect
4. Sclerotic scatter
5. Specular reflection
6. Staining modalities and interpretation

Fundus evaluation

(i) Direct/Indirect ophthalmoscopy

(ii) Fundus drawing

(iii) 3-mirror examination of the fundus

(iv) 78-D/90-D/60-D examination

(v) Amsler's charting

Basic investigations along with their interpretation

Tonometry

Tonometry - Applanation/Indentation/Non-contact

Gonioscopy

Gonioscopy grading of the anterior chamber angle

Tear/ Lacrimal function tests

- Staining- fluorescein and Rose Bengal
- Schirmer test/tear film break up time
- Syringing
- Dacrocystography

Corneal

- Corneal scraping and cauterization
- Smear preparation and interpretation (Gram's stain /KOH)
- Media inoculation
- Keratometry - performance and interpretation
- Pachymetry
- Corneal topography - if available

Color Vision evaluation

- Ishihara pseudoisochromatic plates
- Farnsworth Munsell, if available

Refraction

- Retinoscopy- Streak/ Priestley Smith
- Use of Jackson's cross-cylinder
- Subjective and objective refraction
- Prescription of glasses

Diagnosis and assessment of Squint

- Ocular position and motility examination
- Synoptophore usage
- Lees screen usage

- Diplopia charting
- Assessment of strabismus - cover tests/prisms bars
- Amblyopia diagnosis and treatment
- Assessment of convergence, accommodation, stereopsis, suppression

Exophthalmometry

Usage of Hertel's exophthalmometer - proptosis measurement

Contact lenses

- Fitting and assessment of RGP and soft lenses
- Subjective verification of over refraction
- Complications arising of contact lens use
- Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon

Low Vision Aids

Knowledge of basic optical devices available and relative advantages and disadvantages of each.

The basics of fitting with knowledge of availability & cost

The post graduate must be well versed with the following investigative modalities although the student may or may not perform it individually. But, she/he should be able to interpret results of the following tests:

- Fundus photography
- Fluorescein angiography
- Ophthalmic ultrasound A-scan/B scan
- Automated perimetry for glaucoma and neurological lesions
- Radiological tests - X rays - Antero posterior/ Lateral view PNS (Water's view) / Optic canal views
- Localization of intra-ocular and intra-orbital FBs
- Interpretations of -USG/ CT/ MRI Scans
- OCT and UBM
- ERG, EOG, and VEP

Minor surgical procedures – Must know and perform independently

- Conjunctival and corneal foreign body removal on the slit lamp
- Chalazion incision and curettage
- Pterygium excision

- Biopsy of small lid tumours
- Suture removal- skin/conjunctival/corneal/ corneoscleral Tarsorrhaphy
- Subconjunctival injection
- Retrobulbar, parabulbar anaesthesia
- Posterior Sub-Tenon's injections
- Artificial eye fitting

Surgical procedures

Must know and can perform independently

(i) Ocular anaesthesia:

(ii) Retrobulbar anaesthesia Peribulbar anaesthesia

(iii) Facial blocks- O'Brein / Atkinson/Van lint and modifications Frontal blocks

(iv) Infra orbital blocks

(v) Blocks for sac surgery

Must be able to independently perform and deal with complications arising from the following surgeries:

(i) Lid Surgery -Tarsorrhaphy

(ii) Ectropion and entropion

(iii) Lid repair following trauma

(iv) Epilation

(v) Destructive procedures

(vi) Evisceration with or without implant

(vii) Enucleation with or without implant

(viii) Sac surgery

(ix) Dacryocystectomy

(x) Dacryocystorhinostomy

(xi) Probing for congenital obstruction of nasolacrimal duct

(xii) Strabismus surgery

(xiii) Recession and resection procedures on the horizontal recti.

(xiv) Orbit surgery

(xv) Incision and drainage via anterior orbitotomy for abscess

(xvi) Cyclocryotherapy/Cyclophotocoagulation

PG Students should be well conversant with use of operating microscope and must be able to perform the surgeries listed below competently under the same:

- Cataract surgery
- Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantatio

(i) Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation

(ii) Intracapsular cataract extraction (second year)

(iii) Cataract with Phacoemulsification (third year)

(iv) Secondary AC or PC IOL implantation Vitrectomy/Scleral buckling

Intra-vitreal and intra-cameral (anterior chamber) injection techniques and doses of drugs for the sam needs to know the basis of open sky vitrectomy (anterior segment) as well as management of cataract surgery complications.

- Assisting vitrectomy and scleral buckling procedures Ocular surface procedures
- Pterygium excision with modifications
- Conjunctival cyst excision/foreign body removal
- Corneal foreign body removal
- Conjunctival flap/ peritomy
- Glaucoma Trabeculectomy
- Corneal Repair of corneo - scleral perforations
- Corneal suture removal
- Application of glue and bandage contact lens
- Should have performed/assisted the following microscopic surgeries
- Keratoplasty
- Therapeutic and optical
- Glaucoma surgery
- Pharmacological modulation of trabeculectomy Trabeculotomy
- Goniotomy
- Glaucoma valve implant surgery
- Desirable to be able to perform following laser procedures

- Yag Capsulotomy
- Laser iridotomy
- Focal and pan retinal photocoagulation
- Should have assisted/knowledge of Keratorefractive procedures

Operations:

The PG is provided with an opportunity to perform operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member. The student is provided with an opportunity

to learn special and complex operations by assisting the senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the post-operative care of these cases.

In **first phase**, the post graduate student is given training in preparations of cases for operation, pre-medication and regional anaesthetic blocks. In the **next phase**, the post graduate student assists the operating surgeon during the operations. In the **thirdphase**, the post graduate student operates independently assisted by senior postgraduate student or a faculty member. She/he is required to be proficient in some operations and show familiarity with others.

Syllabus

Course contents:

These are only broad guidelines and are illustrative; there may be overlap between sections.

I. Basic Sciences:

1. Orbital and ocular anatomy
- Gross anatomy
- Histology
- Embryology

2. Ocular Physiology

3. Ocular Pathology

4. Ocular Biochemistry
- General biochemistry, biochemistry applicable to ocular function
- Ocular Microbiology

- General Microbiology, specific microbiology applicable to the eye

5. Immunology with particular reference to ocular immunology

6. Genetics in ophthalmology

7. Community Eye Health

II. Optics

- Basic physics of optics
- Applied ophthalmic optics
- Applied optics including optical devices
- Disorders of Refraction

III. Clinical Ophthalmology

- Disorders of the lids
- Disorders of the lacrimal system
- Disorders of the Conjunctiva
- Disorders of the Sclera
- Disorders of the Cornea
- Disorders of the Uveal Tract
- Disorders of the Lens
- Disorders of the Retina
- Disorders of the Optic Nerve and Visual Pathway
- Disorders of the Orbit
- Glaucoma
- Neuro-ophthalmology
- Paediatric ophthalmology
- Ocular involvement in systemic disease
- Immune ocular disorders
- Strabismus and Amblyopia
- Ocular oncology

TEACHING AND LEARNING METHODS

Teaching Methodology:

The theoretical knowledge is imparted to the post graduate student through distinct courses of lecture demonstrations, seminars, symposia and inter- and intra-departmental meetings. The students are exposed to recent advances through discussions in journal clubs and participation in CMEs, and symposia.

The post graduate students are imparted clinical training in several ways:

Group Discussion

The junior post graduate students may present the symposium to their senior postgraduates where it is fully discussed before finally being discussed in front of the faculty or senior eye specialists. A free and fair discussion is encouraged. These discussions enable the post graduate students to prepare for a general discussion in the class.

Clinical Case discussion

Bedside discussion on the rounds and outpatient teaching take their toll with patient management. Therefore, in addition to these, clinical case discussions should form part of a department's schedule at a fixed time every week. This could range from 1-2 hours and could be held at least once a week. The choice and manner of presentation and discussion varies widely and is left to the discretion of the department. Every effort should be made to include as wide a variety of cases as possible over three years with multiple repetitions. Problem oriented approach is better as it aids in decision making skills.

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary.

Consultant case presentation is another approach which should be encouraged as it aids in solving complex problems and also is forum for discussion of interesting cases.

Case discussions on the patient's records written by the student is to be encouraged as it helps exercise the student's diagnostic and decision-making skills. It also helps the consultant in critical evaluation of the student's progress academically. Case presentation at other in-hospital multidisciplinary forums.

The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

Department should encourage e-learning activities.

Seminars

Seminars should be conducted at least once weekly. The duration should be at least one hour. The

topics selected should be repeated once in 3 years so as to cover as wide a range of topics as possible. Seminars could be individual presentations or a continuum (large topic) with many post graduate students participating.

Journal clubs

Journals are reviewed in particular covering all articles in that subject over a 6 months period and are discussed by the post graduate student under the following headings.

1) Aim	**2) Methods**	**3) Observations**
4) Discussions	**5) Conclusions**	

The post graduate student to whom the journal is allotted presents the journal summaries to the senior postgraduates. They are expected to show their understanding of the aspects covered in the article and clarify any of the points raised in the article, offer criticisms and evaluate the article in the light of known literature.

A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

Out-Patients: For the first six months of the training programme, post graduate students may be attached to a faculty member to be able to pick up methods of history taking and ocular examination in ophthalmic practice. During this period

the post graduate student may also be oriented to the common ophthalmic problems. After 6 months, the clinical post graduate student may work independently, where he receives new and old cases including refractions and prescribes for them. The post graduate students are attached to a senior post graduate student and faculty member whom they can consult in case of difficulty.

Wards: Each post graduate student may be allotted beds in the in-patientsection depending upon the total bed capacity and the number of the post graduates. The whole concept is to provide the post graduate student increasing opportunity to work with increasing responsibility according to seniority. A detailed history and case record is to be maintained by the post graduate student.

Relevance of beds and admissions in Ophthalmology has really gone down at present, as most of the surgical and special investigative procedures are being performed on out-patient basis. Most of the teaching has to be imparted in out-patients department and special Clinics.

Rotations: Specialty clinics

The student may rotate in the following subspecialty clinics:

- Anterior segment and cataract
- Glaucoma
- Oculoplastics
- Pediatric ophthalmology and strabismus
- Retina and Uvea
- Cornea, Contact lens and low vision
- Neuroophthalmology
- Refractive Clinic

Practicals in Ocular Histopathology

The post graduate students may be provided with fully stained slides of the ocular tissues along with relevant clinical data and discuss the diagnosis and differential diagnosis on the basis of the information provided Attend accredited scientific meetings (CME, Symposia, and Conferences).

Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to ophthalmology practice are suggested.

Maintenance of **log book**: Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and

ability to practice in the system.

FORMATIVE ASSESSMENT, i.e., during the training

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

Journal based / recent advances learning

Patient based /Laboratory or Skill based learning

Self-directed learning and teaching

Departmental and interdepartmental learning activity

External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The Post Graduate examination shall be in three parts:

Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners. From regulations)

Theory Examination:

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training.

Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers.

Paper I: Basic Sciences related to Ophthalmology, Refraction & Optics

Paper II: Clinical Ophthalmology

Paper III: Systemic Diseases in Relation to Ophthalmology

Paper IV: Recent Advances in Ophthalmology and Community Ophthalmology

Clinical/Practical and oral/viva voce examination

Clinical

- long case
- short cases with different problems
- fundus Cases
- refraction case

Oral/Viva voce Examination shall be comprehensive enough to test the Post graduate student**'s overall knowledge of the subject and shall include:**

1. Instruments

2. Pathology specimens

3. Drugs, X-rays, USG/OCT/CT/MRI Scans, etc.

4. Visual fields and other ophthalmic diagnostic charts

Recommended Reading:

Books (latest edition)

- Ophthalmic Surgery: Principles and Techniques. Blackwell Science. Albert DM.
- Principles and Practice of Ophthalmology. Albert DM, Jakobiec. W B Saunders
- Principles & Practice of Ophthalmology. Gholam A Paymen
- The Current American Academy of Ophthalmology Basic and Clinical Science Course (13 volumes)
- Duke Elder's Practice of Refraction. Abrams D. Churchill Livingstone.
- Text book of Ophthalmology. Yanoff and Duker

- Retina. Stephen J Ryan:
- Ophthalmic Ultrasound: Sandra Byrne and Ronald Green.
- Cornea: Fundamentals, Diagnosis, and Management. Krachmer JH, Mannis MJ, Holland EJ. Mosby Elsevier.
- Ophthalmology. Yanoff N, Duker JS. Mosby Elsevier.
- Review of Ophthalmology. Friedman NJ, Kaiser PK, Trattler WB. Elseview Saunders, Philadelphia.
- Corneal Transplantation. Vajpayee RB. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
- Fundamentals of Clinical Ophthalmology Series. Coster D. Cornea. Blackwell Publishing Limited.
- The Contact Lens Manual. A practical guide to fitting. Gasson A, Morris A J. Butterworth Heinemann Elsevier.
- Steinert's cataract surgery.

- Shields Text book of glaucoma
- Smith and Nozik : Uvea
- Rootman's diseases of the orbit
- Eyelid, conjunctival and orbital tumors. An atlas and textbook. Shields JA, Shields CL. Philadelphia: Lippincott Williams & Wilkins.
- Intraocular tumors. An atlas and textbook. Shields JA, Shields CL.
- Pediatric Ophthalmology. Taylor and Hoyt: Saunders Ltd.
- Management of Strabismus and Amblyopia. Pratt-Johnson and Tilson: Thieme Verlag.
- Handbook of Pediatric Eye and Systemic disease. Wright, Spiegel and Thompson.
- BinocularVision and Ocular Motility. Theory and Management of Strabismus. Von Noorden GK. Mosby.
- Surgical Management of Strabismus. Helveston:
- Strabismus: A Decision-Making Approach. Von Noorden and Helveston:
- Thyroid Eye Diseases. Char DR. Williams and Wilkins, Baltimore.
- A Manual of Systematic Eyelid Surgery.Collin JRO (ed). Churchill Livingstone, Edinburgh.
- Refractive Surgery. Agarwal A, Agarwal A, Jacob Soosan. Jaypee.

- LASIK Complications, Prevention and management. Gimbel HV, Penno EEA. Slack Inc.
- Management of Complications of Refractive Surgery. Alio JL, Azar DT. Springer.
- Quality of Vision: Essential Optics for the Cataract and Refractive Surgeon. Holladay JT. Slack Inc.
- Ocular Pharmacology: Havener
- Anatomy: Wolff 's Anatomy of the Eye and Orbit
- Physiology: Adler's Physiology of the Eye
- Textbook of Ophthalmology (2 volumes). Easty DL, Sparrow JM.Oxford Oxford Medical Publications.
- The Eye. Basic Sciences in Practice. Forrester JV, Dick AD, McMenamin PG, Lee WR. W B Saunders.
- A Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment. Gass JDM.
- Neuroophthalmology. Glaser JS. LipincottWilliams& Wilkins.
- Clinical Ophthalmic Pathology. Harry J, Misson G. Butterworth/Heinemann.
- Inherited Retinal Diseases. A Diagnostic Guide. Jimenez Sierra JM, Ogden TE, Van Boemel GB. Mosby.
- Clinical Ophthalmology. Kanski JJ. Butterworth/Heinemann.
- ABC of Resuscitation. Colquhoun, M. C., Evans, T. R., Handley, A. J. BMJ Publishing Group.
- Walsh and Hoyt's Clinical Neuroophthalmology (5 volumes). Miller NR, Newman NJ, Williams and Wilkins.
- The human eye. Oyster CW Sinauer Associates. Sunderland. Massachusetts
- Pediatric Ophthalmology. Taylor D. Blackwell Science.
- Decision Making in Ophthalmology. Van Heuven WAJ, Zwann J. Mosby.
- Parsons' Diseases of the eye. Sihota and Tandon.

- Wills Eye Manual
- International Council of Ophthalmology Residency Curriculum available at http://www.icoph.org/

Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. Community Medicine

(Programme code – MM-9)

Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN COMMUNITY MEDICINE

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Community Medicine is an academic subject, a branch of Medicine which deals with promotion of health and prevention of diseases, involving people's participation, utilizing professional management skills. The Community Medicine specialist, will inculcate a holistic view of health and medical interventions primarily focused on Community Health/Population Health. Thus, he/she should be equipped with the knowledge, skills, competencies in primary, secondary & tertiary care, control and prevention of outbreaks/epidemics, community diagnosis, health needs assessment, epidemiological assessment, research and planning evidence-based health policies and programmes.

The Guidelines for teaching Community Medicine, therefore, should be designed to create a cadre of professionals who are competent to meaningfully contribute their expertise in planning, implementation, co-ordination, monitoring, evaluation of Primary Health Care Programs based on

scientific evidence. The competencies must cover a wide spectrum of skills viz., technical, managerial, administrative, organizational skills, applied skills in Health Information Management, software application and soft skills of communication, motivation, decision-making, team building, training in scientific communication and medicalwriting.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

1. To create a skilled cadre of medical professionals having expertise in application of principles of Public Health, Community Medicine and applied epidemiology, contributing meaningfully in formulating National Health Policies &Programmes with a systems approach for overall human development.
2. To standardize the teaching & training approaches at post- graduate level, for Community Medicine
3. Research: To formulate research questions, do literature search, conduct study with an appropriate study design and study tool; conduct data collection and management, data analysis andreport.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course the student should be able to acquire the following competencies under the three domains, Cognitive, Affective and Psychomotor:

A. Cognitive domain (The student should be able to:)

1. Describe conceptual (and applied) understanding of Public Health, Community Medicine, clinical and disease-oriented approach, preventive approach & health promotion, disease control & promotion.

2. Have knowledge about communicable and non-communicable diseases, emerging and re-emerging diseases, their epidemiology, control andprevention.
3. Apply the principles of epidemiology, health research and Bio-statistics, application of qualitative researchmethods

4. Calculate Odds Ratio, Relative Risk, Attributable risk and other relevant health and morbidity indicators.
5. To describe nutritional problems of the country, role of nutrition in health and disease and to describe common nutritionaldisorders
6. Develop nutrition plan for an individual based on his requirements and with concerns to special situations if applicable
7. Plan comprehensive programme to address issue of malnutrition in a given area for aspecific group
8. To describe the concept of Environmental Health and its various determinants.
9. Identify environmental health issues in a givenarea/community
10. Assess impact of adverse environmental conditions on health of human beings
11. Plan awareness programmes at various levels on environmental issues and mobilizecommunity resources and participation to safeguard from local adverse environmentalconditions
12. Should be able to provide technical advice for water purification, chlorination, installing gobar gas plant, construction of soakage pitsetc.
13. Be a technical expert to advice on protection measures from adverse environmentalexposure
14. To describe the working of Primary Health Care system, Panchayat Raj system, National Health Programmes, urban/rural differences, RCH, Demography and FamilyWelfare.
15. Do orientation of the inter-linkage of health sector and non-health sector for promotion of Health & control and prevention ofdiseases.
16. Have familiarity with administrative procedures and protocols
17. Have knowledge about role of media and its use in health.
18. Have knowledge of Health Care Administration, Health Management and PublicHealth Leadership
19. To describe Health Policy planning, Medical Education technology, InformationTechnology and integration of alternative Health system includingAYUSH.
20. To describe the intricacies of Social & Behavioral sciences and theirapplications.
21. To describe Public HealthLegislations
22. To understand and describe International Health & Global Diseasessurveillance.
23. To relate the history of symptoms with specific occupation, diagnostic criteria, preventive measures, identification of various hazards in a specificoccupational environment andlegislations.

24. To keep abreast of recent advances in Public Health & formulate feasible, optimal, sustainable, cost effective strategies in response to the advances in public health & development.

25. To describe the principles of Health Economics and apply it in various public healthsettings.

26. To explain and correlate common health problems (medical, social, environmental,economic, psychological) of urban slum dwellers, organization of health services in urban slumareas

27. Develop workable interventions for control and prevention of emerging and re- emerging diseases at local, national and globallevel.

28. Identify behavior pattern of individual or group of individuals detrimental or adversely affecting theirhealth

29. Define and identify vulnerable, under-privileged high-risk communities and their specialneeds

30. To create awareness about various public healthlaws

31. Evaluate cost effectiveness and cost benefits of a Health Program

32. Understand and express implications of 'Poverty Line', 'Social Inclusion', 'Equity','taxation', 'Insurance' on Health care management.

33. To categorize hospital waste and be able to guide for properdisposal.

34. To provide a comprehensive plan for disaster management and mitigation ofsufferings.

B. Affective domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and secondopinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. **Psychomotor domain: The student should be able to perform independently the following:**

1. Conduct community surveys for assessment of health & morbidity profile, epidemiological determinants, assessment of health needs, disease surveillance, evaluation of healthprogrammes and communitydiagnosis

2. Conduct epidemic investigations, spot maps, predict disease trends, preparation of reports, planning and implementation of controlmeasures

3. Demonstrate clinical skills of preparing case history, examination, provisional diagnosis, treatment and clinical case management and interpretation of laboratory findings. Conduct common procedures such as incision, drainage, dressings &injections.
4. Do data collection, compilation, tabular and graphical presentation, analysis and interpretation, applying appropriate statistical tests, using computer-based software application for validation offindings
5. Conduct epidemiological research studies to establish cause-effect relationships in elaborating the epidemiology of diseases and healthevents
6. Develop appropriate IEC Material, assessment of community communication needs, training skills, counseling skills, conduct Health Education Programmesin urban and ruralsettings
7. Conduct dietary surveys, assessment of nutritional status, nutritive values of common food menus, detection of food adulterants, use of lactometer, recording and interpretation of growth and developmentcharts.
8. Use and apply various instruments and processes concerned with environmental health and biological waste management eg. waste collection, segregation and disposal as per protocols, needle-disposers, disinfection procedures. Also use of Dosi-meters, Kata / Globe Thermometer, Slings Psychrometer, Gobar Gas Plant, Soakage pit, Solar Energy, functioning of ILRs, Deep Freezers, Cold Boxes, VaccineCarriers.
9. identify different types of mosquitoes, detect vector breeding places and orientation of the methods of elimination of breeding places and placement of a mosquito-proof watertank.
10. Conduct clinical screening of various diseases and organize community health camps involving community participation in urban and rural settings. Use of Snellen charts for vision, Ischiara's chart for colour blindness, tourniquet tests for dengue diagnosis in fever, BMI and other physical measurements of infants, children and adults etc., copper-T insertions and preparation of pap smear.
11. Conduct tests for assessment of chlorine demand of water (Horrock's Apparatus), procedure of well-water and urban water-tank chlorination, assessment of chlorination levels, physical examination of water, methods domestic water purification, oriented in use of waterfilters.
12. Prepare health project proposals with budgeting based on the project objectives.

Miscellaneous skills: (The student should be able to)

Devise appropriate health education messages for public health awareness using various health communications strategies.

1. Identify family level and community level interventions and facilitate the implementation of the same e.g. food hygiene, food storage, cooking demonstrations, community kitchen,kitchen garden, empowerment of women for promoting nutritional healthetc.
2. Demonstrate counselling skills for family planningservices.
3. Plan and execute BCC strategy forindividuals.
4. Conduct measurement of occupational exposure to harmfulinfluences.
5. Diagnose occupational hazards and undertake surveys to identify occupational exposures as and whennecessary.
6. Elicit appropriate response at individual and community level to prevent occupational hazards including IEC activities at differentlevels.
7. Use modern IT applications especially internet & internet-based applications.

Conceptual (and applied) understanding of Public Health, Community Medicine, clinical disease-oriented approach, Preventive approach & Health promotion, disease control & promotion.

Learning objectives:

At the end of this course topic, the student should be able to:-

(i) Understand and explain the concept & application and give suitable analogies/examples related to Public Health/Community Medicine (with differences), Disease-oriented v/s Preventive approach, health promotion disease control &prevention.

(ii) Explain correlation between health and human development with analogies/examples.

(iii) Explain concept of Primordial, Primary, Secondary and Tertiary prevention withexamples.

(iv) Evolutionary History and mile-stones in Public Health – National and Internationallevels.

1. Communicable and Non-Communicable diseases, emerging and re-emergingdiseases

Learningobjectives:

At the end of this course, the student should be able to: -

(i) Understand and explain Epidemiology of Communicable/Non-communicable diseases- its causes, precipitating factors, social & other non- health causes, mechanisms of transmission, signs/systems, management, control & prevention measures, related national Health Programmes& national Guidelines, Directives, special projects, ifany.

(ii) Explain application of Disease surveillance system in control of Communicable/Non-communicablediseases.

(iii) Explain & undertake steps to investigate & control outbreaks, epidemics and take

measures to prevent thesame.

(iv) Evolve prevention & control measures based on local & regional epidemiological funding, synchronizing with Nationalguidelines.

2. Applied Epidemiology, Health research,Bio-statistics

Learning objectives:

At the end of this course, the student should be able to:-

i. Explain the concept & application of Epidemiology of Disease and Health, giving suitable examples.

ii. Explain Epidemiological approach, the terms Distribution & Determinants, uses, types of Epidemiological studies, interpretation, merits/demerits and limitations, odds ratio, relative risk, attributable & population attributable risks, Hybrid designs (with examples), validity of Epidemiological Data and application in practice at fieldlevel.

iii. Explain Epidemiological Research methods, Research related protocols, Literature review, estimating sample size, data collection/ compilation/Analysis/ Research,interpretation.

iv. Develop Health interventional programs based on Epidemiological Finding & create evidence for Public Healthaction.

v. Understand difference between data, information & intelligence, types of data, survey methods, formulating questionnaires, interview schedule, data presentation types &analysis.

vi. Apply computer based software application for data designing, data management & collation analysis e.g. SPSS, Epi-info, MS office and other advancedversions.

3. Nutrition Learningobjectives:

At the end of this course, the student should be able to:-

i. Identify various nutritional problems in the region, state and country and contributing factors for the same, with due emphasis on ecologyperspectives.

ii. Explain importance of various nutrients (including micronutrients) in health, their sources, requirements and problems associated with their deficiencies as well as over consumption.

iii. Plan balanced diet and dietary requirements of various age and sexgroups.

iv. Dietary/nutritional concerns of vulnerable groups – young children, adolescents, ANC/PNC/Lactating mothers/senior citizens/individuals with various healthproblems e.g. hypertension, diabetes, renal problemsetc.

v. Classification of food, food additives, food fortification, food enrichment, food toxins and food adulteration.

vi. Explain Food production, Food hygiene and safety, food storage, food preparation, food wastage and feedingpractices.

vii. Assessment of nutritional status of a community by adopting differentmethodologies.

viii. Nutritional supplementation, surveillance, education andrehabilitation.

ix. National programmes in nutrition and theirevaluation

x. National nutritionpolicy.

4. Environmental health learning objectives:

At the end of this course, the student should be able to: -

i. Highlight importance of external environment (air, water, noise, radiation, temperature, ventilation, solid waste disposal, insects and vectors, domestic and country yard pests, industrial waste disposal etc. and its impact on ecology and humanhealth.

ii. Elaborate on health issues related to housing, air, water, noise, radiation pollution i.e. sizes of problems, area and specific groups affected, measurement of pollution levels and health impact of the same, correctivemeasures

iii. Elaborate on requirements of water, water chlorination and household purification measures, measurement of chlorine demand, Break-point chlorination levels, waterquality.

iv. Assessment of quality of water and air, control of airpollution

v. Explain environmental sanitation and control measures (including appropriate technologies) – modern methods of sewage disposal, mechanical ventilation, soakage pits, gobar gas plants, smokeless Chula, solar energy, rainwater harvesting, sewage water recycling plants at society leveletc.

vi. Explain global warming and its healthimpact.

vii. Elaborate on forest reserves, social forestry andhealth

viii. Study vectors of medical importance and integrated control measures againstthem.

ix. Explain dynamics of transmission of vector bornediseases

x. Explain pest controlmeasures

xi. Explain environmental health issues in urban and rural areas

xii. Understand functioning of public sector measures to safeguard environmental health e.g water purificationplant

xiii. Explain Legislative measures for protection of environmentalhealth

5. Primary Health Care System, Panchayat Raj, National Health Programmesincluding RCH, Demography & FamilyWelfare:

Learning Objectives

At the end of this course, the student should be able to: -

i. Explain the meaning of Primary Health Care with suitable analogies with reference toIndia, andbe able to define the systems approach for implementation of Primary HealthCare.

ii. Enumerate the elements, principles, population coverage norms, staff patterns, day to day activities, programme schedule, stakeholders at PHClevel.

iii. Explain the scope and implications of 3-tier system of Primary HealthCare.

iv. Understand functioning of Rural Panchayat Raj system of development and its co-relation with health.

v. Promote community participation in Primary Health Care programme and motivate various stakeholders for thesame.

vi. Understand and comply with medico-legal procedures related to Primary Health Careactivities.

vii. Integrate, coordinate both health and non-health sectors for implementing various national health programmes.

viii. Deliver the provisions of various health schemes to eligible be beneficiaries such as Janani Suraksha Yojana, RashtriyaSwasthyaBeema Yojana, Rajiv Gandhi Jeevandayi Arogya Yojana etc.

ix. Impart training in health programmes for paramedical workers, lab technicians,community health volunteer's, interns and provide health education in thecommunity.

x. Implement Public Health Skills for investigations and containment of outbreaks &epidemics.

xi. Understand history of evolution of public health, important milestones in the world and inIndia.

xii. Enumerate the various health committees established and their major recommendations since 1947-48 to tilldate.

6. Health Care Administration, Health Management and Public HealthLeadership

Learning Objectives:

At the end of this course, the student should be able to:-

i. Explain the conceptual difference between Administration and Management, Power and Authority with reference to healthcare.

ii. Explain the role of fundamental principles of constitution, principles of Democracy and its correlation with health careadministration.

iii. Explain the role of Bureaucracy, Technocracy, Political system, Judiciary, Media and people in health careadministration.

iv. Explain and identify the key positions and their role in health administration at State, District, Taluka (Tehsil block) and villagelevel.

v. Explain the frame work of health care system at State, District, Taluka & village level and understand the mechanism of coordination between bureaucrats, technocrats, political, judiciary and media at each of theselevels.

vi. Enumerate functions of a manager, explain concepts of management and leadership styles, various management techniques, planning process, monitoring & evaluation skills.

vii. Should be sensitive to quality issues in health care management and comply with relevant quality managementtechniques.

viii. Formulate and manage team approach for implementing healthprogrammes.

ix. Apply skills of effective human resource management and identify relevant roles, responsibilities and duties offunctionaries.

x. Implement skills of motivation, communication, negotiation and conflict management at PHC level.

xi. Develop budgetary statements based on evidence of needs assessment and be able to maintain account of expenditure as pernorms.

xii. Undertake community health needs survey, conduct training & communication needs assessment of paramedical and health workers, identify vulnerable, underprivileged communities, implements high riskapproach.

7. Health Policy, Medical Education, Integrating Alternative system of Medicine

Learning Objectives

At the end of this course, the student should be able to:-

i. Understand and elaborate implications of the policy provision with reference to the current health scenario in thecountry.

ii. Explain the role of health policy in promotion of Primary Health care, ensuring equity, inter-sectoral co-ordination, appropriate technology and communityparticipation.

iii. Explain the various provisions for promotion of preventive and curative health services including National Health Mission, National Health Programs, Quality Hospital based services, Medical Education andAYUSH.

iv. Critically appreciate merits and demerits of the HealthPolicy.

v. Explain SWOT analysis of the policy and debate on evidence-based recommendations, additions and deletions.

vi. Debate on suggestions or recommendations for futureinclusions.

8. Social and behavioralsciences

Learningobjectives:

At the end of this course, the student should be able to:-

i. Understand influence of social and behavioral practices onhealth.

ii. Understand principles of behavior change of an individual and community. Clearly understand difference between knowledge, attitude andpractices.

iii. Understand importance of social medicine andhealth.

iv. Importance of behavior change communication(BCC).

v. Socio-cultural factors influencing behaviorchange.

vi. Formal and informal organizations in thecommunity.

vii. Influence of peerpressure.

viii. Know the health problems, where BCC interventions arenecessary.

ix. Understand factors promoting and detrimental toBCC.

9. Public Health Legislations Learning objectives:

At the end of this course, the student should be able to:-

i. Explain public health legislations and need for thesame.

ii. Know in detail each public health law – when, why, implementation, impact, issuesetc.

iii. Enforcement of various public healthlaws.

iv. Judiciary mechanism for ensuring proper implementation of public healthlaws.

v. Scope for integrated approach for implementation of public healthlaws.

10. International Health Learning Objectives:

At the end of this course, the student should be able to:-

i. Understand the need and scope for international healthmeasures.

ii. Enlist and understand functioning of various UN agencies (including WHO) playing key role in internationalhealth.

iii. Enlist and understand functioning of bilateral vs multilateral international donoragencies.

iv. Provide advice to international travelers and vaccinationrequirements

v. Understand International health control measures e.g. quarantine, airport managementetc.

vi. Understand the management of international ports from healthperspectives.

11. Occupational Health Learning Objectives:

At the end of this course, the student should be able to:-

i. Understand the concept of occupational health and its importance,Occupational environment and workdynamics.

ii. Know different types of occupational exposures at varioussettings.

iii. Enlist various occupational hazards and their relativemagnitude.

iv. Understand measurement of exposure levels to harmful influences duringoccupation.

v. Understand preventive and control measures against various occupational hazards – global, national and local levelmeasures.

vi. Understand individual and community responses towards preventing exposure tooccupational hazards.

vii. Understand and advise occupational safetymeasures.

viii. Understand legislative measures to prevent exposures to occupationalhazards.

ix. Advise compensation provisions to persons exposed to various occupationalhazards.

x. Understand occupational health problems amongst people in unorganizedsector

xi. Understand and advise social security and welfare provisions for workers –ESIS, Factory's Act, Role of ILO, Ministry of Labor, DGFASLI.

12. The recent advances in Public Health &miscellaneous issues Learning Objectives:

At the end of this course, the student should be able to:-

i. Identify & enlist events at local, district, national & global levels influencing or adversely affecting health /medical issues of thepopulation.

ii. Adopt & practice skills related to utilization of modern technology, software, IT application in the interest of health promotion & diseaseprevention.

Health Economics Learning Objectives:

At the end of this course, the student should be able to: -

i. Describe the scope of healtheconomics.

ii. Understand health market & itscharacteristics.

iii. Understand & apply economic evaluationtechniques.

iv. Assess the mechanism of Funding Health Care services, especially healthinsurance.

v. Advise on allocation of resources appropriately in their workarea.

TEACHING AND LEARNING METHODS

Teaching methodology

The following is a rough guideline to various teaching/learning activities that may be employed:

- **Journal Club:**Critical appreciation and discussion of research articles in indexedjournals
- **Seminar**
- **Lecture/Discussion:**Lectures on newer topics byfaculty
- **Case presentation:**Communicable disease case presentation (focus on epidemiology, control, prevention) or Family case (focus on health needs assessment, SWOT analysis of family, social determinants and social empowerment, community management, role of primary health care and mobilizing resources for empowerment of the family). PG students will present the cases in presence faculty and discuss various modalities ofmanagement.
- **Public Health Management training** in Immunization clinics, Disease Surveillance Units, General Preventive OPD, hands-on training in management of national health programs at urban health centre and rural health centre along with orientation in health administrative system.
- The PG student shall be required to participate in the teaching and training programme of Undergraduate student's andinterns.
- The PG student must have attended Mandatory training in Research Methodology during his tenure.
- A postgraduate student of a postgraduate degree course in broad specialties/super specialtieswould be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degreeexamination.
- Special Seminars / Workshops: conducted by External Faculty on cross-cutting subjects directly or indirectly concerned with Health. E.g.Critical appreciation of National Developmental Budget, delivered by prominentEconomist.
- **Log Book:** Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of work experience during their postings, including programs implemented under supervision and those performed independently. The log book shall be checked and assessed periodically by the faculty members imparting thetraining.
- Department should encourage e-learningactivities.

Postings are givenbelow:

Recommended schedule for three years training:

Orientation Training/Field postings for students of MD Community Medicine

1.	**Field Posting and work**	**Duration**
2. D	Posting at Sub-centers & PHCs Under & at RHTC and UHTC attached to Dept of Community Medicine as per MCI norm	Total period of ONE year during the 3 year period of PG course. Posting at RHTC should be residential.
u 3.	Posting in the teaching hospital for	Total - One month
r 4.	exposure to clinical departments namely	General Medicine-2 wks
i 5.	Pediatrics, OBGY & General medicine to	Pediatrics -1 wk
6.	acquire clinical skills for diagnosis and	Ob. &Gynae. -1 wk
n 7.	management of Communicable and Non-	Time of posting shall be at the
g 8.	Communicable Diseases	discretion of local feasibility
9. t	Work attachment to gain hands- on skills based, training in public health department & orientation in Health Administration and Management of various National Health	Total - One month Place & time of 2 postings of 2 wks each shall be at discretion of local feasibility.
h 10. e	Programmes and aspects of public health management at the offices of the DHO/DHS/THO/DTO/DMO/CDPO/MOH of Local Civic Body or district health authorities.	
t 11.	Short duration posting in various camps,	Total - one month
r 12.	melas, public health emergencies,	Minimum of four postings of 1wk
a 13.	investigation of epidemics, implementation	duration each shall be done subject to
i 14.	of NHP, linen dept of hospital, Hospital	local feasibility.
n 15.	kitchen, Hospital record section, central	
i 16.	drug store, Medical Supdt. Office, blood	
17.	bank, casualty dept., CCL, Hospital waste	
n 18.	management, ART-VCTC, Matron Office	
g 19.	(HRD), HMIS etc.	
20.	Visits to various institutions of Public Health Importance	Subject to local feasibility

Programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training may be as follows:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and

ability to practice in thesystem.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advanceslearning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self-directed learning andteaching**
4. **Departmental and interdepartmental learningactivity**
5. **External and Outreach Activities /CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. **Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory Examination:**

The Post Graduate examination shall be in three parts: -

Thesis: It should be submitted to the University by each post graduate student at least 6 months before the theory and clinical/practical examination. The thesis shall be examined by a minimum of three examiners, one internal and two external examiners, appointed by the university and who shall not be the examiners for theory and practical. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by twoexaminers.

Theory:

The examinations shall be organized on the basis of 'Grading'or 'marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

There shall be four theory papers as follows:

Paper I: Conceptual (and applied) understanding of Public Health, Community Medicine, Communicable and Non- Communicable diseases, emerging andre- emerging diseases, Applied Epidemiology, Health research,Bio-statistics.

Paper II: Nutrition, Environmental Health, Primary Health Care system, Panchayat Raj system, National health Programs, RCH, Demography and Family Welfare, Health Care Administration, Health Management and Public HealthLeadership.

Paper III: Social & Behavioral sciences- applied aspects, scientific communications & Medical writing, Research Methodology, Public Health Legislations, International Health & Global Diseases surveillance.

PaperIV: Health Policy planning, Medical Education technology, Information Technology, Integration of alternative Health system including AYUSH, Occupational Health, Recent advances in Public Health & Miscellaneous issues, Health Economics.

Practical/Clinical and oral examination:

The practical examination should be conducted over two days, not more than 8 post graduate students per batch, per day as follows:

1. **One long Family case from thecommunity**:

   Socio-economic, demographic, cultural and holistic history taking, of the family to understand the various risk factors affecting health and quality of life, assessment of social support system, assessment of present morbidity and its implications, evolve interventions for medical relief and social empowerment and role of family, community and primary health care system in resolving family issues. This shall be conducted preferably in the community setting.

2. **One long Case (30 minutes), 2 short cases (20 minutes each) – Cases withCommunicable Diseases**

   Students will elaborate on clinico-epidemiological case history to assess the epidemiological factors, precipitating factors, probable source of infection and evolve measures for diagnosis, treatment, management with reference to the case as well as major public health concerns, i.e.Control, prevention of the diagnosed disease and interventions in case of eminent outbreak / epidemic situations. Short cases may be assessed without presentation of detailed history, beginning with Differential Diagnosis in the given time.

3. **Epidemiology and Statistics problem-solving exercises(5): (Epidemiological – 3, Statistical –2)**
4. **Public Health Spots (5):**including interpretation of analytical reports of water, food, environmental assessment and public healthmicro-biology
5. **Viva-voce Examination**

   Oral/ Viva-Voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Recommended reading:

A. Books (latestedition)

1. Public Health and Preventive Medicine (Maxcy-Rosenau-Last Public Healthand Preventive Medicine) by Robert B.Wallace
2. Basic Epidemiology. R Bonita, R Beaglehole, T Kjellstrom. WorldHealth OrganizationGeneva.
3. Epidemiology, by LeonGordis.
4. Oxford Textbook of Public Health. Holland W, Detel R, KnowG.
5. Practical Epidemiology, by D.J.PBarker
6. Park's Textbook of Preventive and Social Medicine, byK.Park
7. Principles of Medical Statistics, by A. BradfordHill
8. Interpretation and Uses of Medical Statistics, by Leslie E Daly, Geoffrey J Bourke, James MCGilvray.
9. Epidemiology, Principles and Methods, by B. MacMahon, D. Trichopoulos, Hunter's Diseases of Occupations, by Donald Hunter, PAB Raffle, PH Adams, Peter J.Baxter, WR Lee.
10. Epidemiology and Management for Health Care for All, by Sathe PV and Sathe AP.
11. Vaccines, by Stanley A.Plotkin.
12. All reports and documents related to all National Programmes from the Ministry of Health and FamilyWelfare.

B. Journals

03-05 international Journals and 02 national (all indexed) journals

FACULTY OF MEDICINE

M.D. General Medicine

(Programme code – MM-10)

Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN GENERAL MEDICINE

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The competency-based training programme aims to produce a post-graduate student who after undergoing the required training should be able to deal effectively with the needs of the community and should be competent to handle all problems related to his/her specialty including recent advances. The student should also acquire skill in teaching of medical/para-medical students in the subject that he/she has received his/her training. He She should be aware of his/her limitations. The student is also expected to know the principles of research methodology and modes of accessing literature.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

The postgraduate training should enable the student to:

- Practice efficiently internal medicine specialty, backed by scientific knowledge including basic sciences and skills
- Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations
- Exercise empathy and a caring attitude and maintain professional integrity, honesty and high ethical standards

- Plan and deliver comprehensive treatment using the principles of rational drug therapy
- Plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty;
- Manage emergencies efficiently by providing Basic Life Support (BLS) and Advanced Life Support (ALS) in emergency situations
- Recognize conditions that may be outside the area of the specialty/ competence and refer them to an appropriate specialist
- Demonstrate skills in documentation of case details including epidemiological data
- Play the assigned role in the implementation of National Health Programs
- Demonstrate competence in basic concepts of research methodology and clinical epidemiology; and preventive aspects of various disease states
- Be a motivated 'teacher' - defined as one keen to share knowledge and skills with a colleague or a junior or any learner
- Continue to evince keen interest in continuing education irrespective of whether he/she is in a teaching institution or is practicing and use appropriate learning resources
- Be well versed with his medico-legal responsibilities

- Undertake audit, use information technology tools and carry out research - both basic and clinical, with the aim of publishing the work and presenting the work at scientific forums.
- The student should be able to recognize the mental condition characterized by self absorption and reduced ability to respond to the outside world (e.g. Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communications, etc.
- The intended outcome of a competency based program is a consultant specialist who can practice medicine at a defined level of competency in different practice settings. i.e. ambulatory (outpatient), inpatient, intensive care and emergency medicine.
- No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know his subject in depth; however, emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in skills commensurate with the specialty (actual hands-on training) must be ensured.

SUBJECT SPECIFIC COMPETENCIES

Cognitive domain

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

- Basics of human anatomy as relevant to clinical practice e.g. surface anatomy of various viscera, neuro-anatomy, important structures/organs location in different anatomical locations in the body; common congenital anomalies.
- Basic functioning of various organ-system, control of vital functions, patho-physiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.
- Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.
- Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.
- Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.
- Knowledge about various poisons with specific reference to different geographical and clinical settings, diagnosis and management.
- Research Methodology and Studies, epidemiology and basic Biostatistics.
- National Health Programmes.
- Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.
- Recent advances in relevant basic science subjects.

Systemic Medicine

Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bio-terrorism.

Aging and Geriatric Medicine including Biology, epidemiology and neuro-psychiatric aspects of aging.

Clinical Pharmacology - principles of drug therapy, biology of addiction and complementary and alternative medicine.

Genetics - Overview of the paradigm of genetic contribution to health and disease, principles of Human Genetics, single gene and chromosomal disorders and gene therapy.

Immunology - The innate and adaptive immune systems, mechanisms of immune mediated cell injury and transplantation immunology.

Cardio-vascular diseases - Approach to the patient with possible cardio-vascular diseases, heart failure, arrhythmias, hypertension, coronary artery disease, valvular heart disease, infective endocarditis, diseases of the myocardium and pericardium and diseases of the aorta and peripheral vascular system.

Respiratory system - approach to the patient with respiratory disease, disorders of ventilation, asthma, Congenital Obstructive Pulmonary Disease (COPD), Pneumonia, pulmonary embolism, cystic fibrosis, obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum.

Nephrology - approach to the patient with renal diseases, acid-base disorders, acute kidney injury, chronic kidney disease, tubulo-interstitial diseases, nephrolithiasis, Diabetes and the kidney, obstructive uropathy and treatment of irreversible renal failure.

Gastro-intestinal diseases - approach to the patient with gastrointestinal diseases, gastrointestinal endoscopy, motility disorders, diseases of the esophagus, acid peptic disease, functional gastrointestinal disorders, diarrhea, irritable bowel syndrome, pancreatitis and diseases of the rectum and anus.

Diseases of the liver and gall bladder - approach to the patient with liver disease, acute viral hepatitis, chronic hepatitis, alcoholic and non-alcoholic steatohepatitis, cirrhosis and its sequelae, hepatic failure and liver transplantation and diseases of the gall bladder and bile ducts.

Haematologic diseases - haematopoiesis, anemias, leucopenia and leukocytosis, myelo-proliferative disorders, disorders of haemostasis and haemopoietic stem cell transplantation.

Oncology - epidemiology, biology and genetics of cancer, paraneoplastic syndromes and endocrine manifestations of tumors, leukemias and lymphomas, cancers of various organ systems and cancer chemotherapy.

Metabolic diseases - Inborn errors of metabolism and disorders of metabolism.

Nutritional diseases - Nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.

Endocrine - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.

Rheumatic diseases - approach to the patient with rheumatic diseases, osteoarthritis, rheumatoid arthritis, spondyloarthropathies, systemic lupus erythematosus (SLE), polymyalgia, rheumatic fibromyalgia and amyloidosis.

Infectious diseases - Basic consideration in Infectious Diseases, clinical syndromes, community acquired clinical syndromes. Nosocomial infections, Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria, miscellaneous bacterial infections, Mycobacterial diseases, Spirochetal diseases, Rickettsia, Mycoplasma and Chlamydia, viral diseases, DNA viruses, DNA and RNA respiratory viruses, RNA viruses, fungal infections, protozoal and helminthic infections.

Neurology - approach to the patient with neurologic disease, headache, seizure disorders and epilepsy, coma, disorders of sleep, cerebrovascular diseases, Parkinson's disease and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.

The mental condition characterized by complete self-absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behavior and/or poor communication etc.

Dermatology - Structure and functions of skin, infections of skin, papulo-squamous and inflammatory skin rashes, photo-dermatology, erythroderma, cutaneous manifestations of systematic diseases, bullous diseases, drug induced rashes, disorders of hair and nails, principles of topical therapy.

Affective Domain:

a. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

b. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

c. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

Clinical Assessment Skills

- Elicit a detailed clinical history
- Perform a thorough physical examination of all the systems

Procedural skills

- Test dose administration
- Mantoux test
- Sampling of fluid for culture
- IV- Infusions
- Intravenous injections
- Intravenous canulation
- ECG recording
- Pleural tap

- Lumbar puncture
- Cardiac
- TMT
- Holter Monitoring
- Echocardiogram
- Doppler studies
- Cardio Pulmonary Resuscitation (CPR)
- Central venous line insertion, CVP monitoring
- Blood and blood components matching and transfusions Arterial puncture for ABG
- Fine needle aspiration cytology (FNAC) from palpable lumps
- Bone marrow aspiration and biopsy
- Abdominal paracentesis - diagnostic
- Aspiration of liver abscess
- Pericardiocentesis
- Joint fluid aspiration

- Liver biopsy
- Nerve/ muscle/ skin/ kidney/ pleural biopsy
- Ultrasound abdomen, echocardiography
- Upper GI endoscopy, procto-sigmoidoscopy

Respiratory management

- Nebulization
- Inhaler therapy
- Oxygen delivery
- ***Critically ill person***
- Monitoring a sick person
- Endotracheal intubation
- CPR
- Using a defibrillator
- Pulse oximetry
- Feeding tube/Ryle's tube, stomach wash
- Naso-gastric intubation
- Urinary catheterization – male and female
- Prognostication
- Haemodialysis

Neurology- interpret

Nerve Conduction studies EEG

- Evolved Potential interpretation Certification of Brain death
- Intercostal tube placement with underwater seal Thoracocentesis
- Sedation
- Analgesia

Laboratory-Diagnostic Abilities

- Urine protein, sugar, microscopy

- Peripheral blood smear
- Malarial smear
- Ziehl Nielson smear-sputum, gastric aspirate

- Gram's stain smear-CSF, pus
- Stool pH, occult blood, microscopy
- KOH smear
- Cell count - CSF, pleural, peritoneal, any serous fluid

Observes the procedure

- Subdural, ventricular tap
- Joint Aspiration – Injection

Endoscopic Retrograde Cholangio- Pancreatography (ERCP)

- Peritoneal dialysis

Interpretation Skills

Clinical data (history and examination findings), formulating a differential diagnosis in order of priority, using principles of clinical decision making, plan investigative work-up, keeping in mind the cost-effective approach i.e. problem solving and clinical decision-making.

- Blood, urine, CSF and fluid investigations - hematology, biochemistry
- X-ray chest, abdomen, bone and joints
- ECG
- Treadmill testing
- ABG analysis
- Ultrasonography
- CT scan chest and abdomen
- CT scan head and spine
- MRI
- Barium studies
- IVP, VUR studies
- Pulmonary function tests
- Immunological investigations
- Echocardiographic studies

Interpretation under supervision

- Hemodynamic monitoring
- Nuclear isotope scanning
- MRI spectroscopy/SPECT

- Ultrasound guided aspiration and biopsies

Communication skills

- While eliciting clinical history and performing physical examination Communicating health, and disease
- Communicating about a seriously ill or mentally abnormal Communicating death
- Informed consent
- Empathy with patient and family members
- Referral letters, and replies

- Discharge summaries
- Death certificates
- Pre-test counseling for HIV
- Post-test counseling for HIV
- Pedagogy -teaching students, other health functionaries-lectures, bedside clinics, discussions
- Health education - prevention of common medical problems, promoting healthy life-style, immunization, periodic health screening, counseling skills in risk factors for common malignancies, cardiovascular disease, AIDS
- Dietary counseling in health and disease
- Case presentation skills including recording case history/examination, preparing follow-up notes, preparing referral notes, oral presentation of new cases/follow-up cases
- Co-coordinating care - team work (with house staff, nurses, faculty etc.)
- Linking patients with community resources
- Providing referral
- Genetic counseling

Others

Demonstrating professionalism ethical behavior (humane and professional care to patients)

Utilization of information technology

Medline search, Internet access, computer usage *Research methodology* designing a study interpretation and presentation of scientific data

Self-directed learning

- Identifying key information sources
- literature searches

- Information management

Therapeutic decision-making

1. managing multiple problems simultaneously
2. assessing risks, benefits and costs of treatment options
3. involving patients in decision-making
4. selecting specific drugs within classes
5. Rational use of drugs

Syllabus

Course contents:

Basic Sciences

1. Basics of human anatomy as relevant to clinical practice surface anatomy of various viscera neuro-anatomy important structures/organs location in different anatomical locations in the body common congenital anomalies
2. Basic functioning of various organ-system, control of vital functions, patho-physiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.
3. Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.
4. Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.
5. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.

6. Knowledge about various poisons with specific reference to different geographical and clinical settings, diagnosis and management.

7. Research Methodology and Studies, epidemiology and basic Biostatistics.

8. National Health Programmes.

9. Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.

10. Recent advances in relevant basic science subjects.

11. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bio-terrorism.

12. Aging and Geriatric Medicine:

- Biology
- Epidemiology
- Neuro-psychiatric aspects of aging

13. Clinical Pharmacology:

- Principles of drug therapy biology of addiction
- Complementary and alternative medicine

14. Genetics:

Overview of the paradigm of genetic contribution to health and disease principles of Human Genetics single gene and chromosomal disorders gene therapy

15. Immunology:

Innate and adaptive immune systems mechanisms of immune mediated cell injury transplantation immunology

16. Cardio-vascular diseases:

Approach to the patient with possible cardio-vascular diseases heart failure arrhythmias hypertension coronary artery disease valvular heart disease infective endocarditis diseases of the myocardium and pericardium diseases of the aorta and peripheral vascular system

17. Respiratory system:

Approach to the patient with respiratory disease disorders of ventilation asthma Congenital Obstructive Pulmonary Disease (COPD) Pneumonia pulmonary embolism cystic fibrosis Obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum

18. Nephrology:

Approach to the patient with renal diseases acid-base disorders acute kidney injury, chronic kidney disease, tubulo-interstitial diseases nephrolithiasis, Diabetes and the kidney and Obstructive uropathy and treatment of irreversible renal failure

19. Gastro-intestinal diseases:

Approach to the patient with gastrointestinal diseases gastrointestinal endoscopy motility disorders diseases of the esophagus acid peptic disease functional gastrointestinal disorders diarrhea irritable bowel syndrome pancreatitis and diseases of the rectum and anus

20. Diseases of the liver and gall bladder:

Approach to the patient with liver disease acute viral hepatitis chronic hepatitis alcoholic and non-alcoholic steatohepatitis cirrhosis and its sequelae hepatic failure and liver transplantation diseases of the gall bladder and bile ducts

21. Haematologic diseases:

Haematopoiesis Anaemias leucopenia and leucocytosismyelo-proliferative disorders disorders of haemostasis and haemopoietic stem cell transplantation

22. Oncology:

Epidemiology biology and genetics of cancer paraneoplastic syndromes and endocrine manifestations of tumours leukemias and lymphomas cancers of various organ systems and cancer chemotherapy

23. Metabolic diseases - inborn errors of metabolism and disorders of metabolism.

24. Nutritional diseases - nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.

25. Endocrine - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.

26. Rheumatic diseases:

Approach to the patient with rheumatic diseases osteoarthritis rheumatoid arthritis spondyloarthropathies systemic lupus erythematosus (SLE) polymyalgia rheumatic fibromyalgia and amyloidosis

27. Infectious diseases:

Basic consideration in Infectious Diseases clinical syndromes community acquired clinical syndromes Nosocomial infections Bacterial diseases - General consideration,

diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria

- Miscellaneous bacterial infections o Mycobacterial diseases
- Spirochetal diseases o Rickettsia
- Mycoplasma and Chlamydia o Viral diseases
- DNA viruses
- DNA and RNA respiratory viruses o RNA viruses
- Fungal infections, protozoal and helminthic infections.

28. **Neurology -** approach to the patient with neurologic disease, headache, seizure disorders and epilepsy, coma, disorders of sleep, cerebrovascular diseases, Parkinson's disease and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.

29. The mental condition characterized by complete self-absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behavior and/or poor communication etc.

30. **Dermatology:**

Structure and functions of skin infections of skin papulo-squamous and inflammatory skin rashes photo-dermatology erythroderma cutaneous manifestations of systematic diseases bullous diseases drug induced rashes. disorders of hair and nails, principles of topical therapy

TEACHING AND LEARNING METHODS

Didactic lectures are of least importance; seminars, journal clubs, symposia, reviews, and guest lectures should get priority for acquiring theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. Students should have hands-on training in performing various procedures and ability to interpret results of various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures should be given.

Importance should be attached to ward rounds especially in conjunction with emergency admissions. Supervision of work in outpatient department should cover the whole range of work in the unit. It is particularly necessary to attend sub-specialty and symptom specific clinics. The development of independent skills is an important facet of postgraduate training. Joint meetings with physician

colleagues, e.g. radiologists and pathologists play a valuable part in training.

The training techniques and approach should be based on principles of adult learning. It should provide opportunities initially for practicing skills in controlled or simulated situations. Repetitions would be necessary to become competent or proficient in a particular skill. The more realistic the learning situation, the more effective will be the learning. Clinical training should include measures for assessing competence in skills being taught and providing feedback on progress towards a satisfactory standard of performance. Time must be available for academic work and audit.

The following is a rough guideline to various teaching/learning activities that may be employed:

1. Intradepartmental and interdepartmental conferences related to case discussions.

2. Ward rounds along with emergency admissions.

3. Attendance at sub-specialty and symptom specific clinics

4. external rotation postings in departments like cardiology, neurology and other subspecialties

5. Skills training

6. Conferences, Seminars, Continuing Medical Education (CME) Programmes.

7. Journal Club

8. Research Presentation and review of research work.

9. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

10. Participation in workshops, conferences and presentation of papers etc.

11. Maintenance of records. **Log books** should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.

12. Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

13. Department should encourage e-learning activities.

Illustration of Structured Training

Time Period	Description / Levels	Content	Responsibilities
1st Month	Orientation	Basic cognitive skills	- Combined duties - Supervised procedures

I year	Beginners	Procedural abilities OPD & ward work	- History sheet writing - Clinical abilities, - Procedural abilities (PA, PI)*, - Laboratory-diagnostic (All PI) - Communication skills O,A,PA - BLS & ACLS
IInd Year	Intermediate	Intermediate degree of cognitive abilities Specialised procedural skills Emergency	- Independent duties - All procedures - Respiratory management abilities (All PI) - Communication skills (PA, PI) - Writing thesis - Teaching UGs
IIIrdyear		Special skills, Intensive critical care	- Advanced levels of independent duti - Casualty calls - ICU, NICU - UG teaching

Specialized skills include exchange transfusions, intercostals drainage, peritoneal dialysis, defibrillation/ cardioversion etc.

Levels of necessary cognitive skills are best illustrated by the following:

Basic: history taking, diagnosis/differential diagnosis, points for and against eachdiagnosis

Intermediate: detailed discussion on differential diagnoses, analysis and detailedinterpretation of clinical and laboratory data;

Advanced : Analysis of clinical information and synthesis of reasonable conceptsincluding research ideas.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in the medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care,

procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self-directed learning and teaching**
4. **Departmental and interdepartmental learning activity**
5. **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, namely, assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post graduate examination shall be in three parts:

1. **Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theoryand Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory:

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There will be four theory papers, as below:

Paper I: Basic Medical Sciences (at the end of first year of training)

Paper II: Medicine and allied specialties including pediatrics, dermatology & psychiatry

Paper III: Tropical Medicine and Infectious Diseases

Paper IV: Recent Advances in Medicine

3. Clinical / Practical and Oral/viva voce Examination:

- The final clinical examination should include:
- Cases pertaining to major systems
- Stations for clinical, procedural and communication skills
- Log Book Records and day-to-day observation during the training
- Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject

Recommended Reading

Text Books (latest edition)

1. API Text book of Medicine

2. Davidson's Principles and Practice of Medicine

3. Harrison's Principles & Practice of Medicine

4. Oxford Text book of Medicine

5. Kumar & Clark: Book of Clinical Medicine

6. Cecil: Text Book of Medicine

Reference books

1. Hurst: The Heart

2. Braunwald - Heart Disease: A Textbook of Cardiovascular Medicine

3. Marriot's Practical Electrocardiography

4. Crofton and Douglas : Respiratory Diseases

5. Brain's Diseases of the Nervous system

6. Adam's Principles of Neurology

7. William's Text Book of Endocrinology

8. De Gruchi's Clinical Hematology in Medical Practice

9. Kelly's Text Book of Rheumatology

10. Slesenger&Fordtran: Gastrointestinal and Liver disease

11. Manson's Tropical Diseases

Clinical Methods

1. Hutchinson's Clinical Methods
2. Macleod's Clinical examination
3. John Patten: Neurological Differential Diagnosis
4. Neurological examination in Clinical Practice by Bickerstaff

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.S. General Surgery
(Programme code – MM-11)
Year of Implementation: 2009-2010

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN GENERAL SURGERY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle effectively medical / surgical problems and should be aware of the recent advances pertaining to his specialty. The PG student should be competent to provide professional services with empathy and humane approach. The PG student should acquire the basic skills in teaching of medical / para-medical students and is also expected to know the principles of research methodology and self-directed learning for continuous professional development.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

Clinical Objectives

At the end of postgraduate training, the PG student should be able to: -

- Diagnose and appropriately manage common surgical ailments in a given situation.
- Provide adequate preoperative, post-operative and follow-up care of surgical patients.
- Identify situations calling for urgent or early surgical intervention and refer at the optimum time to the appropriate centers.
- Counsel and guide patients and relatives regarding need, implications and problems of surgery in the individual patient.
- Provide and coordinate emergency resuscitative measures in acute surgical situations including trauma.
- Organize and conduct relief measures in situations of mass disaster including triage.
- Effectively participate in the National Health Programs especially in the Family Welfare Programs.
- Discharge effectively medico-legal and ethical responsibilities and practice his specialty ethically.

- Must learn to minimize medical errors.
- Must update knowledge in recent advances and newer techniques in the management of the patients.
- Must learn to obtain informed consent prior to performance of operative procedure.
- Perform surgical audit on a regular basis and maintain records (manual and/or electronic) for life.
- Participate regularly in departmental academic activities by presenting Seminar, Case discussion, Journal Club and Topic discussion on weekly basis and maintain logbook.
- Demonstrate sufficient understanding of basic sciences related to his specialty.
- Plan and advice measures for the prevention and rehabilitation of patients belonging to his specialty.

Research:

The student should:

- Know the basic concepts of research methodology plan a research project and know how to consult library.
- Should have basic knowledge of statistics.

Teaching:

The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.

Professionalism:

The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.

The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.

The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

Demonstrate knowledge of applied aspects of basic sciences like applied anatomy, physiology, biochemistry, pathology, microbiology and pharmacology.

Demonstrate knowledge of the bedside procedures and latest diagnostics and therapeutics available.

Describe aetoiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adults and children.

Demonstrate the theoretical knowledge of general principles of surgery.

Demonstrate the theoretical knowledge of systemic surgery including disaster management and recent advances.

Demonstrate the theoretical knowledge to choose, and interpret appropriate diagnostic and therapeutic imaging including ultrasound, Mammogram, CT scan, MRI.

Demonstrate the knowledge of ethics, medico-legal aspects, communication skills and leadership skills. The PG student should be able to provide professional services with empathy and humane approach.

B. Affective domain

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports, obtain a proper relevant history and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Obtain informed consent for any examination/procedure and explain to the patient and attendants the disease and its prognosis with a humane approach.

Provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

C. Psychomotor domain

Perform a humane and thorough clinical examination including internal examinations and examinations of all organs/systems in adults and children write a complete case record with all necessary details.

- Arrive at a logical working diagnosis / differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance (need based).
- Choose, perform and interpret appropriate imaging in trauma - ultrasound FAST (Focused Abdominal Sonography in Trauma).
- Perform minor operative procedures and common general surgical operations independently and the major procedures under guidance.

- Provide basic and advanced lifesaving support services in emergency situations
- Provide required immediate treatment and comprehensive treatment taking the help of specialist as required.
- Perform minimally invasive surgery in appropriate clinical settings. Must have undergone basic training in operative laparoscopy related to general and GI Surgery.
- Undertake complete patient monitoring including the preoperative and post operative care of the patient.
- Write a proper discharge summary with all relevant information.

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. She/he is expected to know the subject in depth, however, emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in surgical skills commensurate with the specialty (actual hands - on training) must be ensured.

General topics:

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to his specialty. Further, the student should acquire in-depth knowledge of his subject including recent advances and should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

- History of medicine with special reference to ancient Indian texts
- Health economics - basic terms, health insurance
- Medical sociology, doctor-patient relationship, family adjustments in disease, organizational behaviour, conflict resolution
- Computers - record keeping, computer aided learning, virtual reality, robotics
- Hazards in hospital and protection: AIDS, hepatitis B, tuberculosis, radiation, psychological
- Environment protection - bio-medical waste management
- Surgical audit, evidence based surgical practice, quality assurance
- Concept of essential drugs and rational use of drugs

- Procurement of stores and material & personal management
- Research methodology - library consultation, formulating research, selection of topic, writing thesis protocol, preparation of consent form from patients
- Bio-medical statistics, clinical trials
- Medical ethics
- Consumer protection
- Newer antibiotics
- Problem of resistance.
- Sepsis - SIRS
- Nosocomial infection
- Advances in imaging technologies
- Disaster management, mass casualties, Triage
- O.T. design, technologies, equipment
- Critical care in surgical practice
- Response to trauma
- Wound healing
- Fluid and electrolyte balance
- Nutrition
- Blood transfusion
- Brain death
- Cadaveric organ retrieval

Systemic Surgery

The student must acquire knowledge in the following important topics are but teaching should not be limited to these topics. A standard text-book may be followed, which will also identify the level of learning expected of the trainees.

- Wound healing including recent advances
- Asepsis, antisepsis, sterilization and universal precaution surgical knots, sutures, drains, bandages and splints surgical infections, causes of infections, prevention
- Common aerobic and anaerobic organisms and newer organisms causing infection including *Helicobacter Pylori*
- Tetanus, gas gangrene treatment & prevention Chronic specific infections TB, Filariasis

- Boils, cellulites, abscess, narcotizing fasciitis and synergistic infection
- Antibiotic therapy rationale including antibiotic prophylaxis, misuse, abuse
- Hospital acquired nosocomial infection causes and prevention including MRSA etc.
- HIV, AIDS and Hepatitis B & C, Universal precautions when dealing with patients suffering from these diseases
- Fluid and electrolyte balance including acid – base disturbance, consequences, interpretation of blood gas analysis data and management
- Rhabdomyolysis and prevention of renal failure

- Shock (septicaemic, hypovolemic, Neurogenic, anaphylactic), etiology, pathophysiology and management
- Blood and blood components, transfusion indication, contraindication, mismatch and prevention and management of complications of massive blood transfusion
- Common preoperative preparation (detailed preoperative workup, risk assessment according to the disease and general condition of the patient as per ASA grade) and detailed postoperative complications following major and minor surgical procedures
- Surgical aspects of diabetes mellitus particularly management of diabetic foot and gangrene, preoperative control of diabetes, consequences of hypo- and hyper-glycaemia in a postoperative setting
- Consequences and management of bites and stings including snake, dog, human bites
- Mechanisms and management of missile, blast and gunshot injuries
- Organ transplantation: Basic principles including cadaver donation, related Human Organ Transplant Acts, ethical and medicolegal aspects.
- Nutritional support to surgical patients
- Common skin and subcutaneous condition Sinus and fistulae, pressure sores
- Acute arterial occlusion, diagnosis and initiate management Types of gangrene, Burger's disease and atherosclerosis
- Investigations in case of arterial obstruction, amputation, vascular injuries: basic principles and management
- Venous disorders: Varicose veins
- Diagnosis, principles of therapy, prevention of DVT: basic principles and management
- Lymphatic: Diagnosis and principles of management of lymphangitis and lymphedema

Surgical management of Filariasis

Burns: causes, prevention and management Wounds of scalp and its management

- Recognition, diagnosis and monitoring of patients with head injury, Glasgow coma scale
- Undergo advanced trauma and cardiac support course (certified) before appearing in final examination
- Recognition of acute cerebral compression, indication for referrals. Cleft lip and palate
- Leukoplakia, retention cysts, ulcers of tongue
- Oral malignancies
- Salivary gland neoplasms
- Branchial cyst, cystic hygroma
- Cervical lymphadenitis nonspecific and tuberculous, metastatic lymph nodes and lymphomas.
- Diagnosis and principles of management of goitre Thyroglossal cyst and fistula
- Thyrotoxicosis
- Thyroid neoplasms
- Management of solitary thyroid nodule Thoracic outlet syndrome
- Management of nipple discharge Breast abscess
- Clinical breast examination, breast self-examination Screening and investigation of breast lump
- Concept of Single Stop Breast Clinic
- Cancer breast diagnosis, staging and multimodality management (common neoadjuvant and adjuvant and palliative chemotherapy protocols and indications of radiation and hormonal therapy, pathology and interpretation of Tumour Markers, breast cancer support groups and counseling)
- Recognition and treatment of pneumothorax, haemothorax
- Pulmonary embolism: Index of suspicion, prevention/recognition and treatment Flail chest, stove in chest
- Postoperative pulmonary complication Empyema thoracis
- Recognition of oesophgeal atresia and principles of management Neoplasms of the lung including its prevention by tobacco control
- Cancer oesophagus: principles of management including importance of early detection and timely referral to specialist
- Achalasia cardia
- Gastro-esophageal reflux disease (GERD) Congenital hypertrophic pyloric stenosis

- Aetiopathogenesis, diagnosis and management of peptic ulcer including role of H. Pylori and its diagnosis and eradication
- Cancer stomach
- Signs and tests of liver dysfunction
- Amoebic liver abscess and its non-operative management
- Hydatid cyst and its medical and surgical management including laparoscopic management
- Portal hypertension, index of suspicion, symptoms and signs of liver failure and timely referral to a specialist center
- Obstructive jaundice with emphasis on differentiating medical vs surgical Jaundice, algorithm of investigation, diagnosis and surgical treatment options
- Neoplasms of liver Rupture spleen
- Indications for splenectomy
- Clinical features, diagnosis, complications and principles of management of cholelithiasis and cholecystitis including laparoscopic cholecystectomy
- Management of bile duct stones including endoscopic, open and laparoscopic management
- Carcinoma gall bladder, incidental cancer gallbladder, index of suspicion and its staging and principles of management
- Choledochal cyst
- Acute pancreatitis both due to gallstones and alcohol Chronic pancreatitis
- Carcinoma pancreas

Peritonitis: causes, recognition, diagnosis, complications and principles of management with knowledge of typhoid perforation, tuberculous peritonitis, postoperative peritonitis

- Abdominal pain types and causes with emphasis on diagnosing early intra-abdominal acute pathology requiring surgical intervention
- Intestinal amoebiasis and other worms manifestation (Ascariasis) and their surgical complications (Intestinal Obstruction, perforation, gastrointestinal bleeding, involvement of biliary tract)
- Abdominal tuberculosis both peritoneal and intestinal Intestinal obstruction

Appendix: Diagnosis and management of acute appendicitisAppendicular lump and abscess

Colon

- Congenital disorders, Congenital megacolon Colitis infective / non infective
- Inflammatory bowel diseases
- Premalignant conditions of large bowel Ulcerative colitis

- Carcinoma colon
- Principles of management of types of colostomy

Rectum and Anal Canal:

- Congenital disorders, Anorectal anomalies Prolapse of rectum
- Carcinoma rectum
- Anal Canal: surgical anatomy, features and management of fissures, fistula - in – ano.
- Perianal and ischiorectal abscess
- Haemorrhoids – Non-operative outpatient procedures for the control of bleeding (Banding, cryotherapy, injection) operative options - open and closed hemorrhoidectomy and stapled hemorrhoidectomy
- Anal carcinoma
- Clinical features, diagnosis, complication and principles of management of inguinal hernia including laparoscopic repair
- Umbilical, femoral hernia and epigastric hernia
- Open and Laparoscopic repair of incisional/primary ventral hernia Urinary symptoms and investigations of urinary tract
- Diagnosis and principles of management of urolithiasis
- Lower Urinary tract symptoms or prostatism
- Benign prostatic hyperplasia; diagnosis and management Genital tuberculosis in male
- Phimosis and paraphimosis Carcinoma penis
- Diagnosis and principles of treatment of undescended testis Torsion testis
- Hydrocele, haematocele and pyocele Varicocele: Diagnosis (Medical Board for fitness)

Varicocele: Diagnosis (Medical Board for fitness) Acute and chronic epididymo-orchitis

- Testicular tumors
- Principles of management of urethral injuries Management of soft tissue sarcoma
- Prosthetic materials used in surgical practice Telemedicine, teleproctoring and e-learning Communication skills
- A student should be expert in good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumber puncture etc. The student should be able to choose the required investigations.

Clinical cases and Symptoms-based approach to the patient with:

1. Solitary nodule of the thyroid
2. Lymph node in the neck
3. Suspected breast lump
4. Benign breast disease
5. Acute abdominal pain
6. Blunt Trauma Abdomen
7. Gall stone disease
8. Dysphagia
9. Chronic abdominal pain
10. Epigastric mass
11. Right hypochondrium mass
12. Right iliac fossa mass
13. Renal mass
14. Inguino-scrotal swelling
15. Scrotal swelling
16. Gastric outlet obstruction
17. Upper gastrointestinal bleeding
18. Lower gastrointestinal bleeding
19. Anorectal symptoms
20. Acute intestinal obstruction
21. Obstructive jaundice
22. Acute retention of Urine
23. Bladder outlet obstruction
24. Haematuria
25. Peripheral vascular disease
26. Varicose veins
27. New born with developmental anomalies
28. Hydronephrosis, Pyonephrosis, perinephric abscess
29. Renal tuberculosis
30. Renal tumors
31. Carcinoma prostate
32. Genital tuberculosis in male

At the end of the course, post graduate students should be able to perform independently (including perioperative management) the following:

- Start IV lines and monitor infusions Start and monitor blood transfusion Venous cut-down
- Start and manage a C.V.P. line
- Conduct CPR (Cardiopulmonary resuscitation)
- Basic/ advance life support Endotracheal intubation
- Insert nasogastric tube Proctoscopy
- Urethral catheterization
- Surgical management of wounds Biopsies including image guided
- Manage pneumothorax / pleural space collections Infiltration, surface and digital Nerve blocks
- Incise and drain superficial abscesses Control external hemorrhage
- Vasectomy (Preferably non-scalpel) Circumcision
- Surgery for hydrocele Surgery for hernia
- Surgery and Injection/banding of piles Management of all types of shock
- Assessment and management of burns Hemithyroidectomy
- Excision of thyroglossal cyst
- Excision Biopsy of Cervical Lymphnode
- Excision of benign breast lump
- Modified Radical mastectomy Axillary Lymphnode Biopsy Excision of gynecomastia
- Excision of skin and subcutaneous swellings Split thickness skin graft
- Management of hernias
- Laparoscopic and open cholecystectomy Management of Liver abscess
- Appendectomy
- Management of intestinal obstruction, small bowel resection, perforation and anastomosis
- Colostomy

The student must have observed or assisted (the list is illustrative) in the following:

- Hartmann's procedure for cancer rectum Splenectomy (emergency)
- Stomach perforation Varicose Vein surgery
- Craniotomy (Head Injury) Superficial parotidectomy
- Submandibular gland excision

- Soft tissue tumors including sarcoma Pancreaticoduodenal resection
- Hydatid cyst liver pancreatic surgery
- Retroperitoneal operations

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted.

Clinical postings

A major portion of posting should be in General Surgery. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

Inter-unit rotation in the department should be done for a period of up to one year.

Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

Log book: Each student must be asked to present a specified number of cases forclinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

Thesis writing and research: Thesis writing is compulsory.

The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present

one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.

Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include: Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in

POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination will be in three parts:

Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences

Paper II: Principles and Practice of Surgery

Paper III: Principles and practice of Operative Surgery

Paper IV: Recent Advances in Surgery

Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/Teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective structured clinical examination.(OSCE)

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures.

Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

Text Book of Surgery, by Christopher Davis

- ASI Text Book of Surgery
- Surgery of Colon, Rectum and Anal canal, by Goligher J C
- Schwartz Text Book of Surgery
- Textbook on Laparoscopic Surgery
- Trauma (Mattox)
- Recent Advances in Surgery
- Year Book of Surgery
- Surgical Clinics of North America
- Short practice of Surgery by Bailey and Love
- A manual of clinical Surgery, by S Das
- Hamilton Bailey's demonstration of clinical signs
- Pye's Surgical Handicraft

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.S. Obstetrics & Gynecology
(Programme code – MM-21)

Year of Implementation: 2001-2002

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OBSTETRICS AND GYNECOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS Obstetrics and Gynaecology is to standardize Obstetrics & Gynaecology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent Obstetrician and Gynaecologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

Programme Objectives

The **goal** of the MS course in Obstetrics and Gynaecology is to produce a competent Obstetrician and Gynaecologist who can:

- Provide quality care to the community in the diagnosis and management of Antenatal, Intra-natal and Post-natal period of normal and abnormal pregnancy and labor.
- Provide effective and adequate care to a pregnant woman with complicated pregnancy.
- Provide effective and adequate care to a normal and high-risk neonate.
- Perform obstetrical ultrasound in normal and abnormal pregnancy including Doppler.
- Manage effectively all obstetrical and gynecological emergencies and ifnecessary, make appropriate referrals.
- Provide quality care to the community in the diagnosis and management of gynaecological problems including screening, and management of all gynecological cancers including during pregnancy.

- Conduct a comprehensive evaluation of infertile couple and have a broad based knowledge of assisted reproductive techniques including – ovulation induction, *invitro* fertilization and intra-cytoplasmic sperm injection, gamete donation,surrogacy and the legal and ethical implications of these procedures.
- Provide counseling and delivery of fertility regulation methods including reversible and irreversible contraception, emergency contraception etc.
- Provide quality care to women having spontaneous abortion or requesting Medical Termination of Pregnancy (MTP) and manage their related complications.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

At the end of the MS Course in Obstetrics and Gynaecology, the student should have acquired knowledge in the following:

1. Recognizes the health needs of women and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics

2. Has acquired the competencies pertaining to Obstetrics and Gynaecology that are required to be practiced in the community and at all levels of health system

3. On genetics as applicable to Obstetrics.

4. Onbenign and malignant gynecological disorders. on Gynecological Endocrinology and infertility.

5. On interpretation of various laboratory investigations and other diagnostic modalities in Obstetrics & Gynecology.

6. On essentials of Pediatric and adolescent Gynecology.

7. Oncare of postmenopausal women and geriatric Gynecology. on elementary knowledge of female breast & its diseases.

8. On vital statistics in Obstetrics & Gynecology.

9. Anesthesiology related to Obstetrics & Gynecology.

10. Reproductive and Child Health, family welfare & reproductive tract infections.

11. STD and AIDS & Government of India perspective on women's health related issues.

12. Medico-legal aspects in Obstetrics & Gynecology. Asepsis, sterilization and disposal of medical waste.

13. be able to effectively communicate with the family and the community

14. Is aware of the contemporary advances and developments in medical sciences as related to

Obstetrics and Gynaecology.

15. Maintain medical records properly and know the medico-legal aspects in respect of Obstetrics & Gynecology

16. Understands the difference between audit and research and how to plan a research project and demonstrate the skills to critically appraise scientific data and literature

17. Has acquired skills in educating medical and paramedical professionals

Ethical and Legal Issues:

The post graduate student should understand the principles and legal issues surrounding informed consent with particular awareness of the implication for the unborn child, postmortem examinations consent to surgical procedures including tubal ligation/vasectomy, parental consent and medical certification, research and teaching and properly maintain medical records.

Risk Management:

The post graduate student should demonstrate a working knowledge of the principles of risk management and their relationship to clinical governance and complaints procedures.

Confidentiality:

The post graduate student should:

1. Be aware of the relevant strategies to ensure confidentiality and when it might be broken.

2. Understand the principles of adult teaching and should be able to teach common practical procedures in Obstetrics and Gynaecology and involved in educational programme in Obstetrics and Gynaecology for medical and paramedical staff.

3. Be abreast with all recent advances in Obstetrics and Gynaecology and practice evidence based medicine.

Use of information technology, audits and standards:

The post graduate student should:

1. Acquire a full understating of all common usage of computing systems including the principles of data collection, storage, retrieval, analysis and presentation.

2. Understand quality improvement and management and how to perform, interpret and use of clinical audit cycles and the production and application of clinical standards, guidelines and protocols.

3. Understand National Health Programmes related to Obstetrics and Gynaecology and should be aware of all the Acts and Laws related to specialty.

Health of Adolescent Girls and Post-Menopausal Women

The student should:

1. Recognize the importance of good health of adolescent and postmenopausal women.
2. Identification and management of health problems of post-menopausal women.
3. Understanding and planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
4. Education regarding rights and confidentiality of women's health, specifically
5. Related to reproductive function, sexuality, contraception and safe abortion. Geriatric problems.

Reproductive Tract and 'HIV' Infection

1. Epidemiology of RTI and HIV infection in Indian women of reproductive age group.
2. Cause, effect and management of these infections.
3. HIV infections in pregnancy, its effects and management.
4. Relationship of RTI and HIV with gynaecological disorders. Planning and implementation of preventive strategies.

Medico-legal Aspects

1. Knowledge and correct application of various Acts and Laws while practicing Obstetrics and Gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
2. Knowledge of importance of proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
3. Knowledge of steps recommended for examination and management of rape cases.
4. Knowledge of steps taken in the event of death of a patient.

Affective domain

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

At the end of the course, the student should acquire following clinical & operative skills and be able to:

Operative Skills in Obstetrics and Gynaecology

Adequate proficiency in common minor and major operations, post-operative management and management of their complications.

- Operative procedures which must be done by P G students during training period:

(in graded manner - assisting, operating with senior person assisting, operating under supervision)

(Operations MUST BE DONE/OBSERVED during PG training programme and log book maintained)

Obstetrics:

Venesection, culdocentesis, Conduct normal deliveries Episiotomy and its repair**,** Application of forceps and ventouse (10).

- Carry out caesarian section delivery (10 must be done)
- Manual removal of placenta
- Management of genital tract obstetrical injuries.
- Post partum sterilization/Minilap tubal ligation (20 must be done)
- Medical termination of pregnancy - various methods (20 must be done)

Gynaecology:

- Endometrial / cervical biopsy
- Dilatation and curettage
- Culdocentesis, Colpotomy
- Opening and closing of abdomen (10 must be done)
- Operations for pelvic organ prolapse
- Ovarian cyst operation
- Operation for ectopic pregnancy
- Vaginal and abdominal hysterectomy

Operations must be OBSERVED and/or ASSISTED when possible:

- Internal podalic version Caesarean Hysterectomy
- Internal iliac artery ligation
- Destructive obstetrical operations
- Tubal microsurgery
- Radical operations for gynaec malignancies Repair of genital fistulae
- Operations for incontinence
- Myomectomy, Laparoscopic and hysteroscopic surgery

Diagnostic Procedures

1. Interpretation of x-rays - Twins, common fetal malformations / mal-presentations, abnormal pelvis (pelvimetry), Hysterosalpingography
2. Sonographic pictures at various stages of pregnancy - normal and abnormal pregnancies, fetal biophysical profile, common gynaecological pathologies.
3. Amniocentesis
4. Fetal surveillance methods - Electronic fetal monitoring and its interpretation
5. Post-coital test
6. Vaginal Pap Smear
7. Colposcopy
8. Endoscopy - Laparo and Hysteroscopy.

Health of Adolescent Girls and Post-Menopausal Women

1. Provide advice on importance of good health of adolescent and postmenopausal women.
2. Identification and management of health problems of post-menopausal women.
3. Planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
4. Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
5. Provide advice on geriatric problems.

Reproductive Tract and 'HIV' Infection

1. Provide advice on management of RTI and HIV infections in Indian women of reproductive age group.
2. Provide advice on management of HIV infections in pregnancy, relationship of RTI and HIV with gynaecological disorders.
3. Planning and implementation of preventive strategies.

Medico-legal Aspects

1. Correct application of various Acts and Laws while practicing obstetrics and gynecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
2. Implement proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
3. Implement the steps recommended for examination and management of rape cases.
4. Follow proper procedures in the event of death of a patient.

Environment and Health

1. Follow proper procedures in safe disposal of human body fluids and other materials.
2. Follow proper procedures and universal precautions in examination and surgical procedures for the prevention of HIV and other diseases.

Syllabus

Course Contents:

Paper I

Basic Sciences

1. Normal and abnormal development structure and function (female and male) urogenital system and female breast.
2. Applied Anatomy of genito-urinary system, abdomen, pelvis, pelvic floorand anterior abdominal wall, upper thigh (inguinal ligament, inguinal canal, vulva, rectum and anal canal).
3. Physiology of spermatogenesis.
4. Endocrinology related to male and female reproduction (Neurotransmitters).
5. Anatomy and physiology of urinary and lower GI (Rectum / anal canal) tract.
6. Development, structure and function of placenta, umbilical cord and amniotic fluid.
7. Anatomical and physiological changes in female genital tract during pregnancy.
8. Anatomy of fetus, fetal growth and development, fetal physiology and fetal circulation.
9. Physiological and neuro-endocrinal changes during puberty, adolescence, menstruation, ovulation, fertilization, climacteric and menopause.
10. Biochemical and endocrine changes during pregnancy, including systemic changes in cardiovascular, hematological, renal hepatic, renal, hepatic and other systems.
11. Biophysical and biochemical changes in uterus and cervix during pregnancy and labor.
12. Pharmacology of identified drugs used during pregnancy, labour, post-partum period in reference to their absorption, distribution, excretion, (hepatic) metabolism, transfer of the drugs across the placenta, effect of the drugs (used) on labor, on fetus, their excretion through breast milk.
13. Mechanism of action, excretion, metabolism of identified drugs used in the management of Gynaecological disorder.
14. Role of hormones in Obstetrics and Gynaecology.

Markers in Obstetrics & Gynaecology - Non-neoplastic and neoplastic diseases

1. Pathophysiology of ovaries, fallopian tubes, uterus, cervix, vagina and external genitalia in healthy and diseased conditions.

2. Normal and abnormal pathology of placenta, umbilical cord, amniotic fluid and fetus.

3. Normal and abnormal microbiology of genital tract. Bacterial, viral and parasitical infections responsible for maternal, fetal and gynaecological disorders.

4. Humeral and cellular immunology in Obstetrics & Gynaecology.

5. Gametogenesis, fertilization, implantation and early development of embryo.

6. Normal Pregnancy, physiological changes during pregnancy, labor and pauperism.

7. Immunology of pregnancy.

8. Lactation.

Medical Genetics

a. Basic medical genetics including cytogenetics.

b. Pattern of inheritance

c. Chromosomal abnormalities - types, incidence, diagnosis, management and recurrence risk.

d. General principles of Teratology.

e. Screening, counseling and prevention of developmental abnormalities.

f. Birth defects - genetics, teratology and counseling.

Paper II

Clinical obstetrics

Antenatal Care:

- Prenatal care of normal pregnancy including examination, nutrition, immunization and follow up.
- Identification and management of complications and complicated of pregnancy – abortion, ectopic pregnancy, vesicular mole, Gestational trophoblastic Diseases, hyperemesis gravidarum, multiple pregnancy, antipartum hemorrhage, pregnancy induced hypertension, preeclampsia, eclampsia, Other associated hypertensive disorders, Anemia, Rh incompatibility, diabetes, heart disease, renal and hepatic diseases, preterm - post term pregnancies, intrauterine fetal growth retardation,
- Neurological, hematological, dermatological diseases, immunological disorders and other medical and surgical disorders/problems associated with pregnancy, Multiple pregnancies, Hydramnios, Oligoamnios.
- Diagnosis of contracted pelvis (CPD) and its management.
- High-risk pregnancy
- Pregnancy associated with complications, medical and surgical problems. Prolonged gestation.
- Preterm labor, premature rupture of membranes. Blood group incompatibilities.
- Recurrent pregnancy wastage.

- Evaluation of fetal and maternal health in complicated pregnancy by making use of diagnostic modalities including modern once (USG, Doppler, Electronic monitors) and plan for safe delivery for mother and fetus. Identifying fetus at risk and its management. Prenatal diagnostic modalities including modern ones.
- Infections in pregnancy (bacterial, viral, fungal, protozoan) Malaria, Toxoplasmosis.
- Viral – Rubella, CMV, Herpes, HIV, Hepatic viral infections (B, C etc) Sexually Transmitted Infections (STDs)
- Mother to fetal transmission of infections.
- Identification and management of fetal mal-positions and mal-presentations.
- Management of pregnancies complicated by medical, surgical (with other specialties as required) and gynecological diseases.
- Anemia, hematological disorders
- Respiratory, Heart, Renal, Liver, skin diseases.
- Gastrointestinal, Hypertensive, Autoimmune, Endocrine disorders. Associated Surgical Problems.
- Acute Abdomen (surgical emergencies - appendicitis and GI emergencies). Other associated surgical problems.
- Gynaecological disorders associate with pregnancy - congenital genital tract developmental anomalies, Gynaec pathologies - fibroid uterus, Ca Cx, genital prolapse etc.
- Prenatal diagnosis (of fetal problems and abnormalities), treatment – Fetal therapy M.T.P, PC & P.N.D.T Act etc.
- National health MCH programs, social obstetrics and vital statistics Recent advances in Obstetrics.

Intra-partum care:

- Normal labor - mechanism and management.
- Partographic monitoring of labor progress, recognition of abnormal labor and its appropriate management.
- Identification and conduct of abnormal labor and complicated delivery - breech, forceps delivery, caesarian section, destructive operations.
- Induction and augmentation of labor.
- Management of abnormal labor - Abnormal pelvis, soft tissue abnormalities of birth canal, mal-presentation, mal-positions of fetus, abnormal uterine action, obstructed labor and other distocias.
- Analgesia and anaesthesia in labor.

- Maternal and fetal monitoring in normal and abnormal labor (including electronic fetal monitoring).
- Identification and management of intrapartum complications, Cord presentation, complication of 3rd stage of labor - retained placenta, inversion of uterus, rupture of uterus, post partum hemorrhage.

Post Partum

- Complication of 3rd stage of labor retained placenta, inversion of uterus, post partum hemorrhage, rupture of uterus, Management of primary and secondary post-partum hemorrhage, retained placenta, uterine inversion. Post-partum collapse, amniotic fluid embolism
- Identification and management of genital tract trauma - perineal tear, cervical/vaginal tear, episiotomy complications, rupture uterus.
- Management of critically ill woman.
- Post partum shock, sepsis and psychosis.
- Postpartum contraception.
- Breast feeding practice; counseling and importance of breast-feeding. Problems in breast-feeding and their management, Baby friendly practices.
- Problems of newborn - at birth (resuscitation), management of early neonatal problems.
- Normal and abnormal purpureum - sepsis, thrombophlebitis, mastitis, psychosis. Hematological problems in Obstetrics including coagulation disorders. Use of blood and blood components/products.

Operative Obstetrics:

- Decision-making, technique and management of complications.
- Vaginal instrumental delivery, Caesarian section, Obst. Hysterectomy, destructive operations, manipulations (External/internal podalic version, manual removal of placenta etc)
- Medical Termination of Pregnancy - safe abortion - selection of cases, technique and management of complication. MTP law.

New Born

- Care of new born: Normal and high risk new born (including NICU care).
- Asphyxia and neonatal resuscitation.
- Neonatal sepsis - prevention, detection and management.
- Neonatal hyper - bilirubinemia - investigation and management.
- Birth trauma - Detection and management.

- Detection and management of fetal/neonatal malformation.
- Management of common neonatal problems.

Paper III

Clinical Gynaecology and Fertility Regulation

- Epidemiology and etiopathogenesis of gynaecological disorders.
- Diagnostic modalities and management of common benign and malignant gynaecological diseases (diseases of genital tract):
- Fibroid uterus, Endometriosis and adenomyosis, Endometrial hyperplasia, Genital prolapse (uterine and vaginal), Cervical erosion, cervicitis, cervical polyps, cervical neoplasia.
- Vaginal cysts, vaginal infections, vaginal neoplasia (VIN) Benign Ovarian pathologies
- Malignant genital neoplasia of ovary, Fallopian tubes, uterus, cervix, vagina, vulva and Gestational Trophoblastic diseases, Cancer Breast.
- Diagnosis and surgical management of clinical conditions related to congenital malformations of genital tract. Reconstructive surgery in gynaecology.
- Intersex, ambiguous sex and chromosomal abnormalities.
- Reproductive endocrinology: Evaluation of Primary/secondary Amenorrhea, management of Hyperprolactinemia, Hirsutism, Chronic an-ovulation, PCOD, thyroid and other endocrine dysfunctions.
- Infertility - Evaluation and management
- Methods of Ovulation Induction
- Tubal (Micro) surgery
- Management of immunological factors of Infertility Male infertility
- Obesity and other Infertility problems.

(Introductory knowledge of) Advanced Assisted ReproductiveTechniques (ART)

Reproductive tract Infections: prevention, diagnosis and treatment. STD

- HIV
- Other Infections
- Genital Tuberculosis
- Principles of radiotherapy and chemotherapy in gynaecological malignancies. Choice, schedule of administration and complications of such therapies.

Rational approach in diagnosis and management of endocrinal abnormalities such as: menstrual abnormalities, amenorrhea (primary/secondary), dysfunctional uterine bleeding, polycystic ovarian

disease, hyperprolactinemia (galactorrhea), hyperandrogenism, thyroid - pituitary - adrenal disorders, menopause and its treatment (HRT).

Urological problems in Gynaecology - Diagnosis and management. Urinary tract infection

Urogenital Fistulae Incontinence

Other urological problems

- Orthopedic problems in Gynaecology.
- Menopause: management (HRT) and prevention of its complications.
- Endoscopy (Laparoscopy - Hysteroscopy)
- Diagnostic and simple therapeutic procedures (PG students must be trained to do these procedures)
- Recent advances in gynaecology - Diagnostic and therapeutic Pediatric, Adolescent and Geriatric Gynaecology

Introduction to Advance Operative procedures.

Operative Gynaecology

- Abdominal and Vaginal Hysterectomy
- Surgical Procedures for genital prolapse, fibromyoma, endometriosis,ovarian, adnexal, uterine, cervical, vaginal and vulval pathologies.
- Surgical treatment for urinary and other fistulae, Urinary incontinence
- Operative Endoscopy

Family Welfare and Demography

Definition of demography and its importance in Obstetrics and Gynaecology.

1 Statistics regarding maternal mortality, perinatal mortality/morbidity, birth rate, fertility rate.

2 Organizational and operational aspects of National health policies and programs, in relation to population and family welfare including RCH.

3 Various temporary and permanent methods of male and female contraceptive methods.

4 Knowledge of in contraceptive techniques (including recent developments).

(i) Temporary methods

(ii) Permanent Methods.

(iii) Recent advances in contraceptive technology

5 Provide adequate services to service seekers of contraception including follow up.

6 Medical Termination of Pregnancy: Act, its implementation, providing safe and adequate services.

7 Demography and population dynamics.

8 Contraception (fertility control)

Male and Female Infertility

- History taking, examination and investigation.
- Causes and management of male infertility.
- Indications, procedures of Assisted Reproductive Techniques in relation to male infertility problems.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology should be imparted to the students through:

Lectures, seminars, symposia, Inter- and intra- departmental meetings (clinic-pathological, Radio-diagnosis, Radiotherapy, Anaesthesia, Pediatrics/ Neonatology), maternal morbidity/mortality meetings and journal club.

Recordsof these are to be maintained by the department.

By encouraging and allowing the students to attend and actively participate in CMEs, Conferences by presenting papers.

Maintenance of log book: Log books shall be checked and assessed periodically by the faculty members imparting the training.

Writing thesis following appropriate research methodology, ethical clearance and good clinical practice guidelines.

The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.Department should encourage e-learning activities.

Practical and Clinical Training

Emphasis should be self learning, group discussions and case presentations.

Student should be trained about proper History taking, Clinical examination, advising / ordering relevant investigations, their interpretation and instituting medical / surgical management by posting students in OPD, specialty clinics, wards, operation theaters, Labor room, family planning clinics and other departments like anesthesiology, neonatology, radiology/ radiotherapy. **Studentsshould be able to**

perform and interpret ultra - sonography in Obstetrics and Gynaecology, NST, Partogram

Rotations:

Details of 3 years posting in the PG programme (6 terms of 6 months each)

a. Allied posts should be done during the course *– for 8 weeks*

1.	Neonatology	- 2 weeks
2.	Anaesthesia	- 2 weeks
3.	Radiology/Radiotherapy	- 2 weeks
4.	Surgery	- 2 weeks
5.	Oncology	- 2 weeks

Details of training in the subject during resident posting

The student should attend to the duties (Routine and emergency):

- Outpatient Department and special clinics
- Inpatients
- Operation Theater
- Labor Room

Writing clinical notes regularly and maintains records.

1st term - working under supervision of senior residents and Teaching faculty

2nd& 3rd term - Besides patient care in O.P.D., wards, Casualty and labor room, carrying out minor operations under

4th 5th& 6th term - Supervision and assisting in major operation.

Surgeries to be done during PG training. **(Details in the Syllabus)**

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training includes

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to

improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self-directed learning and teaching**
4. **Departmental and interdepartmental learning activity**
5. **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**Postgraduate Examination shall be in three parts:**

Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory Examination:

The examinations shall be organized on the basis of ‘Grading ‘or ‘Marking system’ to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in ‘Theory’ as well as ‘Practical’ separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be four theory papers, as given below:

Paper I: Applied Basic sciences.

Paper II: Obstetrics including social obstetrics and Diseases of New Born

Paper III: Gynaecology including fertility regulation

Paper IV: Recent Advances in Obstetrics & Gynaecology

Clinical/Practical & oral/viva voce Examination: shall be as given below:

Obstetrics:

Clinical

Long Case: 1 case

2 cases with different problems

Short Case/ Spot Case: 1 case

Viva voce including:

Instruments

Pathology specimens

Drugs and X-rays, Sonography etc.

Dummy Pelvis

Gynaecology:

Clinical

Long Case: 1 case, 2 cases with different problems, Short Case/ Spot Case: 1 case

Viva including:

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Family planning

Recommended Reading:

Books (latest edition)

Obstetrics

- William Textbook of Obstetrics
- High risk Obstetrics - James
- High risk pregnancy - Ian Donal
- Text book of Operative Obstetrics - Munro Kerr.
- Medical disorder in pregnancy - De Sweit
- High risk pregnancy - Arias

- A text book of Obstetrics - Thrnbull
- Text book of Obstetrics - Holland & Brews.
- Manual of Obstetrics - Daftary & Chakravarty

Gynaecology

- Text book of Gynaecology - Novak
- Text book of Operative Gynaecology - Te-lindes
- Text book of operative gynaecology - Shaws
- Text book of Gynaecology and Reproductive Endocrinology - Speroft
- Text book of Obstetrics & Gynaecology - Dewhurst
- Manual of Gynaecological Oncology - Disai
- Text book of Gynaecology – Jaeffcot

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.D. Paediatrics
(Programme code – MM-16)
Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PAEDIATRICS

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate student after undergoing the required training should be able to deal effectively with the needs of the community and should be competent to handle the problems related to his specialty including recent advances. She/He should also acquire skills in teaching of medical/para-medical students.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

The objectives of MD Course in Paediatrics are to produce a competent paediatrician who:

- Recognizes the health needs of infants, children and adolescents and carries out professional obligations in keeping with principles of the National Health Policy and professional ethics
- Has acquired the competencies pertaining to Paediatrics that are required to be practiced in the community and at all levels of health system
- Has acquired skills in effectively communicating with the child, family and the community
- Is aware of contemporary advances and developments in medical sciences as related to child health
- Is oriented to principles of research methodology
- Has acquired skills in educating medical and paramedical professionals
- Is able to recognize mental conditions and collaborate with Psychiatrists/Child Psychologists for the treatment of such patients

SUBJECT SPECIFIC COMPETENCIES

Cognitive domain

At the end of the MD course in Paediatrics, the students should be able to:

- Recognize the key importance of child health in the context of the health priority of country

- Practice the specialty of Paediatrics in keeping with the principles of professional ethics
- Identify social, economic, environmental, biological and emotional determinants of child and adolescent health, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to children
- Recognize the importance of growth and development as the foundation of Paediatrics and help each child realize her/his optimal potential in this regard
- Take detailed history; perform full physical examination including neuro-development and behavioral assessment and anthropometric measurements in the child and make clinical diagnosis
- Perform relevant investigative and therapeutic procedures for the paediatric patient
- Interpret important imaging and laboratory results
- Diagnose illness based on the analysis of history, physical examination and investigations
- Plan and deliver comprehensive treatment for illness using principles of rational drug therapy
- Plan and advice measures for the prevention of childhood disease and disability
- Plan rehabilitation of children with chronic illness and handicap and those with special needs
- Manage childhood emergencies efficiently
- Provide comprehensive care to normal, 'at risk' and sick neonates
- Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation
- Recognize the emotional and behavioral characteristics of children, and keep these fundamental attributes in focus while dealing with them
- Demonstrate empathy and humane approach towards patients and their families and keep their sensibilities in high esteem
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling and giving health education messages to patients, families and communities
- Develop skills as a self-directed learner. Recognize continuing educational needs; use appropriate learning resources and critically analyze published literature in order to practice evidence-based Paediatrics
- Demonstrate competence in basic concepts of research methodology and epidemiology
- Facilitate learning of medical/nursing students, practicing physicians, paramedical health workers and other providers as a teacher-trainer
- Implement National Health Programs, effectively and responsibly
- Organize and supervise the desired managerial and leadership skills
- Function as a productive member of a team engaged in health care, research and education.

- Recognize mental conditions, characterized by self-absorption, reduced ability to respond, abnormal functioning in social interaction with or without repetitive behaviour, poor communication (autism) and collaborate with Psychiatrists/Child Psychologists for the treatment of such patients.

All PG students joining the course should have an orientation session to acquaint them with the requirements and other details. A plan for orientation session has been given at Annexure 1.

Affective Domain:

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

At the end of the course, the student should have acquired following skills:

History and Examination

The student must gain proficiency in eliciting, processing and systemically presenting Paediatrics history and examination with due emphasis of the important and minimization of less important facts. The following skills must be achieved:

- Recognition and demonstration of physical findings
- Recording of height, weight, head circumference and mid arm circumference and interpretation of these parameters using growth reference standard assessment of nutritional status and growth
- Assessment of pubertal growth
- Complete development assessment by history and physical examination, and recognizing developmental disabilities, including autism
- Systematic examination
- Neonatal examination including gestation assessment by physical neurological criteria
- Examination of the fundus and the ear-drum
- Skills related to IMNCI and IYCF

Monitoring Skills

Non-invasive monitoring of blood pressure, pulse and respiratory rates, saturation; ECG

Investigative Procedures

- Venous, capillary and arterial blood sampling using appropriate precautions

- Pleural, peritoneal, pericardial aspiration; subdural, ventricular and lumbar puncture
- Tuberculin test
- Biopsy of liver and kidney
- Urethral catheterization and suprapubic tap
- Gastric content aspiration

Therapeutic Skills

A Breast feeding assessment and counselling; management of common problems

B Establishment of central and peripheral vascular access; CVP monitoring

C Administration of injections using safe injection practices

D Determination of volume and composition of intravenous fluids and heir administration

E Neonatal and Paediatric basic and advanced life support

F Oxygen administration, CPAP and nebulization therapy

G Blood and blood component therapy

H Intraosseous fluid administration

I Phototherapy, umbilical artery and venous catheterization and exchange transfusion

J Nasogastric feeding

K Common dressings and abscess drainage; intercostal tube insertion

L Basic principles of rehabilitation

M Peritoneal dialysis

N Mechanical ventilation

Bed side investigations, including

- Complete blood counts, micro ESR, peripheral smear
- Urinalysis
- Stool microscopy and hanging drop
- Examination of CSF and other body fluids

- Blood sugar
- Shake test on gastric aspirate
- Gram stain, ZN stain

Patient Management Skills

- Proficiency in management of paediatric emergencies, including emergency triaging
- Drawing and executing patient management plan and long-term care
- Documenting patient records on day to day basis and problem oriented medical record

- Care of a normal and sick new born, management of neonatal disorders hypothermia, sepsis, convulsions, jaundice, metabolic problems
- Identifying need for timely referral to appropriate departments/health facility and pre-transport stabilization of the sick child

Communication Skills; Attitudes; Professionalism

- Communicating with parents/child about nature of illness and management plan prognostication, breaking bad news
- Counselling parents on breast feeding, nutrition, immunization, disease prevention, promoting healthy life style
- Genetic counselling
- Communication and relationship with colleagues, nurses and paramedical workers
- Appropriate relation with pharmaceutical industry
- Health economics
- Professional and research ethics

Interpretation of Investigations

- Plan x-ray chest, abdomen, skeletal system
- Contrast radiological studies: Barium swallow, barium meal, barium enema, MCU
- Ultrasound skull and abdomen
- Histopathological, biochemical and microbiological investigations
- CT Scan and MRI (skull, abdomen, chest)
- Electrocardiogram, electroencephalogram
- Arterial and venous blood gases

Desirable: Interpretation of radio-isotope studies, audiogram, neurophysiologicalstudies, (BERA, VER, Electromyography [EMG], Nerve Conduction Velocity [NCV]), lung function tests

Academic Skills

- Familiarity with basic research methodology, basic IT skills. Planning the protocol of the thesis, its execution and final report
- Review of literature
- Conducting clinical sessions for undergraduate medical students
- Desirable: writing and presenting a paper. Teaching sessions for nurses and medical workers

Syllabus

Course contents:

Guidelines

During the training period, effort must be made that adequate time is spent in discussing child health problems of public health importance in the country or particular region.

Basic Sciences

Principles of inheritance, chromosomal disorders, single gene disorders, multifactorial / polygenic disorders, genetic diagnosis and prenatal diagnosis, pedigree drawing.

Embryogenesis of different organ systems especially heart, genitourinary system, gastro-intestinal tract. Applied anatomy and functions of different organ systems.

Physiology of micturition and defecation; placental physiology; fetal and neonatal circulation; regulation of temperature, blood pressure, acid base balance, fluid electrolyte balance and calcium metabolism.

Vitamins and their functions.

Haematopoiesis, homeostasis, bilirubin metabolism.

Growth and development at different ages, growth charts; puberty and its regulation. Nutrition: requirements and sources of various nutrients.

Pharmacokinetics of common drugs, microbial agents and their epidemiology.

Basic immunology, biostatistics, clinical epidemiology, ethical and medico-legal issues. Teaching methodology and managerial skills.

Understanding the definition, epidemiology, aetiopathogenesis, presentation, complications, differential diagnosis and treatment of the following, but not limited to:

- **Growth and development**
- **Neonatology**
- **Nutrition**
- **Cardiovascular**
- **Respiratory**
- **Gastrointestinal and liver disease**
- **Endocrinology**
- **Nephrological and Urological disorders**
- **Neurologic disorders**
- **Hematology and Oncology**
- **Infections**
- **ENT**
- **Emergency and Critical Care**
- **Skin Diseases**
- **Immunology and Rheumatology**

- **Eye problems**
- **Behavioral and Developmental disorders**
- **Orthopaedics**
- **Approach to clinical problems**
- **Growth and development**
- **Neonatology**
- **Nutrition**
- **Cardiovascular**
- **GIT and Liver**
- **Respiratory**
- **Infections**
- **Renal**
- **Haematology and Oncology**
- **Neurology**
- **Endocrine**
- **Miscellaneous**

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

General principles

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching methodology

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision. Department should encourage e-learning activities.

Formal teaching sessions

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the following sessions:

Journal club	Once a week
Seminar	Once a fortnight

Case discussions	once a month
Interdepartmental case or seminar	Once a month
[Cardiology, Paediatric Surgery]	

1 Attend accredited scientific meetings (CME, symposia, and conferences).

2 Additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to paediatric practice are suggested.

3 There should be a training program on Research methodology for existing faculty to build capacity to guide research.

4 The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

5 A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

Log book: During the training period, the post graduate student should maintain aLog Book indicating the duration of the postings/work done in paediatric Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The purpose of the Log Book is to:

1 Help maintain a record of the work done during training,

2 Enable Consultants to have direct information about the work; intervene if necessary,

3 Use it to assess the experience gained periodically.

The log book shall be used to aid the internal evaluation of the student. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

Rotations

The postgraduate student should rotate through all the clinical units in the department. In addition, following special rotations should be undertaken:

Mandatory

Neonatology, perinatology

Intensive care, emergency

Desirable

Posting in Out Patient Services of the following specialties is recommended Skin

Paediatric Surgery

Physical Medicine and Rehabilitation

Community

Note: Additionally, the PG students may be sent to allied specialties (Cardiology, Neurology, nephrology *etc.*) depending on facilities available. It should be ensured that the training conforms to the curriculum.

Thesis Objectives

By carrying out a research project and presenting his work in the form of thesis, the student shall be able to:

Identify a relevant research question conduct a critical review of literature formulate a hypothesis determine the most suitable study design state the objectives of the study prepare a study protocol undertake a study according to the protocol analyze and interpret research data, and draw conclusions write a research paper

Guidelines

While selecting the topic, following should be kept in mind:

The scope of study is limited to enable its conduct within the resources and time available the study must be ethically appropriate the emphasis should be on the process of research rather than the results the protocol, interim progress and final presentation is made formally to the department only one student per teacher/thesis guide

There should be periodic department review of the thesis work, as per following schedule:

End of 6 months	**Submission of protocol**
During 2nd yr	**Mid-term presentation**
6 months prior to examination	**Final presentation; submission**

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The postgraduate examination shall be in three parts**:**

Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners**.**

Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers. Each paper should have 10 short essay questions (SEQ).

Paper I: Basic sciences as applied to Paediatrics

Paper II: Neonatology and community Paediatrics

Paper III: General Paediatrics including advances in Paediatrics relating to Cluster Ispecialties

Paper IV: Paediatric Medicine including advances in Paediatrics relating to ClusterII specialties

Cluster I: Nutrition, Growth and Development, Immunization, Infectious disease, Genetics, Immunology, Rheumatology, Psychiatry and Behavioral Sciences, Skin, Eye, ENT, Adolescent Health, Critical Care, Accidents and Poisoning

Cluster II: Neurology and Disabilities, Nephrology, Hematology and Oncology, Endocrinology, Gastroenterology and Hematology, Respiratory and Cardiovascular disorders

Practical/clinical and Oral/viva voce examination Practical examination

Case I

Case II (New born)

Case III

OSCE may be used.

Oral/Viva voce examination on defined areas by each examiner separately. Oralexamination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Recommended Reading:

Books (latest edition)

- Nelson's Textbook of Paediatrics, Kliegman et al (Editors)
- Manual of Neonatal care, Cloherty
- Nada's Paediatric Cardiology, Kaene
- PG Textbook of Paediatrics, IAP P Gupta et al (Editors)
- Clinical Methods in Paediatrics, P Gupta
- Care of the newborn, Meharban Singh

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.D. Psychiatry
(Programme code – MM-13)
Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY

MEERUT

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PSYCHIATRY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate specialist having undergone the required training should be able to recognize the health needs of the community should be competent to handle medical problems effectively and should be aware of the recent advances pertaining to his specialty. The post graduate student should acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

The primary **goal** of the MD course in Psychiatry is to produce a post graduate clinician able to provide health care in the field of Psychiatry. A physician qualified in Psychiatry, at the end of the course, should be able to diagnose and treat psychiatric disorders, take preventive and curative steps for the disease in the community at all levels of health care and qualify as a consultant and teacher in the subject.

At the end of the MD course in Psychiatry, the student should have able to:

- Understand the relevance of mental health in relation to the health needs of the country
- Ethical considerations in the teaching and practice of Psychiatry
- Identify the social, economic, biological and emotional determinants of mental health
- Identify the environmental causes as determinants of mental health
- Institute appropriate diagnostic, therapeutic and rehabilitative procedures to the mentally ill patient
- Take detailed history, conduct appropriate ethically valid physical examination and institute appropriate evaluation procedures to make a correct clinical diagnosis
- Perform relevant investigative and therapeutic procedures for the psychiatric patient
- Recommend appropriate laboratory and imaging examinations and interpret the results correctly

- Plan and deliver comprehensive treatment of a psychiatric patient using principles of rational drug therapy
- Plan rehabilitation of psychiatric patient suffering from chronic illness Clinically manage psychiatric emergencies efficiently
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities
- Develop appropriate skills to practice evidence-based psychiatry
- Demonstrate competence in basic concepts of research methodology and epidemiology
- Be aware of and take appropriate steps in the implementation of national mental health programs, effectively and responsibly
- Be aware of the concept of essential drugs and rational use of drugs Be aware of the legal issues in the practise of Psychiatry
- Be aware of the special requirements in the practice of Child and adolescent
- Psychiatry and Geriatric Psychiatry

Research: The student should know the basic concepts of research methodologyand plan a research project in accordance with ethical principles. S/he should also be able to interpret research findings and apply these in clinical practice. S/he should know how to access and utilize information resources and should havebasic knowledge of statistics.

Teaching: S/He should learn the basic methodology of teaching and developcompetence in teaching medical/paramedical students, health professionals, members of allied disciplines (e.g. behavioral sciences), law enforcement agencies, families and consumers and members of the public.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

Cognitive domain by the end of the course, the student should demonstrate knowledge in the following:

General topics:

- The student should be able to demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.
- The student should be able to explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities), and

Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology and Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics.

- Acquire knowledge of delirium, dementia, amnestic & other cognitive disorders and mental disorders due to a general medical condition.

- The student should be able to explain follow-up care of person suffering from chronic relapsing psychiatric ailments.
- The student should acquire knowledge of emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.
- The student should acquire knowledge of pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.
- The student should acquire knowledge of (a) normal child development and adolescence, mental retardation in children (b) learning & associated disorders and their management
- The student should acquire knowledge and be able to explain mechanisms for rehabilitation of psychiatric patients.
- The student should acquire knowledge of substance related disorders and their management.
- The student should acquire knowledge of psychotic disorders, mood disorders, and anxiety disorders and their management
- The student should acquire knowledge of sexual and gender identity disorders and their management.
- The student should acquire knowledge of eating disorders and sleep disorders and their management.
- The student should be conversant with recent advances in Psychiatry.
- The student should be conversant with routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.
- The student should be conversant with various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Health Mental Programmes etc.

Affective Domain:

The student should be able to function as a part of a team, develop an attitude of cooperation with colleagues, interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

The student should always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel.

The student should demonstrate respect for the rights of the patient including the right to information and second opinion.

The student should develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

At the end of the course, the student should acquire the following clinical skills and be able to:

Become an expert in good history taking, physical examination, mental state examination, and able to establish rapport and counsel family members and patients on scientific basis. Choose the required investigations for both short and long term management.

At the end of the course, the student should be able to:

- Obtain a proper relevant history, and perform a humane and thorough clinical examination including detailed mental state examinations using proper communication skills.
- Arrive at a logical working diagnosis and differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.
- Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
- Write a complete case record with all necessary details.
- Write a proper discharge summary with all relevant information.
- Obtain informed consent for any examination/procedure.
- Perform clinical audit.
- Must be able to perform modified Electroconvulsive therapy (ECT).

The student, at the end of the course should be able to perform independently, the following:

- Conduct detailed Mental Status Examination (MSE)
- Cognitive behavior therapy
- Supportive psychotherapy
- Modified ECT
- Clinical IQ assessment
- Management of alcohol withdrawal
- Alcohol intoxication management
- Opioid withdrawal management
- Delirious patients

- Crisis intervention

The student must be able to demonstrate approach to patient with variety of clinical presentations including following symptoms:

- Auditory hallucinations
- Visual hallucinations
- Pseudo hallucination
- Seizures true and pseudo seizure
- Panic attack
- Manic symptoms
- Behavioural symptoms of schizophrenia
- Catatonia
- Delirium
- Malingering

The student, at the end of the course should be able to perform under supervision, the following:

- Behaviour therapy
- Opioid intoxication management
- Genetic counselling
- Family therapy

The student, at the end of the course should be able to assist the expert in the following:

- Interpersonal therapy
- Management of suicide attempt

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. He is expected to know the subject in depth; however emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in managing behavioral problems commensurate with the specialty must be ensured.

The student must acquire knowledge in the following:

Theoretical concepts:

- Functional and behavioural neuroanatomy
- Neurophysiology and Neuro-chemistry
- Neuro-imaging

- Electrophysiology (including chronobiology, electroencephalogram, etc
- Psychoneuroendocrinology
- Neurogenetic disorder
- Classification In Psychiatry
- Theory of personality and personality disorders
- Abuse (Physical / Sexual) or Neglect Of Child /Adult
- Adjustment Disorder
- Anxiety Disorders (including Panic Disorder, Agoraphobia, Phobias, Obsessive-Compulsive Disorder, Posttraumatic Stress Disorder, Acute Stress Disorder, Generalized Anxiety Disorder, etc).
- Case-Presentations (including History Taking, Neurological Examination, Mental Status Examination etc.).

Child Psychiatry (including Learning Disorders, Motor Skills Disorder,Communication Disorders, Pervasive Developmental Disorders (Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder), Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Pica, Tic Disorders, Elimination Disorders, Separation Anxiety Disorder, Selective Mutism, Reactive Attachment Disorder of Infancy or Early Childhood, Stereotypic Movement Disorder, etc.)

- Community psychiatry
- Consultation-Liaison Psychiatry
- Culture Bound Syndromes
- Dissociative Disorders (including Dissociative Amnesia, Dissociative Fugue, Dissociative Identity Disorder, Depersonalization Disorder, etc.
- Eating Disorders (including Anorexia Nervosa, Bulimia Nervosa, etc.)
- Electro-Convulsive Therapy
- Emergencies In Psychiatry
- Emotional Intelligence
- Ethics In Psychiatry
- Factitious Disorders
- Impulse-Control Disorders (including Intermittent Explosive Disorder, Kleptomania, Pyromania, Pathological Gambling, Trichotillomania, etc
- Learning – Theories
- Memory
- Mental Retardation

- Miscellaneous: Non-compliance, Malingering, Antisocial Behaviour, Borderline Intellectual Functioning, Age-Related Cognitive Decline, Bereavement [including Death], Academic Problems, Occupational Problems, Identity Problems, Religious or Spiritual Problems, Acculturation Problems, Phase of Life Problems, Chronic Fatigue Syndrome, etc.)
- Mood Disorders (including Depressive Disorders, Bipolar Disorders, Cyclothymic Disorder, etc.)
- Movement Disorders (including Medication-Induced Movement Disorders, etc)
- Organic Psychiatry (including Amnestic Disorders, Catatonic Disorder, Cerebrovascular Disorders, Delirium, Dementia, Endocrine Epilepsy, Head Injury, Headache, HIV – AIDS, Infections, etc.
- Neuropsychology (including Psychological Features of Cerebral Disorders, Clinical Assessment etc.)
- Pre-Menstrual Dysphoric Disorder
- Post-Partum Psychiatric Disorders
- Psychodynamics
- Psychology (Clinical)
- Psychometry/ Psychodiagnostics
- Psychopharmacology
- Psychosis (including Schizophrenia, Schizophreniform Disorder, Schizoaffective Disorder, Delusional Disorder, Brief Psychotic Disorder, Shared Psychotic Disorder, etc.)
- Psychosomatic Disorders
- Psychotherapy
- Sexual and Gender Identity Disorders (including Sexual Desire Disorders, Sexual arousal Disorders, Orgasmic Disorders, Sexual Pain Disorders, Vaginismus, Paraphilias, etc)
- Sleep Disorders (including Insomnia, Narcolepsy, Breathing-Related Sleep
- Disorders, Circadian Rhythm Sleep Disorders, Parasomnias, Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, etc.)
- Somatoform Disorders (including Somatization Disorder, Undifferentiated Somatoform Disorder, Conversion Disorder, Pain Disorder, Hypochondriasis, Body Dysmorphic Disorder, etc.)
- Statistics/Research Methodology
- Stress and related disorders
- Stupor
- Substance Related Disorders (including Alcohol-Related Disorders, Amphetamine-Related Disorders, Caffeine-Related Disorders, Cannabis-Related Disorders, Cocaine-Related Disorders, Hallucinogen-Related Disorders, Inhalant-Related Disorders, Nicotine-Related Disorders, Opioid-

Related Disorders, Phencyclidine-Related Disorders, Sedative-, Hypnotic-, or Anxiolytic-Related Disorders, etc.)

- Suicidemanagement and medico-legal aspect
- Transcultural Psychiatry
- Rehabilitation of psychiatric patients
- Geriatric Psychiatry

The student may know the following:

- Psychiatry rating scales
- Epidemiology
- History of Psychiatry
- Mental Health Issues in Women
- Mind – the evolving concepts
- Placebo Effect
- Psychosurgery

TEACHING AND LEARNING METHODS

Teaching methodology

Lectures: Lectures are to be kept to a minimum. They may, however, be employedfor teaching certain topics. Lectures may be didactic or integrated. Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lecturers should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. The student should have hands-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning the subject should be given. Self-learning tools like assignments and case base learning may be promoted.

The post graduate student should have knowledge of:

- Psycho-pharmacology and broadening the treatment options using medicines.Neuro-imaging techniques to understand behaviour and psychiatric illness.
- Community-Psychiatry.
- Functioning of psychiatric hospital.
- Community Psychiatry should go beyond familiarization with the National Mental Health Programme. The post graduate student should have hands on experience with:
- G.P. Training Programme

- Organizing Mental Health Camps
- Carrying out Health Education Activities
- Forensic /Legal Psychiatry
- Integration of Mental Health Care with General Health Care
- **Thesis writing:** Thesis writing is compulsory.
- **Research Methodology:** The student should know the basic concepts of researchmethodology and biostatistics, plan a research project, be able to retrieve information from the library.
- **Teaching skills:** The post graduate students shall be required to participate in theteaching and training programme of undergraduate students and interns.
- **Continuing Medical Education Programmes (CME):** Each student should attendat least two CME programmes, in 3 years.
- **Conferences:** The student should attend courses, conferences and seminars relevantto the specialty.
- A post graduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

Seminars: There should be a weekly seminar in which the PG students presentmaterial on assigned topics in rotation. It should be followed by discussion in which all trainees are supposed to participate. Generally, the topics covered should be those that supplement the formal teaching programme.

- **Case Conference**: A case conference should be held every week where a PGstudent prepares and presents a case of academic interest by rotation and it is attended by all the members of the Department.
- **Psychosomatic Rounds**: This is a presentation of a case of psychosomatic illness,or a medical illness with pronounced psychiatric problems. It should be held weekly in collaboration with various departments and attended by the faculty and the PG students of psychiatry and the concerned Department.
- **Research Forum**: There should be a monthly meeting of one hour each in whichthe PG students presents their plan of research as well as the report of the completed work of their projects. The other research scholars/staff in the department also may participate in it. The faculty, PG students and the non-medical professionals should make critical comments and suggestions.
- **Journal Club**: A monthly meeting of Journal club should be held in which a seniorPG student presents a critical evaluation of a research paper from a journal. All PG students are expected to attend.

- **Case presentations**: All new in-patients and outpatients cases should be routinelyreviewed with one of the Consultants. In addition, the PG student is required to present case material at routine rounds and other case conferences. Senior PG students will conduct evening classes on clinical topics.
- **Extra-mural activities**: The post graduate students are encouraged to attend certainacademic activities in allied subjects held outside parent department e.g. seminars/lectures held at Departments of Sociology, Psychology, and Neurology etc.
- **Psychotherapy tutorials**: These should be held in small groups supervised by aconsultant, in which a case is presented by a PG student and psychotherapeutic management discussed.
- **Rotation: Clinical Postings**
- A major tenure of posting should be in General Psychiatry. It should include care of in-patients, out-patients, special clinics and maintenance of case records for both in and out patients.

Exposure to the following areas should be given:-

Schedule of clinical postings for M.D Psychiatry *(36 months)

Area/ Specialty

Ward and OPD (Concurrent)	18 months
Neurology	2 months
Emergency Medicine/ Internal Medicine	1 month
Consultation Liaison Psychiatry	3 months
Psychiatric hospital and Forensic Psychiatry	1 month
Clinical Psychology	1 month
Addiction Psychiatry	3 months
Child and Adolescent Psychiatry	3 months
Community psychiatry	2 months#
Elective posting	2 months (as per choice in the same Institute)

The stated duration can be subjected to minor modifications depending on available resources

Exposure to community-based services should be integral to various postings.

Applicable only for trainees in General Hospital Psychiatric units: Facilities forthese need to be arranged.

The post graduate student in Psychiatric hospitals would have extended period of exposure to consultation - liaison psychiatry and other medical specialties. Exposure to community-based services should be integral part of various postings. The post graduate student shall be given full responsibility for patient care and record keeping under the supervision of the senior PG students and consultants.

The post graduate student shall also take patients for psychological interventions in an individual as well as group setting. S/he must complete a minimum of 100 hours of supervised psychological interventions.

Inter-Unit Rotation of posting

Inter-unit rotation in the department should be done for a period of up to one year (divided during the first year and third year while the post graduate student stays in the parent unit throughout the duration of his thesis work).

Clinical meetings:

There should be intra - and inter - departmental meetings for discussing the uncommon / interesting medical problems.

Log book:

Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book and signed by the authorized teacher and Head of Department.

The Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of clinical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., assessment during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

Thesis:

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory Examination:

There shall be four papers each of three hours duration.

Paper I: Basic Sciences as related to Psychiatry

Paper II: Clinical Psychiatry

Paper III: Psychiatric theory and Psychiatric specialties

Paper IV: Neurology and General Medicine as related to Psychiatry

Clinical/Practical and Oral/viva voce examination should consist of:

- Presentation of long case of Psychiatry
- Neurology short case
- A short case Psychiatry
- Viva –voce

Due importance should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading

Books (latest edition)

- Kaplan and Saddock's Comprehensive Text Book of Psychiatry
- Kaplan and Saddock's Synopsis of Psychiatry
- Fish Clinical Psychopathology
- Lishman's Organic Psychiatry, The Psychological consequences of cerebral disorder
- Clinical practice guidelines of Psychiatric disorders in India
- Stahl Psychopharmacology
- Oxford text book of Psychiatry
- Mental Health Act, Person with Disability Act (India)
- Lowinson et al -Substance Abuse-A Comprehensive Textbook

- Galanter and Klebert-Textbook of Substance Use Treatment

Journals

03-05 international Journals and 02 national (all indexed) Journals.

FACULTY OF MEDICINE

M.D. Dermatology
(Programme code – MM-11)
Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN DERMATOLOGY, VENEREOLOGY & LEPROSY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of community, should be competent to handle effectively the medical problems and aware of recent advances pertaining to the discipline. The PG student should acquire basic skills in teaching medical/para-medical students. The student should be able to counsel patients and relatives in infectious diseases like HIV/AIDS, STDs, cutaneous tuberculosis, leprosy and any event of serious illness or death.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

At the end of 3 years of post graduate training in Dermatology, Venereology & Leprosy:

- Student should have knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to dermatology. The student should acquire in-depth knowledge of his subject including recent advances. The student should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.
- Student should have acquired practical and procedural skills related to the subject.
- Critically evaluate, initiate investigation and clinically manage cases in Dermatology, Venereology and Leprosy with the help of relevant investigations.
- Should plan and advise measures for the prevention and rehabilitation of patients with various dermatological conditions.
- Able to ensure the implementation of National Health Programmes, particularly in sexually transmitted diseases (STD) and leprosy.
- Acquire training skills in research methodology, professionalism, attitude and communication skills,

as below:

- Student must know basic concepts of research methodology, plan a research project, consult library and online resources, has basic knowledgeof statistics and can evaluate published studies.
- Should be able to practice the specialty of dermatology ethically.
- Recognize the health needs of patients and carry out professional obligations in keeping with principles of National Health Policy and professional ethics.
- Teaching skills in the subject
- Student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.
- Should have acquired Problem Solving skills

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

Cognitive domain

At the end of the course, the student should have acquired following theoreticalcompetencies:

- Describe structure, functions and development of human skin.
- Describe ultra structural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Describe basic pathologic patterns and reactions of skin.
- Demonstrate the knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.
- Describe the basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Describe papulosqamous and vesiculobullous disorders.
- Describe disorders of epidermal appendages and related disorders. Describe inflammatory and neoplastic disorders of dermis.
- Describe skin lesions in nutritional, metabolic and heritable disorders.
- Describe pharmacokinetics and principles of topical and systemic therapy. Describe drug reaction, its diagnosis and management.
- Describe cutaneous manifestations of systemic disorders.
- Describe anatomy of male and female genitalia, epidemiological transmission, clinical aspects and management of STDs and HIV.
- Describe clinical features, reactions, treatment and rehabilitation in leprosy.

- Describe etiology, pathophysiology, principles of diagnosis and management of common problems in dermatology including emergencies in adults and children.
- Describe indications and methods for fluid and electrolyte replacement therapy including blood transfusion in dermatological conditions.
- Describe common dermatological malignancies in the country and their management including prevention.
- Should be expert in evaluation of ECG, chest X-ray (CXR), biochemical, haematology and immunology reports related to dermatology.
- Acquire knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immuno-fluorescence, immuno-peroxidase and other related techniques.
- Acquire knowledge of the basics of laser operation and precautions which needs to be taken.
- Demonstrate competence in basic concepts of research methodology and interpretation of data in medical literature/publications.
- Skilled as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant published literature in order to practice evidence-based dermatology;
- Should also have a broad idea how to approach an uncommon dermatological disease.

Affective Domain

At the end of the course, the student should have acquired the following attitudinalcompetencies:

- Demonstrate self-awareness and personal development in routine conduct.
- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stablein emergency situations and shows positive approach.
- **Motivation and Initiative:** Is innovative, enterprising,does not shirk duties orleave any work pending and motivates team members.
- **Honesty and Integrity:** Is truthful, admits mistakes, does not cook upinformation, has ethical conduct and exhibits good moral values.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitudetowards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.
- Should be able to maintain confidentiality with regards to history, physical examination and management of patients.
- Identify social, economic, environmental, biological and emotional determinants of patients, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide

holistic care to patients at individual and community level against skin, venereal disease and leprosy.

- Recognize the emotional and behavioral characteristics of patients and keep these fundamental attributes in focus while dealing with them.
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities.
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.
- Organize and supervise the desired managerial and leadership skills.
- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Psychomotor Domain

A student at the end of training of 3 years of MD programme, must acquire thefollowing practical skills:

- General medical skills as learnt in MBBS to be maintained:
- Should be able to provide basic life support (BLS).
- Should be expert in blood pressure measurement, intravenous access, bloodsampling, fluid electrolytes therapy, pleural and cerebrospinal; fluid (CSF) fluid examination.
- Should be able to provide basic and advanced life-saving support servicesin emergency situations.
- Should be able to undertake complete monitoring of the patient and identifysocial, economic, environmental and emotional determinants in a given case and take them into account for planning therapeutic measures.
- Recognize conditions that may be outside the area of his specialty/competence and refer them to the proper specialist.

Dermatology, Venereology and Leprosy, HIV/AIDS Skills

The student should:

- Acquire skills in history taking, physical examination, diagnosis and management of patients in dermatology, venereology and leprosy.
- Be able to identify, classify and differentiate cutaneous findings in dermatological terms in a systematic way.

- Be able to perform systemic examination (chest, cardiac, abdomen, neurological, genitals, oral, eye and gynaecological examination) relevant to dermatologic condition.
- Be competent to manage dermatologic emergencies like angioedema, toxic epidermal necrolysis (TEN), Stevens-Johnson syndrome (SJS), pemphigus, drug reaction and necrotic erythema nodosum leprosum (ENL).
- Be able to plan and deliver comprehensive treatment for diseases using principles of rational drug therapy.
- Be able to plan and advice measures for the prevention of infectious disease.
- Be able to plan rehabilitation of patient suffering from chronic illness and disability and those with special needs like leprosy.
- Demonstrate skills in documentation of case details and of morbidity/mortality data relevant to the assigned situation.

Laboratory Skills

The student:

- Should be able to perform common laboratory procedures like potassium hydroxide (KOH) mount, Gram stain, Giemsa stain, acid fast bacilli (AFB) stain, Woods lamp examination, stains, culture media etc. related tothe cutaneous diagnosis independently.
- Should be able to order relevant investigations and interpret them to reachto a diagnosis.
- Should be familiar with other recent investigations.

Dermatopathology - Student should be competent enough to:

- To interpret histopathology of common skin diseases.
- To diagnose common skin diseases by examining slides under microscope.

Surgery in dermatology

At the end of training following skills should be performed independently by the student:

- Should able to give incisions, take stitches and sutures.
- Should be trained in taking skin biopsy and nail biopsy.
- Should be able to perform chemical peels, manual dermabrasion, skin punch grafting and wound dressing independently.
- Should be able to perform cryosurgery, nail surgery and acne surgery.
- Able to perform chemical cauterization, cryotherapy, patch and photo patch test, slit smears and tissue smears.

Venereology

- Should be competent in the clinical approach to the patient of STDs and HIV/AIDS.

- Should be able to interpret the histopathological diagnosis including laboratory aids related with venereology.
- Able to perform dark ground illumination, gram stain, Bubo aspiration and tissue smear.
- Able to manage the patient according to syndromic approach for treatment of STDs.

Leprosy

The student should be:

- Able to diagnose and approach the case of leprosy.
- Perform AFB smear.
- Able to manage cases of lepra reaction.
- Identify, judge and decide when to refer the patients at appropriate level for surgery or rehabilitation. Should able to manage paediatric cases with skin diseases.

Syllabus

Course contents

Topics related to allied basic sciences

- The structure, functions and development of human skin.
- Ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Immunology, molecular biology and genetics in relation to the skin.
- Epidermal cell kinetics and keratinization.
- Lipids of epidermis and sebaceous glands.
- Percutaneous absorption.
- Skin as an organ of protection and thermoregulation.
- Biology of eccrine and apocrine sweat glands.
- Biology of melanocytes and melanin formation.
- Biology of hair follicles, sebaceous glands and nails.
- Epidermal proteins.
- Dermal connective tissue: collagen, elastin, reticulin, basement membrane and ground substance.
- Metabolism of carbohydrates, proteins, fats and steroids by the skin.
- Cutaneous vasculature and vascular reactions.
- Mechanism of cutaneous wound healing.
- Cellular and molecular biology of cutaneous inflammation and arachidonic acid metabolism.
- Immunologic aspects of epidermis.

- Human leukocyte antigen (HLA) system.
- Immunoglobulin.
- Cytokines and chemokines.
- Lymphocytes, neutrophils, eosinophils, basophils and mast cells.
- Complement system.
- Hypersensitivity and allergy.
- Cutaneous carcinogenesis (chemical, viral and radiation).
- Basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Common laboratory procedures, stains, culture media etc. related to the cutaneous diagnosis.
- Basic pathologic patterns and reactions of skin.
- Common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques**.**

Clinical dermatology

- Epidemiology of cutaneous disease.
- Psychologic aspects of skin disease and psycho-cutaneous disorders.
- Pathophysiology and clinical aspects of pruritus.

Papulosquamous diseases

- Psoriasis, pityriasis rubra pilaris, pityriasis rosea.
- Parapsoriasis, lichen planus, lichen niditus.
- Palmo-plantar keratodermas, Darier's disease, porokeratosis.
- Ichthyoses and ichthyosiform dermatoses.
- Kyrle's disease and other perforating disorders.

Vesiculo - bullous disorders

- Erythema multiforme, Stevens-Johnson syndrome, Toxic epidermal necrolysis.
- Bullous pemphigoid, Pemphigus.
- Chronic bullous disease of childhood.
- Herpes gestationis (pemphigoid gestationis).
- Hereditary epidermolysis bullosa.
- Epidermolysis bullosa acquisita.
- Dermatitis herpetiformis.
- Familial benign pemphigus.
- Subcorneal pustular dermatoses.
- Pustular eruptions of palms and soles.

Disorders of epidermal appendages and related disorders

- Disorders of hair and nails.
- Disorders of sebaceous glands.
- Rosacea, Perioral dermatitis, acne.
- Disorders of eccrine and apocrine sweat glands.
- Follicular syndromes with inflammation and atrophy.

Epidermal and appendageal tumours

- Precancerous lesions, squamous cell carcinoma and basal cell carcinoma
- Keratoacanthoma, benign epithelial tumours, appendageal tumours
- Merkel cell carcinoma, Paget's disease

Disorders of melanocytes

- Disorders of pigmentation, albinism, benign neoplasia and hyperplasia of melanocytes, dysplastic melanocytic nevi, cutaneous malignant melanoma.

Inflammatory and neoplastic disorders of the dermis

- Acute febrile neutrophilic dermatosis (Sweet's syndrome)
- Erythema elevatumdiutinum
- Cutaneous eosinophilic diseases
- Granuloma faciale
- Pyoderma grangrenosum
- Erythema annulare centrifugum and other figurate erythemas
- Granuloma annulare
- Malignant atrophic papulosis (Dego's Disease)
- Neoplasms, pseudo neoplasms and hyperplasia of the dermis
- Vascular anomalies
- Kaposi's Sarcoma
- Anetoderma and other atrophic disorders of the skin
- Ainhum and pseudoainhum
- Neoplasias and hyperplasias of neural and muscular origin
- Elastosis perforansserpiginosa and reactive perforating collagenosis

Lmphomas, pseudolymphomas and related conditions

Disorders of subcutaneous tissue

- Panniculitis
- Lipodystrophy

- Neoplasms of the subcutaneous fat

Disorders of the mucocutaneous integument

- Biology and disorders of the oral mucosa
- Disorders of the anogenitalia of males and females

Cutaneous changes in disorders of altered reactivity

- Genetic immunodeficiency diseases
- Urticaria and Angioedema
- Disorders associated with complement abnormalities
- Graft-versus-host Disease
- Muco-cutaneous manifestations in immunosuppressed host other than HIV-infection
- Contact dermatitis
- Auto-sensitization dermatitis
- Atopic dermatitis (atopic eczema)
- Nummular eczematous dermatitis
- Seborrhoeic dermatitis
- Vesicular palmoplantar eczema

Skin changes due to mechanical and physical factors

- Occupational skin disease
- Radiobiology of the skin
- Skin problems in amputee
- Sports dermatology
- Skin problems in war field
- Decubitus ulcers

Photomedicine, photobiology and photo immunology in relation to skin

- Acute and chronic effects of ultraviolet radiation and sun light on the skin
- Narrow-band ultraviolet B (NBUVB) therapy, phototherapy, photochemotherapy

Disorders due to drugs and chemical agents

- Cutaneous reactions to drugs
- Mucocutaneous complications of anti-neoplastic therapy
- Cutaneous manifestations of drug abuse

Dermatology and the ages of man

- Neonatal dermatological problems
- Pediatric and adolescent dermatological problems

- Ageing of skin
- Geriatric dermatological problems

Skin lesions in nutritional metabolic and heritable disorders

1. Cutaneous changes in nutritional disease

2. Acrodermatitis enteropathica and other zinc deficiency disorders

3. Cutaneous changes in errors of amino acid metabolism: Tyrosinemia II, phenylketonuria, arginine succinic aciduria, and alkaptonuria

4. Amyloidosis of the skin

5. The porphyrias

6. Xanthomatosis and lipoprotein disorders

7. Fobry's Disease; galactosidase - a deficiency (Angiokeratoma corporis diffusumuniversale)

8. Lipid proteinosis

9. Cutaneous mineralisation and ossification

10. Heritable disorders of connective tissue with skin changes

11. Heritable disease with increased sensitivity to cellular injury

12. Basal cell Naevus syndrome

Skin manifestations of hematologic disorders

1. Skin changes in hematological disease

2. Langerhans cell and other cutaneous histiocytoses

3. The Mastocytosis syndrome

Skin manifestations of systemic disease

8. The skin and disorders of the alimentary tract

9. The hepatobiliary system and the skin

10. Cutaneous changes in renal disorders, cardiovascular, pulmonary disorders and endocrinal disorders

11. Skin changes and diseases in pregnancy

12. Skin changes in the flushing disorders and the carcinoid syndrome

Skin manifestations of rheumatologic disease

- Lupus Erythematosus
- Dermatomyositis
- Scleroderma
- Systemic Necrotizing Arteritis
- Cutaneous Necrotisingvenulitis
- Cryoglobulinemia and Cryofibrinogenemia

- Relapsing Polychondritis
- Rheumatoid Arthritis, Rheumatic Fever and Gout
- Sjogren's syndrome
- Raynaud's phenomenon
- Reiter's syndrome
- Multicentric Reticulohisticytosis

Cutaneous manifestations of disease in other organ systems

(a) Sarcoidosis of the skin

(b) Cutaneous manifestations of Internal Malignancy

(c) Acanthosis Nigricans

(d) Scleredema

(e) Papular Mucinosis

(f) Neurocutaneous disease

(g) Tuberous Sclerosis Complex

(h) The Neurofibromatosis

(i) Ataxia Telangiectasia

(j) Behcet's disease

Bacterial diseases with cutaneous involvement

- General considerations of bacterial diseases
- Pyodermas: Staphylococcus aureus, Streptococcus, and others
- Staphylococcal Scalded-Skin syndrome
- Soft Tissue Infections: Erysipelas, Cellulitis, Septicemia and Gangrenous Cellulitis
- Gram-Negative Coccal and bacillary infections
- Bartonellosis
- Miscellaneous bacterial infections with cutaneous manifestations
- Tuberculosis and other mycobacterial infections
- Actinomycosis, Necardiosis, and Actinomycetoma
- Lyme Borreliosis
- Kawasaki Disease

Fungal diseases with cutaneous involvement

- Superficial fungal infection: Dermatophytosis, Tinea Nigra, Piedra
- Yeast Infections: Candidiasis, Pitryiasis (Tinea) Versicolor
- Deep Fungal Infections

Viral and ricketisial disease

- Viral Diseases: general consideration
- Rubella (German Measles)
- Measles
- Hand, Foot and Mouth Disease
- Herpangina
- Erythema Infectiosum and Parvovirus B 19 infection
- Herpes simplex
- Varicella and Herpes Zoster
- Cytomegalovirus Infection
- Epstein - Barr Virus Infections
- Human Herpes virus 6 & 7 infections and Exanthem subitum (Roseola Infantum or Sixth Disease)
- Smallpox and Complications of small pox vaccination
- Contagious Pustular Dermatitis, Contagious Ecthyma: Orf virus infection
- Milluscum Contagiosum
- Miller's Nodules
- Warts
- Human Retroviral Disease: Human T-Lymphotropic Virusviruses

Therapeutics

Topical therapy

- Pharmacokinetics principles intopical applications of drugs.
- Principles of topical therapy.

Topical agents

Glucocorticoids, Acne therapies, Analgesics, Anesthetics, Anti-inflammatory, Anti hair loss, Anti-microbial, Anti-parasitic, Anti-perspirants, Anti-pruritic, Anti-viral, Astringents, Bleaching agents, Keratolytics, Psoriasis therapies, Wart therapies, Topical Retinoids, Topical Antibiotics, Topical Anti-fungal Agents, Sun-protective Agents, Keratolytic Agents, Topical Cytotoxic Agents, Cosmetics and Skin care in practice.

Systemic therapy

Systemic glucocorticoids, Sulfones, Aminoquinolines, Cytotoxic and Antimetabolic Agents, Oral Retinoids, Antihistamines, Antibiotics, Antiviral Drugs, Oral Antifungal Agents, Immunosuppressive and Immunomodulatory drugs, Thalidomide, photo-chemotherapy and photo-therapy, electric cautery, cryotherapy, electrolysis, tattooing, intra-lesional injections etc.

Surgery in dermatology

- Dermatologic Surgery: Introduction and Approach
- Skin Resurfacing: Chemical Peels
- Skin Resurfacing: Dermabrasion
- Skin Resurfacing: Laser
- Skin punch grafting
- Wound Dressings
- Cryosurgery
- Nail Surgery

Venereology

- Clinical approach to the patient of sexually transmitted disease
- Anatomy of male and female genitalia
- Epidemiological aspects of STDs
- Viral STDs including HIV, Herpes, Human Papilloma virus (HPV), Molluscum contagiosum, Espirito Santo virus (ESV) etc.
- Bacterial STD's: Syphilis, Gonorrhoea, Chancroid, Donovanosis
- Chlamydial infections: Lymphogranuloma venereum, urethritis, cervicits, nongonococcal urethritis (NGU), non-specific vaginitis etc.
- Fungal: Candidiasis
- Protozoal: Trichomoniasis
- Ectoparasitic: Scabies, Pediculosis infestations.
- Syndromic management of STDs
- HIV/AIDS - Epidemiology, transmission, patient load, High risk groups, cutaneous manifestations of HIV, treatment of opportunistic infections, antiretroviral therapy, management of STDs in HIV positive cases
- STDs in reproduction health and Pediatrics
- STDs and HIV
- Prevention, counselling and education of different STDs including HIV
- National Control Programmes of STDs and HIV infection
- Medico-legal, social aspects of STDs including psychological and behavioural abnormalities in STD patients

Leprosy

- Approach to the patient with leprosy

- Epidemiological aspects
- Structure, biochemistry, microbiology of Mycobacterium leprae
- Animal models
- Pathogenesis
- Classification
- Immunology and molecular biological aspects
- Histopathology and diagnosis including laboratory aids
- Clinical features
- Reactions
- Systemic involvement (Ocular, bone, mucosa, testes and endocrine etc.)
- Pregnancy and leprosy
- HIV infection and leprosy

TEACHING AND LEARNING METHODS

A post graduate student pursuing the course should work in the institution as a full time student. No candidate should be permitted to run a clinic/laboratory/nursing home while studying postgraduate course. Each year should be taken as a unit for the purpose of calculating attendance. Every student shall attend teaching and learning activities during each year as prescribed by the department and should not be absent from work without valid reasons.

Teaching methodology:

A list of teaching and learning activities designed to facilitate students acquire essential knowledge and skills outlined is given below.

Lectures: Lectures are to be kept to a minimum. They may, however, be employedfor teaching certain topics. Lectures may be didactic or integrated.

Didactic Lectures: Few topics are suggested as examples:

- Bio-statistics
- Use of library
- Research Methodology
- Medical code of Conduct and Medical Ethics
- National Health and Disease Control Programmes

Communication Skills

These topics may preferably be taken up in the first few weeks of the first year.

Integrated Lectures: Some of the topics may be taken up bymultidisciplinary teams eg. Jaundice, Diabetes mellitus, Thyroid etc.

Journal Club & Subject seminars: Both are recommended to be held once aweek. All PG students are expected to attend and actively participate in discussion and enter relevant details in the Log Book. Further, every post graduate student must make a presentation from the allotted journal(s), selected articles at least four times a year. The presentations would be evaluated and would carry weightage for internal assessment.

Student Symposium: Recommended as an optional multi-disciplinary programme.The evaluation may be similar to that described for subject seminar.

Ward Rounds: Ward rounds may be service or teaching rounds.

Service Rounds: Post graduate students and Interns should be responsiblefor everyday care of the patients. Newly admitted patients should be worked up by the PGs and presented to the seniors the following day.

Teaching Rounds: Every unit should have 'grand rounds' for teachingpurpose. A diary (log book) should be maintained for day to day activities by the students.

Entries of (a) and (b) should be made in the Log book. Log books shall be checked and assessed periodically by the faculty members imparting the training.

Clinical Case Presentations: Minimum of 5 cases to be presented by every postgraduate student each year. They should be assessed using check lists and entries made in the log book

Clinico-Pathological Conference (CPC): Recommended once a month for allpost graduate students. Presentation is to be done by rotation. If cases are not available, it could be supplemented by published CPCs.

Inter-Departmental Meetings: Strongly recommended particularly withDepartments of Pathology and Radio-Diagnosis at least once a week. These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.

Pathology: A dozen interesting cases may be chosen and presented by the postgraduate students and discussed. The staff of Pathology department would then show the slides and present final diagnosis. In these sessions, the advances in immuno-histochemical techniques can be discussed.

The post graduate students should undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing the work and presenting the same at various scientific fora.

Continuing Medical Education Programmes (CME): At least two CME programmes should be attended by each student during the MD programme.

Conferences: The student should attend courses, conferences and seminars relevantto the specialty.

A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the

period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

Department should encourage e-learning activities.

Rotation:

Clinical Postings

A major tenure of posting should be in the Department of Dermatology. It should include care of in-patients, out-patients, special clinics like STD clinic, leprosy clinic, vitiligo clinic and maintenance of case records for both in- and out-patients.

A short posting for 2-4 weeks in the Department of Medicine is to be arranged for exposure to Emergency Medicine and Resuscitation.

Clinical meetings:

There should be intra - and inter- departmental meetings for discussing uncommon / interesting medical problems. Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. These should be entered in a Log Book; log books should be checked and assessed periodically by the faculty members imparting the training.

Thesis writing:

Thesis writing is compulsory. All MD students are required to carry out work on a selected research project under the guidance of a recognized post graduate teacher, the result of which shall be written up and submitted in the form of a Thesis.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training may be as follows:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Quarterly assessment during the MD training should be based on:

- Journal based / recent advances learning
- Patient based /Laboratory or Skill based learning
- Self directed learning and teaching
- Departmental and interdepartmental learning activity

- External and Outreach Activities / CMEs

SUMMATIVE ASSESSMENT, i.e., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory Examination:

There shall be four papers each of three hours duration. Each paper shall consist of two long essay questions, three short essay questions and four short notes. These are:

Paper – I	**Basic Science as applied to Dermatology, STDs and Leprosy**
Paper – II	**Dermatology**
Paper – III	**STD & Leprosy**
Paper – IV	**Recent advances in field of Dermatology, Applied Sciencespertaining to skin /VD & internal medicine and skin**

Clinical / Practical and viva voce Examination

Practical examination should be taken to assess competence and skills oftechniques and procedures and should consist of two long cases, two short cases and 10 spots.

During oral/viva voce examination, student should be evaluated for Interpretation of data, instruments, clinical problems, radiological and biochemical investigations, slides, drugs, X-rays etc.

Recommended Reading:

Books (latest edition)

1. Sexually Transmitted Diseases - Sharma V K IADVL Text book of Dermatology - R G Walia IAL Textbook of Leprosy - H Kar
2. Bolognia “Textbook of Dermatology”
3. Text Book of Dermatology, Wilkinson/Ebling/Rook, 4 Volumes, Oxford
4. Text Book of Dermatology, Samuel L. Moschelia M.D. Harry J. Hurllay M.D., 2 Volumes
5. Histopathology of the Skin, Walter - F. Lever- Gundula Schaumburg Lever
6. Atlas of Dermatology, 2 Volumes, Bhalani Publishing House, Dadar, Mumbai.
7. Diseases of the skin, I Iarry L Arnold Richard 13-Dom William D. James, Andrews

8. Differential Diagnosis in Dermtology, Satish S. Savant, Radha Atalshah, Deepak Gore, Richard Ashan, Barbara Lepdard Leprosy, Dharmendra, 2 Volumes, Samant and Company, Mumbai.

9. Recent Advances in Dermatology, Champion, R.H. Pye, R.J. 8th Volumes.

10. Venereal Diseases, Amborse King Claude Nicol Philip Rodin, EL.BS English Language Book Society/ Baillere Tindal, East Sussex.

11. Sexually Transmitted Diseases, King K Holmes, McGraw-Hill Health profession

12. Hand Book of leprosy, Jopling W.H, William Hethgunnah Medical Book Ltd., London.

13. Dermatology in General Medicine, Thomas B. Fitzpatrick, McGraw Hill Book Company.

14. Fundamentals of Pathology of skin, Mysore Venkataram

Journals

Three international and two national journals (all indexed).

FACULTY OF MEDICINE

M.D. Pulmonary Medicine
(Programme code – MM-12)
Year of Implementation: 2010-2011

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN TB & Respiratory Diseases

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Evolution of critical care medicine makes it imperative that the postgraduates are trained in the basic principles of Pulmonary Medicine as applied to critical care. The person shall be abreast with the recent advances and developments in the specialty of Pulmonary Medicine. It is expected that the person will develop a spirit of enquiry and get oriented to apply recent advances and medical evidence to the practice of pulmonary medicine. He would also grasp the fundamentals of research methodology. Medical Science is dynamic with a continuous enhancement of knowledge. The process of acquiring knowledge and skills continues even after formal education. The syllabus to be covered during post graduate training in Pulmonary Medicine given below is designed to develop a sound and scientific foundation. It is intended to serve as a guide to impart basic knowledge and develop skills and does not impose any limits to expansion beyond the areas listed.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC OBJECTIVES

The primary goal of the MD course in Pulmonary Medicine is to produce post graduate clinicians able to provide health care in the field of pulmonary medicine. It is expected that a physician qualified in Pulmonary Medicine at the end of the course should be able to diagnose and treat pulmonary diseases, take preventive and curative steps for these diseases in the community at all levels of health care and qualify as a consultant and teacher in the subject. Each student should obtain proficiency in the following domains during the period of training:

1. Theoretical knowledge of different aspects of Pulmonary Medicine including the status in health and disease.
2. Acquire clinical skills.
3. Acquire practical skills.

4. Management of emergencies including intensive care.

5. Preparation of thesis as per MCI guidelines.

These involve patient management in the outpatient, inpatient and emergency situations, case presentations, didactic lectures, seminars, journal reviews, clinico-patholgical conferences and mortality review meetings and working in the laboratories.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the MD course in Pulmonary Medicine, the students should be able to:

1. Demonstrate sound knowledge of common pulmonary diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis. A comprehensive knowledge of epidemiological aspects of pulmonary diseases should be acquired.

2. Demonstrate comprehensive knowledge of various modes of therapy used in treatment of pulmonary diseases.

3. Describe the mode of action of commonly used drugs, their doses, side-effects / toxicity, indications and contra-indications and interactions.

4. Describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National tuberculosis Control Programme.

5. Manage common pulmonary emergencies and understand the basic of intensive care in patients with pulmonary diseases.

6. Practice the field of pulmonary medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.

7. Recognize the national priorities in pulmonary medicine and play an important role in the implementation of National Health Programmes including tuberculosis.

8. Demonstrate competence in medical management.

9. Should inculcate good reading habits and develop ability to search medical literature and develop basic concept of medical research.

B. Affective Domain

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives

and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical skills and be able to:

1. Interview the patient, elicit relevant and correct information and describe the history in chronological order.
2. Conduct clinical examination, elicit and interpret clinical findings and diagnose common pulmonary disorders and emergencies.
3. Perform simple, routine investigative and office procedures required for making the bedside diagnosis, especially sputum collection and examination for etiologic organisms especially Acid Fast Bacilli (AFB), interpretation of the chest x-rays and lung function tests.
4. Interpret and manage various blood gases abnormalities in various pulmonary diseases.
5. Develop management plans for various pulmonary diseases.
6. Assist in the performance of common procedures, like bronchoscopic examination, pleural aspiration and biopsy, pulmonary physiotherapy, endotracheal intubation and pneumo-thoracic drainage / aspiration etc.
7. Recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
8. Collect, compile, analyse, interpret, discuss and present research data.
9. Teach pulmonary medicine to undergraduate and postgraduate students. To acquire the above skills, the student should be exposed and trained in the following tests and procedures:

Diagnostic tests: Performance and interpretation

- Sputum and other body fluids examination with ZN stain for AFB, culture
- Methodsfor pathogenic bacteria, fungi and viruses. Newer diagnostic techniques for tuberculosis including molecular
- Techniques FNAC of lung masses (blind and image-guided)
- Arterial blood gas analysis and pulse oximetry
- Imaging: Interpretation of plain radiography, ultrasound examination, Computed tomogram, PET scan,MRI Sputum cytology
- Simple hematological tests
- Immunological and Serological tests
- Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of

daytime sleepiness Cardiopulmonary exercise testing

- Pulmonary function tests and interpretation (Spirometry, lung volume, diffusions, bodyplethysmography, other lung function tests)
- Bronchoprovocation tests
- BCG vaccination
- Mantoux testing; interferon gamma release assays
- Bronchoscopy: fibreoptic/rigid, diagnostic and therapeutic
- ECG, 2D and Doppler echocardiography
- Venous Doppler ultrasound
- Skin tests for hypersensitivity
- Sputum induction and non-invasive monitoring of airway inflammation
- Medical thoracoscopy

Therapeutic procedures

- Fine needle aspiration and other guided procedures
- Tube thoracostomy
- Cardiopulmonary rehabilitation exercises
- Postural drainage
- Pleural biopsy, lymph node biopsy
- Administration of inhalation therapy
- Administration of oxygen therapy
- Administration of continuous positive airway pressure (CPAP)/Bilevel Positive Airway Pressure (BiPAP)
- Monitoring and emergency procedures in intensive care

Syllabus

Course contents:

The student should acquire knowledge in the following:

Basic Sciences

A. Anatomy and Histology of Respiratory System

1. Development and Anatomy of Respiratory System

2. Applied embryology of lungs, mediastinum and diaphragm

3. Developmental anomalies

B. Physiology and Biochemistry

1. Assessment of pulmonary functions
2. Control of ventilation; pulmonary mechanics
3. Ventilation, pulmonary blood flow, gas exchange and transport
4. Non-respiratory metabolic functions of lung
5. Principles of electrocardiography
6. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
7. Acid-base and electrolyte balance
8. Physiology of sleep and its disorders
9. Pulmonary innervation and reflexes
10. Pulmonary defense mechanisms
11. Principles of exercise physiology and testing.
12. Physiological changes in pregnancy, high altitude, aging
13. Physiological basis of pulmonary symptoms

C. Microbiology

1. Mycobacterium tuberculosis and other mycobacteria
2. Bacteria causing pulmonary diseases
3. Atypical organisms and respiratory tract infections
4. Anaerobes in pleuropulmonary infections
5. Laboratory diagnosis of non-tubercular infections of respiratory tract
6. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing
7. Virulence and pathogenicity of mycobacteria
8. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods
9. Respiratory fungi: (i) Classification of fungal diseases of lung: candidiasis, Actinomycosis, Nacardiosis, Aspergillosis, Blastomycosis etc. (ii) Laboratory diagnostic procedures in pulmonary mycosis.
10. Opportunistic infections in the immuno-compromised individuals
11. HIV and AIDS. Virological aspects, immuno-pathogenesis, diagnosis
12. Parasitic lung diseases

D. Pathology

1. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
2. Pathology aspects of Tuberculosis
3. Pathology aspects of Pneumonias and bronchopulmonary suppuration
4. Chronic bronchitis and emphysema, asthma, other airway diseases

5. Occupational lung diseases including Pneumoconiosis

6. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinophilia

7. Tumors of the lung, mediastinum and pleura

E. Epidemiology

1. Epidemiological terms and their definitions

2. Epidemiological methods

3. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, COPD and other pulmonary diseases

4. National Tuberculosis Control Programme and RNTCP; Epidemiological aspects of BCG

5. Epidemiological aspects of pollution-related pulmonary diseases

6. Research methodology, statistics and study designs

F. Allergy and Immunology

1. Various mechanisms of hypersensitivity reactions seen in pulmonary diseases

2. Diagnostic tests in allergic diseases of lung - in vitro and in vivo tests, bronchial provocation test

3. Immunology of tuberculosis, Sarcoidosis and other diseases with an immunological basis of pathogenesis

G. Pharmacology

1. Pharmacology of antimicrobial drugs

2. Pharmacology of antitubercular drugs

3. Pharmacology of antineoplastic and immunosuppressant drugs

4. Bronchodilator and anti-inflammatory drugs used in pulmonary diseases

5. Drugs used in viral, fungal and parasitic infections

6. Other drugs pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases

7. Pharmacovigilance

Clinical Pulmonary Medicine

Clinical pulmonary medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, aetiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered.

Infections

1. Tuberculosis

(a) Aetiopathogenesis

(b) Diagnostic methods

(c) Differential diagnosis

(d) Management of pulmonary tuberculosis; RNTCP, DOTS, and DOTS-Plus; International Standards of TB Care

(e) Complications in tuberculosis

(f) Tuberculosis in children

(g) Geriatric tuberculosis

(h) Pleural and pericardial effusion and empyema

(i) Mycobacteria other than tuberculosis

(j) Extrapulmonary tuberculosis

(k) HIV and TB; interactions of antitubercular drugs with antiretrovirals

(l) Diabetes mellitus and tuberculosis

(m) Management of MDR and XDR tuberculosis

2. Non-tuberculous infections of the lungs

Approach to a patient with pulmonary infection

(a) Community-acquired pneumonia

(b) Hospital-associated pneumonia, ventilator-associated pneumonia

(c) Unusual and atypical pneumonias including bacterial, viral, fungal and parasitic and ricketisial, anerobic Bronchiectasis, lung abscess and other pulmonary suppurations

(d) Acquired immunodeficiency syndrome and opportunistic infections in immuno-compromised host

(e) Principles governing use of antibiotics in pulmonary infections

(f) Other pneumonias and parasitic infections, Zoonosis

Non-infectious Lung Diseases

3. Immunological disorders

(a) Immune defense mechanisms of the lung

(b) Sarcoidosis

(c) Hypersensitivity pneumonitis and lung involvement

(d) Eosinophilic pneumonias and tropical eosinophilia

(e) Pulmonary vasculitides

(f) Connective tissue diseases involving the respiratory system

(g) Interstitial lung disease of other etiologies

(h) Reactions of the interstitial space to injury, drugs

(i) Occupational and environmental pulmonary diseases

4. Other non-infectious disorders of the lungs and airways

(a) Aspiration and inhalational (non-occupational) diseases of the lung

(b) Drug induced pulmonary diseases

(c) Bullous lung disease

(d) Uncommon pulmonary diseases (metabolic, immunological, unknown etiology), pulmonary hemorrhagic syndromes

(e) Other pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolar microlithiasis

(f) Cystic fibrosis and disorders of ciliary motility

(g) Obesity-related pulmonary disorders

(h) Upper airways obstruction syndromes

(i) Occupational lung diseases and pneumoconiosis

(j) Air-pollution induced diseases, toxic lung and other inhalational injuries

(k) Health hazards of smoking

(l) Drug-induced lung diseases

5. Pulmonary Circulatory disorders

- Pulmonary hypertension and cor pulmonale
- Pulmonary edema
- Pulmonary thromboembolic diseases and infarction
- Cardiac problems in a pulmonary patient and pulmonary complications produced by cardiac diseases

6. Obstructive diseases of the lungs

- Asthma including allergic bronchopulmonary aspergillosis, specific allergen immunotherapy and immunomodulation
- Chronic obstructive lung disease and diseases of small airways
- Special aspects of management including Long term oxygen therapy, Inhalation therapy and Pulmonary rehabilitation

7. Tumors of the lungs

- Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- Solitary pulmonary nodule

8. Diseases of the mediastinum

- Non-neoplastic disorders
- Benign and malignant (primary and secondary) neoplasms and cysts

9. Disorders of the pleura

- Pleural dynamics and effusions
- Non-neoplastic and neoplastic pleural diseases
- Pneumothorax
- Pyothorax and broncho-pleural fistula
- Fibrothorax

10. Critical Care Pulmonary Medicine

- Management of emergency problems of different pulmonary diseases
- Adult respiratory distress syndrome
- Respiratory failure in the patient with obstructive airway disease
- Respiratory failure in other pulmonary diseases
- Management of sepsis
- Respiratory and haemodynamic monitoring in acute respiratory failure
- Non-invasive and Mechanical ventilation
- Principles of critical care, diagnosis and management of complications; severity of illness scoring systems
- Ethical and end-of-life issues in critical care

11. Extrapulmonary manifestations of pulmonary diseases

12. Sleep-related pulmonary diseases

- Polysomnography
- Sleep apneas
- Other sleep-disordered breathing syndromes

13. Miscellaneous aspects

- Diseases of the diaphragm
- Disorders of chest wall
- Obesity-related pulmonary disorders
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Assessment of quality of life using questionnaires

- Health impacts of global warming

14. Preventive Pulmonology

- Principles of smoking cessation and smoking cessation strategies
- Cardiopulmonary rehabilitation
- Preventive aspects of pulmonary diseases
- Vaccination in pulmonary diseases

III. Surgical aspects of Pulmonary Medicine

- Pre- and post-operative evaluation and management of thoracic surgical patients
- Chest trauma/trauma related lung dysfunction
- Lung transplantation

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

General principles

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching methodology

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

Formal teaching sessions

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the sessions, as given under formative assessment. Further, the student should:

- Attend accredited scientific meetings (CME, symposia, and conferences).
- Attend additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to medical practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Log book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The Log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.

Thesis

All MD (Pulmonary Medicine) post graduate students should carry out work on an assigned topic under the direct guidance of a recognised post graduate teacher. A written protocol of the proposed work should be submitted before the end of the first 6 months. Subsequently, the post graduate student should carry out the proposed work for at least 1 year (not inclusive of the period for submitting the protocol and writing-up the final thesis).

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self-directed learning and teaching**
4. **Departmental and interdepartmental learning activity**

5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate Examination shall be in three parts:

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature. 13 Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

Paper I: General pulmonary medicine and basic sciences;

Paper II: Clinical pulmonary medicine including medical emergencies;

Paper III: Clinical pulmonary medicine including critical care medicine;

Paper IV: Recent advances in pulmonary medicine, and research methodology.

The final qualifying examination should include an assessment of clinical skills in the form of case presentations and discussions. Other rules laid down by the MCI regarding M.D. examinations shall apply here as well.

3. Practical/Clinical and Oral/viva voce Examination:

The post graduate students shall examine a minimum of one long and two short cases.

Oral/viva voce Examination

The oral examination shall be thorough and shall aim at assessing the knowledge and competence of the post graduate student on the subject, investigative procedures, therapeutic technique and other aspects of the specialty which form a part of the examination. Recommended reading: Books (latest edition)

1.	Harrison's Principles of Internal Medicine	ed. Petersdorf (McGraw Hill)
2.	Cecil Text book of Medicine	ed. Wyngaarden
3.	Crofton & Douglas Respiratory diseases	ed. Seaton et al (Oxford)
4.	Pulmonary diseases & disorders	by Fishman (McGraw Hill)
5.	Textbook on Pulmonary disease	by Fraser & Pare
6.	Asthma	by Clarke et al
7.	Bronchoscopy	by Straddling
8.	Tuberculosis	by SK Sharma
9.	Lung diseases in the Tropics	ed. OP Sharma (Marcel Dekker)
10.	The Normal Lung	by Murray (Saunders)
11.	Pulmonary Function Testing	by Clausen (Academic Press)
12.	Respiratory Physiology	by J.B. West (Williams & Wilkins)
13.	Physiology of Respiration	by J.H. Comroe (Yearbook Med Pub.)
14.	Respiratory Function in disease	by Bates et al (Saunders)

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.D. Orthopedics
(Programme code – MM-20)
Year of Implementation: 2001-2002

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal systems. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centers.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

This will be dealt with under the following headings:

Theoretical knowledge (Cognitive domain)

Practical and clinical skills (psychomotor domain)

Attitudes including communication skills (Affective domain)

Writing thesis / Reviewing Research activities (Scholarly activity)

Training in Research Methodology (Practice based learning; Evidence based practice) Professionalism

Teaching skills

SUBJECT SPECIFIC COMPETENCIES

Cognitive domain

At the end of the M.S. Orthopaedics programme, the post graduate student should be able to:

1. Demonstrate sufficient understanding of the basic sciences relevant to orthopaedic speciality through a problem based approach.

2. Describe the Principles of injury, its mechanism and mode, its clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculo-skeletally injured patient.

3. Identify and describe the surface anatomy and relationships within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck.

4. Define and describe the pathophysiology of shock (circulatory failure).

5. Define and describe the pathophysiology of Respiratory failure

6. Describe the principles and stages of bone and soft tissue healing

7. Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.

8. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.

9. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.

10. escribe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage

11. Describe the physiological coagulation cascade and its abnormalities

12. Describe the pharmacokinetics and dynamics of drug metabolism and excretion of analgesics, anti-inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents.

13. Understanding of biostatistics and research methodology

14. Describe the clinical presentation, plan and interpret investigations, institute management and prevention of the following disease conditions

- Nutritional deficiency diseases affecting the bones and joints
- Deposition arthropathies
- Endocrine abnormalities of the musculoskeletal system
- Metabolic abnormalities of the musculoskeletal system
- Congenital anomalies of the musculoskeletal system
- Developmental skeletal disorder of the musculoskeletal system

15. Describe the pathogenesis, clinical features plan and interpret investigations and institute the management in adults and children in

- Tubercular infections of bone and joints (musculoskeletal system)
- Pyogenic infections of musculoskeletal system
- Mycotic infections of musculoskeletal system
- Autoimmune disorders of the musculoskeletal system
- Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy
- Osteoarthrosis and spondylosis

16. Describe the pathogenesis, clinical presentation, plan and interpret investigations and institute appropriate treatment in the following conditions:

- Post-polio residual paralysis
- Cerebral palsy
- Muscular dystrophies and myopathies
- Nerve Injuries
- Entrapment neuropathies

17. Identify the diagnosis and describe management of musculoskeletal manifestation of AIDS and HIV infection

- Describe the etiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.
- Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care
- Identify a problem, prepare a research protocol, conduct a study, record observations, analyze data, interpret the results, discuss and disseminate the findings.
- Identify and manage emergency situation in disorders of musculoskeletal system
- Understanding of the basics of diagnostic imaging in orthopaedics like:
  - **a.** Plain x-ray
  - **b.** Ultrasonography
  - **c.** Computerized axial tomography
  - **d.** Magnetic resonance imaging
  - **e.** PET scan
  - **f.** Radio Isotope bone scan
  - **g.** Digital Subtraction Angiography (DSA)
  - **h.** Dual energy x-ray Absorptiometry
  - **i.** Arthrography

18. Describe the etiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.

a. Understand the basics, principles of biomaterials and orthopaedic metallurgy

b. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.

c. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.

Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Attitudes including Communication skills and Professionalism

Communication skills:

- Exhibits participation in honest, accurate health related information sharing in a sensitive and suitable manner
- Recognizes that being a good communicator is essential to practice effectively
- Exhibits effective and sensitive listening skills
- Recognizes the importance and timing of breaking bad news and knows how to communicate
- Exhibits participation in discussion of emotional issues
- Exhibits leadership in handling complex and advanced communication
- Recognizes the importance of patient confidentiality and the conflict between confidentiality and disclosure
- Able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication
- Able to obtain comprehensive and relevant history from patients/relatives.
- Able to counsel patients on their condition and needs

Teamwork: Seek cooperation. Coordination and communication among treating specialtiesand paramedical staff

Counseling of relatives: regarding patients condition, seriousness, bereavement andcounseling for organ donation in case of brain stem death

Leadership: Trauma prevention, education of the public, paramedical and medical persons.

Advocacy: with the government and other agencies towards cause of trauma care

Ethics: The Code of Medical Ethics as proposed by Medical Council of India will be learntand observed.

Psychomotor domain

At the end of the first year of M.S. Orthopaedics programme, the student should beable to:

- Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis

- Impart wound care where applicable
- Apply all types of POP casts/slabs, splints and tractions as per need
- Identify shock and provide resuscitation
- Perform aspiration of joints and local infiltration of appropriate drugs
- Perform appropriate wound debridement
- Perform arthrotomy of knee joint
- Perform incision and drainage of abscess
- Perform split thickness skin grafting
- Perform fasciotomies
- Apply external fixators
- Apply skeletal tractions including skull tongs
- Triage a disaster situation and multiple trauma patients in an emergency room
- Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
- Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
- Perform on a cadaver standard surgical approach to the musculoskeletal system

At the end of the second year of M.S. Orthopaedics course, the student should be able to:

1. Take an informed consent for standard orthopaedic procedures

2. Perform closed/open biopsies for lesions of bone, joints and soft tissues

3. Perform split thickness skin grafting and local flaps

4. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.

5. Perform sequestrectomy and saucerization

6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow

7. Perform repair of open hand injuries including tendon repair

8. Perform arthrodesis of small joints

9. Perform diagnostic arthroscopy on models and their patients

10. Perform carpal tunnel/tarsal tunnel release

11. Apply ilizarov external fixator

12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities

13. Perform amputations at different levels

14. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia

At the end of the third year of M.S. Orthopaedics programme, the student should be able to:

- Assist in the surgical management of polytrauma patient
- Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle
- Assist in spinal decompressions and spinal stabilizations
- Assist in operative arthroscopy of various joints
- Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow
- Assist in corrective osteotomes around the hip, pelvis, knee, elbow, finger and toes
- Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
- Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand
- Assist in spinal deformity corrections
- Independently perform closed/open reduction and internal fixation with DCP, LCP, intramedullary nailing, LRS
- Assist in limb lengthening procedures
- Assist in Revision surgeries
- Provide pre and post OP care
- Perform all clinical skills as related to the specialty.

Syllabus

Course contents:

Basic Sciences

- Anatomy and function of joints
- Bone structure and function
- Growth factors and facture healing
- Cartilage structure and function
- Structure and function of muscles and tendons
- Tendon structure and function
- Metallurgy in Orthopaedics
- Stem Cells in Orthopaedic Surgery
- Gene Therapy in Orthopaedics

Diagnostic Imaging in Orthopaedics

(Should know the interpretation and Clinical Correlation of the following): -

- Digital Subtraction Angiography (DSA)

- MRI and CT in Orthopaedics
- Musculoskeletal USG
- PET Scan
- Radio-isotope bone scan

Metabolic Bone Diseases

- Rickets and Osteomalacia
- Osteoporosis
- Scurvy
- Mucopolysaccharidoses
- Fluorosis
- Osteopetrosis

Endocrine Disorders

- Hyperparathyroidism
- Gigantism, Acromegaly

Bone and Joint Infections

- Pyogenic Hematogenous Osteomyelitis - Acute and Chronic
- Septic arthritis
- Fungal infections
- Miscellaneous infections
- Gonococcal arthritis
- Bone and joint brucellosis
- AIDS and the Orthopaedic Surgeon (universal precautions)
- Musculoskeletal Manifestations of AIDS
- Pot’s spine
- Tubercular synovitis and arthritis of all major joints

Poliomyelitis

- General considerations
- Polio Lower limb and spine
- Management of Post-Polio Residual Palsy (PPRP)

Orthopaedic Neurology

- Cerebral Palsy
- Myopathies

Peripheral Nerve Injuries

- Traumatic
- Entrapment Neuropathies

Diseases of Joints

- Osteoarthrosis
- Calcium Pyrophosphate Dihydrate (CPPD), Gout
- Collagen diseases

Systemic Complications in Orthopaedics

- Shock
- Crush syndrome
- Disseminated Intravascular Coagulation **(**DIC)
- Acute Respiratory Distress Syndrome (ARDS)

Bone Tumors

- Benign bone tumors
- Malignant bone tumors
- Tumor like conditions
- Metastatic bone Tumors

Miscellaneous Diseases

- Diseases of muscles
- Fibrous Dysplasia
- Unclassified diseases of bone
- Paget's disease
- Peripheral vascular disease
- Orthopaedic manifestations of bleeding disorders

Regional Orthopaedic Conditions of Adults and Children

- The spine
- The shoulder
- The elbow
- The hand
- The wrist
- The hip
- The knee
- The foot and ankle
- The pelvis

Biomaterials

- Orthopaedic metallurgy
- Bio-degradable implants in Orthopaedics
- Bone substitutes
- Bone Banking

Fracture and Fracture-Dislocations

- General considerations
- Definitions, types, grades, patterns and complications
- Pathology of fractures and fracture healing
- Clinical and Radiological features of fractures and dislocations
- General principles of fracture treatment
- Recent advances in internal fixation of fractures
- Locking plate osteosynthesis
- Less Invasive Stabilization System (LISS)
- Ilizarov technique
- Bone grafting and bone graft substitutes
- Open fractures and soft tissue coverage in the lower extremity
- Compartment syndrome
- Fractures of the upper extremity and shoulder girdle
- Fractures of the lower extremity
- Fractures of the hip and pelvis
- Malunited fractures
- Delayed union and non-union of fractures
- Fractures/dislocations and fracture - dislocations of spine

Dislocations and Subluxations

- Acute dislocations
- Old unreduced dislocations
- Recurrent dislocations

Traumatic Disorders of Joints (Sports Injuries)

- Ankle injuries
- Knee injuries
- Shoulder and elbow injuries
- Wrist and hand injuries

Arthrodesis

- Arthrodesis of lower extremity and hip
- Arthrodesis of upper extremity
- Arthrodesis of spine

Arthroplasty

- Biomechanics of joints and replacement of the following joints.
- Knee
- Ankle
- Shoulder
- Elbow

Minimally Invasive Surgery (MIS)

Arthroscopy

- General principles of Arthroscopy
- Arthroscopy of knee and ankle
- Arthroscopy of shoulder and elbow

Amputations and Disarticulations

- Amputations and disarticulations in the lower limb
- Amputations and disarticulations in the upper limb

Rehabilitation - Prosthetics and Orthotics

Pediatric orthopaedics:

- Fractures and dislocations in children
- Perthes' disease
- Slipped capital femoral epiphysis
- Congenital Dislocation of Hip (CDH)
- Neuromuscular disorders

Spine

Spinal trauma: Diagnosis and management including various types of fixations

- Rehabilitation of paraplegics/quadriplegics
- Management of a paralyzed bladder
- Prevention of bed sores and management of established bed sores
- Exercise programme and Activities of Daily Living (ADL)
- Psychosexual counseling

Degenerative disorders of the spine

- Prolapsed Inter Vertebral Disc (PIVD)
- Lumbar Canal Stenosis (LCS)
- Spondylolysis/Spondylolisthesis
- Lumbar Spondylosis
- Ankylosing Spondylitis
- Spinal fusion: various types and their indications.

Triage, Disaster Management, BTLS and ATLS

Recent advances in orthopaedics

a. Autologous chondrocyte implantation

b. Mosaicplasty

c. Video assisted Thoracoscopy (VATS)

d. Endoscopic spine surgery

e. Metal on metal arthroplasty of hip

f. Surface replacements of joints

g. Microsurgical techniques in Orthopaedics

h. Designing a modern orthopaedic operation theatre

i. Sterilization, Theatre Discipline, Laminar air flow, Modular OTs

TEACHING AND LEARNING METHODS

Emphasis should be given to various small group teachings rather than didactic lectures.

CASE PRESENTATION once a week in the ward, in the outpatient department and special clinics.

Seminars / Symposia – Twice a month; Theme based student centered Journal club/ Review: Twice a month

Academic grand ward rounds: Twice a month presentation of cases by residents and clinically applicable discussions.

ORTHO RADIOLOGY MEETS: Twice a month discussions amongst Ortho & RadiologyResidents under facilitation of faculty on various imaging modalities used and its interpretation

ORTHO SURGICAL PATHOLOGICAL MEET: Special emphasis on the surgicalpathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presenting the clinical details of the case, radiology PG student describes the Radiological findings and its interpretation and Pathology student describes the morbid anatomy and histopathology of the same case.

SKILLS LAB SESSIONS: Once a fortnight for all two years.

Clinical teaching in the OPD, Emergency room, ICU, OR as per the situation.

Mortality & Morbidity meetings with SURGICAL AUDIT: Once a month

Maintenance of log book: to be signed by the faculty in charge

The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

A post graduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the post graduate degree examination.

Should have attended two conferences/CMEs/Workshops during his tenure as a postgraduate Department should encourage e-learning activities.

Rotations:

Clinical postings

A major portion of posting should be in Orthopaedics department. It should include in-patients, out-patients, ICU, trauma, emergency room and specialty clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

Log book: Each student must be asked to present a specified number of cases for clinicaldiscussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive and objective assessing the competencies stated in the course. The assessment is both formative and summate. Formative is spread over the entire duration of the programme and the summative is as per university examination pattern.

FORMATIVE ASSESSMENT, during the training,

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self-directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, at the end of the course,

Post Graduate Examination

The summative examination would be carried out as per the Rules given in **POSTGRADUATEMEDICAL EDUCATION REGULATIONS, 2000.**

The Post Graduate examination shall be in three parts: -

Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory:

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

There shall be four theory papers as follows:

Paper I: Basic Sciences as applied to Orthopaedics

Paper II: Traumatology and Rehabilitation

Paper III: Orthopaedic diseases

Paper IV: Recent advances in Orthopaedic surgery + General Surgery as applied to Orthopaedics

Practical/Clinical: The practical examination should consist of the following and shouldbe spread over two days, if the number of post graduate students appearing is more than five.

- One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
- Short cases from various sections of the specialty (three)

Oral/Viva-voce Examination

- Surgical Anatomy including Osteology
- Instruments
- Radiology
- Surgical Pathology
- Orthotics and prosthetics

Recommended Reading:

Books (latest edition)

- Campbell's Operative Orthopaedics, Vols 1,2,3 & 4
- Mercer's Orthopaedic Surgery
- Rockwood And Greens – Fractures in Adults, Vol 1& 2
- Fractures in Children – Rockwood & Wilkins
- Physiological Basis of Medical Practice – Best and Taylor's
- Arthroscopic Surgery of The Knee – Johannes
- PaediatricOrthopaedics – Tachidjian, Vol 4
- Concise System of Orthopaedics And Fractures – Graham Apley
- Orthopaedics and Traumatology – Natarajan

- Outline of Fractures Adams, Hamblen
- Textbook Of Orthopaedics And Trauma – Kulkarni, Vol 1
- B.D. Chaurasia's Human Anatomy, Vol1,Vol 2, Vol 3
- Pharmacology and Pharmacotherapeutics – Satoskar
- Orthopaedics Anatomy and Surgical Approaches Frederick Wreckling
- The Art of Aesthetic Plastic Surgery – John R Levis, Vol 1
- Current Concepts in Orthopaedics Dr. D. K. Tareja
- Custom Mega Prosthesis & Limb Salvage Surgery Dr. Mayilvahanan
- Advances in Operative Orthopaedics
- Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N
- Tachdjian's Pediatric Orthopaedics-Vol. 1, Vol 2, Vol 3, Herring, John Anthony
- Surgical Exposures in Orthopedics:The Anatomic Approach, Hoppenfeld, Stanley; De Boer,Piet
- Adams's Outline of Orthopaedics, Hamblen, David L; Simpson, Hamish R
- Text Book Of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H
- Current Techniques In Total Knee Arthroplasty, Sawhney G S
- Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta,Debasis
- Essential Orthopaedics And Trauma, Dandy, David J; Edwards, Dennis J
- Adams's Outlines Of Fractures;Including Joint Injuries, Hamblen, David L; Simpson, A Hamish R W
- Orthopedic Physical Assessment, Magee, David J
- Turek's Textbook Of Orthopaedics Vol 1 & 2, Turek's
- Orthopaedics Surgical Approach, Miller

Journals

03-05 international Journals and 02 national (all indexed) journals.

FACULTY OF MEDICINE

M.D. Radio-Diagnosis
(Programme code – MM-15)
Year of Implementation: 2001-2002

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIODIAGNOSIS

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The Goal of this program is to impart training in conventional and modern radiology andimaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology. The student should also acquire basic knowledge in the various sub-specialties of radiology. These Guidelines also would also help to standardize Radiodiagnosis teaching at post graduate diploma (DMRD) level throughout the country so that it will benefit in achieving competent radiologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SPECIFIC LEARNING OBJECTIVES

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/ intervention.

SUBJECT SPECIFIC COMPETENCIES

Cognitive Domain

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

Acquire good basic knowledge in the various sub-specialties of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular-radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women's imaging.

Independently conduct and interpret all routine and special radiologic and imaging investigations.

Provide radiological services in acute emergency and trauma including its medico-legal aspects.

Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost-effective algorithm of various imaging techniques in a given problem setting.

Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.

Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.

Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.

Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.

Interact with other specialists and super-specialists so that maximum benefit accrues to the patient.

Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.

Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.

Acquire knowledge of interventional radiology.

Affective Domain:

Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor domain

Practical Training will include two major aspects:

- Interpretation of images, and

- Skill in performing a procedure.

A) Interpretation of images:

The student should be able to interpret images on all imaging modalities of diseases of following organs:

Musculo-skeletal System - Interpretation of diseases of muscles, soft tissue,bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.

Respiratory System - Interpretation of diseases of the chest wall, diaphragm,pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.

Cardiovascular System - Interpretation of diseases and disorders ofcardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.

Gastro-intestinal tract and hepato-biliary pancreatic system - Interpretation ofdiseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas**.**

Urogenital System - Interpretation of various diseases and disorders of genitor-urinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.

Central Nervous System (C.N.S.) - Interpretation of diseases and disorders ofthe head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.

- Imaging in Emergency Medicine.
- Imaging in Obstetrics and Gynecology.
- Imaging of Breast and interventional procedures.
- ENT, EYE and Dental Imaging**.**
- Imaging of endocrine glands and those involved with metabolic diseases.
- Clinical applied radionuclide imaging.
- Interventional Radiology

B) Skills in performing a procedure

The student should be able to perform the following procedures:

GIT contrast studies: Barium studies (swallow, upper GI, Follow through, enema); fistulogram; sialogram; cologram/ileostogram,

GU: Excretory urography, MCU, RGU, nephrostogram, genitogram,

Ultrasound: Studies of whole body including neonatal transfontanell studies,Doppler studies,

CT scan: should be able to position a patient, plan study as per the clinical indication,do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.

MRI: plan and perform MRI studies of whole body

DSA: should be able to describe the techniques, do(if available to student)transfemoralpuncture and insert catheter, help in angiographic procedures both diagnostic and interventional.

Radiography: should be able to independently do radiography of common and someimportant uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.

Interventional radiology: The student should be able to perform simple, commonnon- vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures;

Syllabus

Course contents:

Anatomy

Gross and cross-sectional anatomy of all the body systems.

Pathology

Gross morphology of pathological conditions of systemic diseases affecting all organ systems.

Radiology Course

This would cover imaging and interventions of diseases affecting all the body systems:

- Chest
- Cardiovascular system
- Musculoskeletal including soft tissue
- Gastrointestinal system
- Hepato-biliary-pancreatic system
- Urogenital (genito-urinary) system
- CNS including head and neck
- Obstetrics and gynaecology

- ENT, eye, dental, breast
- Endocrine and metabolic system
- Clinically applied radionuclide imaging

Radiological Physics

Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity

- Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
- X-ray Generating Apparatus
- Screen-film radiography
- Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
- Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
- Digital radiography: Computed Radiography, Flat panel radiography
- Other equipments: Ultrasound including Doppler, CT, MRI and DSA
- Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
- Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
- Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
- Radiation protection, dosimetry and radiation biology
- Image quality and Quality Assurance (QA)
- Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit Check linearity of mA
- Verification of inverse square law for radiation Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit Processor quality assurance test
- Radiological protection survey of an x ray unit Check compatibility of safe light
- Check performance of view box Effect of kVp on x ray output

Radiography and processing techniques

- Processing techniques: includes dark room and dry processing.

- Radiography of the musculo-skeletal system including extremities.
- Radiography of the chest, spine, abdomen and pelvic girdle.
- Radiography of the skull, orbit, sinuses.
- Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
- Contrast techniques and interpretation of the Central Nervous system.
- Contrast techniques and interpretation of the cardiovascular system including chest.
- Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
- Paediatric radiology including MCU, genitogram, bone age.
- Dental, portable and emergency (casualty) radiography.

TEACHING AND LEARNING METHODS

The training is spread over 3 years and includes following components:

- Physics related to imaging
- Rotational posting in various sub-specialties.
- Seminars, case discussion, journal club**.**
- Research methodology and statistics.
- A log book should be maintained by the student and will be checked and signed regularly by the faculty-in-charge during the training program.
- The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
- The postgraduate student would be required to present one poster presentation, toread one paper at a national/state conference and to submit one research paper whichshould be published or accepted for publication or sent for publication to a peerreviewed journal, during the period of his/her postgraduate studies so as tomake him/her eligible to appear at the postgraduate degree examination.
- Department should encourage e-learning activities.

Rotations:

During the three-year course, suggested rotations are as follows: -

Conventional chest, abdomen, musculoskeletal including	8 months
skull, spine, PNS and mammography etc	
Contrast studies: G.U., GIT, Hepato-biliary,	8 months
angiography etc including fluoroscopic guided	

interventions	
US, Doppler and US guided interventions	8 months
CT and CT guided interventions	6 months
Emergency radiology	2 months
M.R.I.	2 months
Elective posting	2 months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

PROPOSED SCHEDULE FOR ROTATION

1st Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, musculo-skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
(2/6)	US & interventions	Conventional skull, spine, musculo-skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interve-ntions
2nd Year (3/6)	Conventional Chest & abdomen	Contrast studies – GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
(4/6)	Conventional skull, spine, musculo-skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/genito- gram	US & intervent - ions	US & Doppler	Emergency	MRI
3rd Year (5/6)	Conventional Chest & mammo-graphy	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & inter-ventions	Elective
(6/6)	Conventional musculo-skeletal & mammo-graphy	Contrast Studies - G.U. tract including pediatric MCU/genito-gram	CT & inter-ventions	CT & inter-ventions	MRI	Elective

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- **Journal based / recent advances learning**
- **Patient based /Laboratory or Skill based learning**
- **Self directed learning and teaching**
- **Departmental and interdepartmental learning activity**
- **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in

POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

Postgraduate Examination

The Post Graduate Examination was conducted in three parts.

Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical/Practical examination. The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for

Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

Theory Examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period**.**

There shall be four theory papers:

Paper I: Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.

Paper III: Abdominal Imaging including GI, GU, Hepatobiliary, endocrine andmetabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

Practical/ clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

Practical Examination will have:

- 3-4 Cases
- Film Quiz (50 – 60 Spots)
- To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

Suggested Reading:

Books (latest edition)

- Grainger & Allison's Text book of Diganostic Radiology (Churchill Livingstone)
- Textbook of Gastrontestinal Radiology- Gore and Levine (Saunders)

- MRI of Brain and Spine - Scott Atlas (LWW)
- Diagnosis of Diseases of the Chest -Fraser
- Diagnostic Imaging Series: (Amirsys, Elsevier)
- Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
- MRI in Orthopedics and Sport Injuries - Stoller
- Skeletal Radiology - Greenspan
- Abdominal-Pelvic MRI - Semelka (lWW)
- Caffey's Pediatric Radiology
- CTI and MRI of the whole body- John R. Haaga
- Text Book of Radiology and imaging - Davodsulton
- Diagnostic ultrasound - Carol C. Rumack
- AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volumes 1, 2, 3.

FACULTY OF MEDICINE

M.D. Anesthesiology
(Programme code – MM-14)
Year of Implementation: 2001-2002

Curriculum and Syllabus

SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT (U.P.) 250005

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN ANAESTHESIOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training in anesthesiology should be able to recognize the health needs of the community. He or she should be competent to handle effectively medical problems and should be aware of the recent advances pertaining to his/her specialty. She/he should be highly competent anesthesiologist with broad range of skills that will enable him/her to practice anesthesiology independently. The PG student should also acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library. She/he should attend conferences, workshops and CMEs regularly to upgrade his/her knowledge.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC LEARNING OBJECTIVES

The training should have clear objective, is competency based, is well planned & evaluated and is supervised and delivered by well trained teachers. It will have special emphasis on attitude and behavior, safety, communication, presentation, audit, teaching, ethics and law and management.

No limit can be fixed and on the number of topics that can be prescribed as course contents. The student is expected to know his/her subject in depth from various text books and journals; however more emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competency in anaesthesia skills commensurate with the specialty (actual hand on training) must be ensured.

Specific learning objectives:

1. Theoretical knowledge: The student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Statistics and Physics) as applied to

Anaesthesia. The student should acquire in-depth knowledge including recent advances. He/she should be fully conversant with the bedside procedures (diagnostic and therapeutic) and have knowledge of latest diagnostics and therapeutics procedures available including radiological methods.

2. Teaching: The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students. The student should be familiar with the latest teaching (computer and power point presentation) modes including simulators training and evidence based medical education.

3. Attitude development: The student should develop attitude that leads to appropriate communication with colleagues to function in a group in Operating Room /Intensive Care Unit, and develop the ability to function as a leader in the operating room.

SUBJECT SPECIFIC COMPETENCIES

The student during the training programme should acquire the following competencies:

A. Cognitive domain

Demonstrate knowledge of Anatomy related to;

- Diaphragm, upper and lower airway, heart and coronary circulation ,
- Regional anaesthesia - field block, central neuraxial, blockade, block for acutepain states
- Procedures like -Intramuscular injections, arterial and venous cannulationsand
- Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory,cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological,neuromuscular, regulation of temperature and metabolism, stress response,cerebral blood flow and ICP, central, autonomic and peripheral nervous systems,metabolic response to stress and trauma) in detail and translate its application in aproblem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and bloodtransfusion, peri-operative fluid therapy, acid base homeostasis in health anddiseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice(premedication, induction agents - intra-venous and inhalational, neuromuscularblocking agents and reversal of muscle relaxants) - general principles, concepts ofpharmacokinetics and pharmacodynamics, drug interactions with the other drugstaken concomitantly by the patient and anaphylactoid reactions.
- Demonstrate knowledge of gas laws, medical gas supply system, fluidics,electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of ‘principles of physics’ that govern functions of basicanaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc),breathing systems and monitors, fiber optics, Lasers, Pacemakers anddefibrillators, monitoring equipments (used for assessment of

cardiac functions,temperature, respiratory functions, blood gases, intracranial pressure, depth ofanaesthesia and neuromuscular block), Sterilization of equipments, manufacture,filling and transport of gases and liquid oxygen. etc.

- Demonstrate knowledge of importance of pre-anaesthetic assessment andoptimization of a patient; consisting of evaluation, interpretation of laboratoryinvestigation as applied to the care of the patients in planning and conducts ofgeneral anaesthesia.
- Demonstrate knowledge of basic life support, advanced cardiac, trauma lifesupport, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universalprecautions, selection, maintenance and sterilization of anaesthesia andrelated equipment, Infection control, cross contamination in OT and ICU.Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty withknowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management ofunconscious patients, oxygen therapy, shock- (pathophysiology and management)and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recoveryroom, in terms of management of
  - **(i)** Post-operative pain: various modalities
  - **(ii)** Nausea and vomiting
  - **(iii)** Identified emergencies and postoperative complications.
  - **(iv)** Special precautions to be taken in specific surgical patients.
- Demonstrate knowledge of acute pain management, chronic pain therapy &therapeutic nerve blocks, acupuncture, acupressure and other non-conventionalmethods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept ofinformed consent.
- Demonstrate knowledge of research methodology and basics of biostatisticsrelevant to data collection, analysis, record keeping in anaesthesia, comparisonand estimation of significance.
- Demonstrate ability to interpret blood gas analysis and other relevant biochemicalvalues, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use ofblood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevantto:
  - **(i)** Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormalenvironments including rural area and calamitous situations

(ii) Associated medical disorders in surgical patients

(iii) Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic,ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.

(iv) Induced hypothermia, incidental, and environmental safety of patient.

(v) Malignant hyperthermia, myasthenia gravis, GB syndrome and otherneuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchialasthma and hypertensive crises.

(vi) Principles of anaesthetic management of neuro / cardiac / thoracic / vascular / transplantation / burns and plastic surgery.

(vii) Anaesthesia for patients with severe cardiac, respiratory, renal andhepatobiliary disorder posted for unrelated surgery

(viii) Shock, types, pathogenesis and management of patients in shock, renalfailure, critically ill and/or on ventilator, Multiple organ failure

- Demonstrate knowledge pertaining to care of terminally ill, Hospices management, Do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incidentreporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medicaleducation.
- Demonstrate knowledge of principles of human resources and material management.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire skills in the following broad areas and be able to:

- Demonstrate ability **as a perioperative physician**, in terms of Acquiring mastery in careful and relevant history taking, physical examinationin clinical evaluation of the patient preoperatively.
- Collecting and synthesizing preoperative data from parent hospital and othersources and to develop a rational strategy for the peri-operative care of thepatient.

- Thorough and systematic approach to preoperative evaluation of patients withand without systemic diseases, undergoing different types of operations.
- Prioritizing problems, present cases clearly and systematically to attendingconsultants.
- Developing working relationships with consultants in other specialties toassist in preoperative evaluation and get a good consultation.
- Interacting with preoperative patients and developing effective counselingtechniques for different anaesthetic techniques and peri-operative procedures.
- Assessing and explaining risk of procedure and taking informed consent.
- Managing information in preoperative evaluation and outcome enhancementand communication skill to patients and relatives.
- Ability to choose and order the required investigations to be done in aparticular patient peri operatively
- Demonstrate ability in performing
  - **(i)** Pre-operative equipment check
  - **(ii)** selection of drugs
  - **(iii)** Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.
- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolarity and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical co relation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
  - **a.** Electrocardiogram with ST-segment analysis

b. Non-invasive blood pressure

c. Capnograph: values and changes in values and waveform.

d. Pulse oximetry: values and changes in values

e. Neuromuscular blockade monitor

f. Invasive arterial pressure: waveform and changes in the waveform

g. Central venous pressure: values and waveform

h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.

(i) Cardiac output

(ii) Mixed venous oxygen saturation

(iii) Evoked potential

(iv) Trans-esophageal echocardiography: basic understanding

- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumber puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries, able to manage critically ill patients and treat intractable pain.
- Demonstrate following abilities in **Emergency Anaesthesia, Trauma andResuscitation:**

(i) Organize resources in case of mass casualty.

(ii) Perform triage.

(iii) Assess, transport and manage mass casualties / disaster management and camp anaesthesia.

(iv) Manage massive hemorrhage and massive blood transfusion.

(v) Transport critically ill patient.

(vi) Perform anaesthetic management of geriatric patients with fracture neck of femur

(vii) Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septicaemic shock, acute upper airway obstruction such as foreign body,

epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta

(viii) Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.

(ix) Management of intra-operative cardiac arrest

(x) Management of intra-operative bronchospasm

- Demonstrate ability to document a Medico-legal aspect.
- Demonstrate ability to provide special sedation /**anaesthesia requirementsoutside operating Room,** e.g.**Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Oncho radiotherapy**, **Electroconvulsive shocktherapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologicprocedures, lithotripsy** etc**.**
- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.
- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**

A. Assess the patient's recovery and condition for a safe discharge or transfer.

B. Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthsia Care Unit (PACU) especially those in relation to cardio-respiratory systems:

1. Airway integrity and compromise.

2. Arrhythmia

3. Hypertension

4. Hypotension

5. Pain prevention and pain relief

6. Nausea and vomiting

7. Decreased urine output

8. Emergence delirium

9. Delayed emergence from anaesthesia

10. Shivering

11. Post-obstructive pulmonary edema.

C. Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.

D. Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.

- Demonstration of following abilities in **Intensive Care Unit**

Understanding the spectrum of critical illnesses requiring admission toICU.

(i) Recognizing the critically ill patient who needs intensive care -Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.

(ii) Monitoring progress of patients by physiological scoring systems

(iii) Practicing infection control practices and control of nosocomial infections.

(iv) Inserting central venous lines, arterial lines using ultrasound and interpreting the data.

(v) Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications

(vi) Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.

(vii) Principles and application of Oxygen Therapy

(viii) Glycemic control in the critically ill patient

(ix) Practice of Hypothermia and prevention of cerebral injury after cardiac arrest

(x) Delivering appropriate nutritional support - enteral and parenteral.

(xi) Proper use of sedative/hypnotic drugs in the ICU.

(xii) Practicing ethical and legal aspects of critical care

(xiii) Good communication skills with patient and relatives.

(xiv) Proper Sterilization of ICU equipment.

- Demonstration of following abilities in **Acute and Chronic Pain Management**

(i) Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.

(ii) Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.

(iii) Practice the different modalities of physical therapy that may relieve both acute and chronic pain

(iv) Practice the acute pain, cancer pain guidelines and WHO treatment ladder.

(v) Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.

(vi) Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.

- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture.
- Demonstration of abilities to manage **Chronic Pain**

(i) Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioral approaches), neuro-ablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.

(ii) Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).

(iii) Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.

(iv) Practice Epidural steroid injection (all levels) and long-term epidural catheterization.

(v) Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve

(vi) Recognize complications associated with each blocks and know appropriate treatment of each

(vii) Know the indications for stimulation techniques such as trans-cutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.

(viii) Mechanisms and side effects of other therapies used for treating pain.

(ix) The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.

(x) Awareness of the principles for insertion and management of implantable drug delivery pumps.

(xi) Awareness of the basic principles of palliative care.

- **Demonstrate practice of Regional Anaesthesia**

(i) Applying general principles of pharmacology of local anaesthetics and various adjuvants.

(ii) Familiarizing with the relevant anatomy for regional techniques.

(iii) Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.

(iv) Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.

(v) Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.

(vi) Performing the following regional anaesthesia techniques:

Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Para-vertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.

- **Demonstrate practice of Thoracic Anaesthesia**

(i) Pre-operative assessment of patients undergoing Thoracotomy (lungresection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy

(ii) Various approaches and their relevant equipments for lung isolation.

(iii) Various double lumen tubes and their placement.

(iv) Application of Principle of chest drain.

(v) Respiratory Physiology and management of one lung ventilation (OLV).Indications, contraindications and hazards of OLV.

(vi) Application of the knowledge of Anatomy of lung and broncho-pulmonarysegments.

(vii) Anatomy and techniques for intercostals nerve block and thoracic epidural.Management of thoracic epidural anaesthesia and analgesia

(viii) Anatomy, techniques and placement of paravertebral block/catheter.

(ix) Post-operative care of patients after lung surgery.

(x) Peri-operative management of patients with myasthenia gravis.

(xi) Peri-operative management of patients with mediastinal mass.

(xii) Anaesthetic management of mediastinoscopy, major airway stenting.

(xiii) Lung volume reduction surgery and problems.

- **Demonstrate practice of Cardiovascular Anaesthesia**:

(i) Application of the knowledge of Anatomy and physiology of valvulardisease, coronary arteries and their territories. Pulmonary circulation,coronary circulation, cerebral circulation, visceral circulation.

(ii) Application of the knowledge of Distribution of blood volume to differentorgans and systems and their control. Microcirculation. Venous system,venous pressure, its influence on various functions.

(iii) Regulation of blood pressure, hypotensive anaesthesia.

(iv) Anatomy and physiology of all operable congenital heart disease like ASD,VSD, PDA, TOF, transposition of great vessels.

(v) Application of the knowledge of anatomy and physiology of vascular heartdisease like co-arctation of aorta.

(vi) Assessment of cardiac patient with ischemic heart, valvular heart diseaseand other diseases listed above. Understanding of cardiac catheterization,echocardiography, stress testing, and radio-nucleide imaging.

(vii) Application of Principle and complication of cardiopulmonary bypass

(viii) Application of Principle of trans-esophageal echocardiography

(ix) Application of Principle of circulatory support: inotropes, IABP, pacing

(x) Coagulation and management of coagulopathy.

(xi) Off pump bypass

(xii) Intra-operative management of aortic surgery and major peripheral vascularsurgery, aneurysm grafts, recanalisation procedures.

(xiii) Understanding of the adult patient with congenital heart disease and theirmanagement during anaesthesia.

(xiv) Postoperative cardiac critical care, including cardiovascular problems,analgesia.

(xv) Insertion of invasive monitoring for arterial monitoring, central venouspressure monitoring, pulmonary artery catheter insertion and interpretation.

(xvi) Robotic cardiac surgery.

- **Demonstrate practice of Paediatric Anaesthesia**

(i) Application of knowledge of Anatomical changes in paediatric patient andneonates.

(ii) Application of knowledge of Physiology and pharmacology in paediatricpatient.

(iii) Guideline for pre-operative fasting in children and pre-medication.

(iv) Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs,PLMA and breathing circuit for children.

(v) Anaesthesia management for premature and newborn.

(vi) Emotional problems for parent and child and principles of premedication.Consent by parents and their presence during induction. To become skilledin communicating with children, parents and other relatives.

(vii) Problems of transporting a sick pediatric patient from the ward to theoperating room and back with regard to temperature maintenance,cardiovascular stability, ventilation and oxygenation.

(viii) Estimate preoperatively blood volume, hourly fluid requirements, fluiddeficit, third space loss, acceptable blood loss and apply principles of fluidand blood replacement in the perioperative period.

(ix) Induce and maintain anaesthesia by inhalation, intravenous, intramuscularand rectal routes and monitor pediatric patients.

(x) Understand the benefits, risks and techniques of regional anaesthesia inchildren. Anatomy and techniques of caudal, dorsal penile and inguinalregional block, spinal and epidural block

(xi) Learn to recognize and treat post anaesthesia complications like apnea,laryngospasm, acid-base and electrolyte disturbances, febrile and convulsingchild and bleeding child.

(xii) Common problems related to common congenital syndromes presenting forsurgery. Anaesthetic management of a child with concurrent disease –Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's,Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanoticcongenital heart disease.

(xiii) Paediatric resuscitation: drugs, doses and defibrillation of children of allages, from the very premature neonates to those children with complexcoexisting disease.

(xiv) Management of patients requiring paediatric intensive care, ventilatormanagement, and support of circulation.

(xv) Resuscitation of neonates and children of all ages. A period of one to twomonths in a PICU is recommended for all post graduate students undergoingadvanced training in paediatric anaesthesia.

(xvi) Paediatric pain management

(xvii) Assessment of a child with URTI, with a heart murmur.

(xviii) Management of fluid and electrolytes in children.

(xix) Anaesthetic management of a malignant hyperthermia susceptible child.

(xx) Anaesthetic management of FB bronchus, oesophagus, Wilm'stumour,congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.

(xxi) Anaesthesia for Fetal Surgery.

(xxii) Sedation techniques including the selection, management and monitoring ofchildren for diagnostic and therapeutic procedures, with particular attentionto working in areas outside the theatre suite.

- **Demonstrate practice of Transplant anaesthesia**

(i) Application of knowledge of basic pathophysiology of renal and liverfailure. Principles of anesthetizing an immuno-compromised patient.

(ii) Principles of anesthetizing patient with end stage renal/liver disease andpatient with organ transplantation. Perioperative management.

- **Demonstrate practice of Neuroanaesthesia**

(i) Application of basic knowledge of cerebral circulation and intra cranialpressure and its implications

(ii) Anaesthesia to patients with neurologic disease, head injury undergoingneurologic or non-neurologic surgery and for diagnostic proceduresrequiring anaesthesia.

(iii) Anesthetic implications of the most common neurosurgical procedures,transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery.Surgery for supratentorial pathology.

(iv) Application of basic concepts behind electro-physiologic monitoring of thebrain and spinal cord.

(v) Application of knowledge of general principles of positioning the patient forsurgery and the advantages and disadvantages of each position.

(vi) Effects of anaesthesia on the electroencephalogram (EEG) and evokedpotentials.

(vii) Differential diagnoses and treatment alternatives of intraoperativeintracranial hypertension ("tight brain")

(viii) Management of Head Trauma, and its anesthetic management and variousprotocols regarding their management and associated trauma.

(ix) Intracranial surgery and spinal surgery, both routine and emergency.

(x) Monitoring: techniques for detection and management of air embolism.

(xi) Lumbar puncture and CSF drainage.

(xii) Non-surgical management of the head trauma patient, Systemiccomplications of severe brain injury.

(xiii) Management of subarachnoid hemorrhage and vasospasm.

(xiv) Diagnosis and management of patients with brainstem death; and dealingwith patient's relatives

- **The following are special procedures which the post graduate student must be able to perform**

1. Blind Nasal intubation

2. Failed intubation drill (includes Fiberoptic Laryngo/Bronchoscope)
3. Double Lumen Tube
4. Bronchial Blocker placement
5. Jet Ventilation
6. Suctioning and physiotherapy of wet lung
7. Intubation in Neonates
8. Initiation and management of ventilation
9. Combined Spinal Epidural
10. Brachial Plexus Block
11. Intravenous Regional Anaesthesia
12. Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle - each
13. Cervical-Superficial and Deep, Stellate, Splanchnic - each
14. Central Venous Line by Brachial, Jugular and Subclavian veins
15. Radial and Femoral Artery cannulation
16. CVP monitoring
17. Pulmonary Capillary Wedge Pressure
18. Neuro-muscular transmission Monitoring
19. Anaesthetic Depth e.g. BIS monitoring

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopedic, Gynecology – Obstetrics, General surgery, Oncosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc.

Suggested Time Frame for Training the PG Students:

The student should be taught as per the following schedule to acquire the skills:

1. **First 6 months:**
   - During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any super specialty (ASA I and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal aneasthesia to ASA I and II cases for minor and major surgery, under graded supervision.
   - The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain, perioperative care of the surgical patient, care of handling equipments, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.

- He/she should select the thesis topic and submit the protocol for his thesis.

2. Next 18 months

- The student should widen his experience and should be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.
- The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn paediatric and trauma life support and maintain skills for basic and advanced cardiac life support.
- It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radio-diagnostic and therapeutic procedures (CT scan, MRI scan and angiography).
- The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

3. Last 12 months

- Thesis should be submitted minimum of 6 months before the final MD examination.
- The post graduate student should be given experience of various super-specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anaesthesia to elective and emergency cases.
- The post graduate student should be able to manage critically ill patients and treat intractable pain. They should also know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting (2 months during initial years under supervision and 2 months independently in the last six months).

4. At the end of 3 years, the post graduate student should have the skills to:

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.

- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.

Overall the student should acquire skills in the following practical competencies: Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

Syllabus

The course content of **1st year** should cover the following:

1. Anatomy related to:

- Diaphragm, upper and lower airway
- Regional anaesthesia, field block, central neuraxial, blockade, block for acute pain states
- Intramuscular injections, arterial and venous cannulations and positioning.

2. Physics related to:

- Anaesthesia machine - assembly of necessary items.
- Airway equipment including laryngoscopes, airway devices
- Breathing systems
- Monitoring in anaesthesia with concepts of minimum monitoring
- Gas laws, medical gas supply system
- Fluidics
- Electricity and diathermy
- Oxygen therapy

3. Physiology related to:

- Theories of anaesthesia
- Respiratory, cardiovascular, hepatobiliary, renal and endocrine system, pregnancy, blood, muscle and N-M junction, Nerve impulse transmission, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP.
- Central, autonomic and peripheral nervous systems.
- Metabolic response to stress and trauma.

4. Pharmacology related to

- General principles, concepts of pharmacokinetics and pharmacodynamics
- Drug interactions in anaesthesiology, anaphylactoid reactions
- Drugs used for premedication, induction of anaesthesia, general anaestheticsintra- venous and inhalational, neuromuscular block and reversal of muscle relaxants.

5. **Biochemistry** relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.

6. Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia, general principles of pre-anesthetic assessment and medication, recovery from anaesthesia and post operative care, effects of positioning during anaesthesia.

7. Introduction to the operation theatre, post-anaesthesia care rooms

8. Introduction to acute, chronic pain and pain management.

9. Documentation and medico-legal aspects of anaesthesia. Defensive anaesthesia. Concept of informed consent.

10. Resuscitation - basic and advanced life support (cardiac and trauma life support), neonatal resuscitation.

11. Intensive care of critical patients with introduction to artificial ventilation, management of unconscious patients, oxygen therapy, shock - pathophysiology and management.

12. Introduction to Research methodology, basics of biostatistics.

The course content of **2nd year** should cover the following:

Anatomy related to blocks for chronic pain, chemical neurolysis and different organ systems.

1. **Physics related to:**

- equipments used in anaesthesia monitors, ventilators, vaporizers,
- Fibreoptics.
- Laser
- Pacemaker and defibrillator
- Monitoring equipment used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block.
- Sterilization of equipment
- Computers in anaesthesia

2. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.

3. Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.

4. Blood coagulation mechanism, disturbances and blood components.

5. Special anaesthetic techniques as relevant to –

- Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
- Associated medical disorders in surgical patients

6. Geriatric and pediatric anaesthesia

7. Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.

8. Medical statistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.

9. Care of terminally ill, Hospices management. Do not resuscitate orders.

10. Postures and anaesthesia.

11. Induced hypothermia, incidentaland environmental safety of patient.

12. Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..

13. Third world anaesthesia.

14. Inherited metabolic diseases and anaesthesia.

The course contents of **3rd year** should cover the following:

1. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/ transplantation/burns and plastic surgery.

2. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery

3. Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and / or on ventilator.

4. Multiple organ failure

5. Infection control, cross contamination in OT and ICU.

6. Immune response and anaesthesia.

7. Concept of cytokines, and other enzymes.

8. Selection, maintenance and sterilization of anaesthesia and related equipment

9. Chronic pain therapy and therapeutic nerve blocks.

10. Acupuncture, acupressure and other non-conventional methods of treatment.

11. Principles of neonatal resuscitation, ventilation and critical care.

12. Principles of human resources and material management.

13. General principles of medical audit. Critical incident reporting

14. Ethics and clinical trial.

15. Hospital, ICU and OT design and planning.

16. Medical education including evidence based medical education.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology

Didactic lectures are of least importance.

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Reviews and guest lecturers should get priority for theoretical knowledge.
- Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning.
- Student should have hands-on training in performing various procedures (medical/surgical concerning his specialty) and ability to interpret various tests/investigations.
- Exposure to newer specialized diagnostic/therapeutic procedures concerning his/her subject should be given.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

Thesis: Supervision

- The postgraduate is responsible to a Faculty member and the latter should beavailable to advise and assist the student in his clinical assignments
- Departmental teaching committee will be responsible for the educationalactivities of the department and the teaching schedule.
- This involves providing services for emergencies and it makes different demandsupon the anaesthesiologist. It should be learned through experience, with reducedstaff. The clinical work during emergency should have a close supervision. Thestandards should be maintained of the

agreed competence on schedule. Theemergency duties should be properly arranged with duty off. The postgraduatesmay have to do emergency duty as per schedule

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervisionfollowed by performing independently; for this purpose, provision of skills laboratoriesin medical colleges is mandatory.

Simulators:

Simulators should be used for the events of high importance but infrequent occurrence and where there may be high risks to the patients. The simulators can also be used for assessment purposes.

Rotation:

Schedule for three years of MD Anaesthesia postings:

The post graduate student should be exposed to the following areas of clinical anaesthesiapractice:

1. Pre-anaesthesia clinic

2. Pain clinic

3. Recovery and Post anaesthesia Care Unit (PACU)

4. Intensive Care Units

5. Dialysis and transplant

6. All specialty theatres

7. Peripheral areas: Radiology, MRI, ECT and other interventional laboratories

The suggested schedule of the Operating Theatre can be as follows: This may change as per availability of specialties.

Operation theatre	**Months**
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	
Neurosurgery	2
ICU	4

Pain	1
Recovery	1
Organ Transplant in the other areas	(Radiology, Radiotherapy)posting

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination. The thesis is assessed separately.

Quarterly assessment during the MD training should be based on:

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning and teaching**
4. **Departmental and interdepartmental learning activity**
5. **External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

Post graduate Examination

The examinations shall be organized on the basis of 'Grading'or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

The final examination consists of three parts:

a. Thesis

b. Theory evaluation

c. Practical/Clinical and Oral evaluation

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory: Consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

Paper I: Basic Sciences as applied to Anaesthesiology

Paper II: Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.

Paper III: Anaesthesia in relation to subspecialties/superspecialties

Paper IV: Intensive Care Medicine, Pain Medicine and Recent advances.

3. Practical/Clinical Examination: will consist of: 3 clinical cases,

Long case: One, duration 30 min (history, examination, Diagnosis and Management, Discussion)

Short cases: Two, 15 minutes each for short case. In short cases, only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion).

Oral/Viva-voce should be conducted preferably on four tables with one examiner on each table:

Table 1: ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card.

Table 2: Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Bocks (skeleton).

Table 3: Anaesthesia machine including circuits and Vaporizers, ETT, Supra-glottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table 4: Resuscitation equipments, resuscitation demonstration, Difficult Airway Equipment, monitoring equipments.

1. One long case, viva voce at one station with all examiners, and : 150 marks

2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, Respiratory loops, Resuscitation etc.,: 150 marks

Recommended Reading

Books (latest edition)

1. Lee's Synopsis of Anaesthesia

2. Clinical Anesthesiology by Morgan

3. Cardiac Anaesthesia By Joel Kaplan

4. Clinical Anaesthesia by Barash, Cullen and Stoelting

5. Textbook of Anaesthesia by AitkenheadRowbotham and Smith

6. Anaesthesia for neonates and infants by Smith

7. Pharmacology and Physiology for Anaesthetists by Stoelting

8. Principles of Obstetric Anaesthesia by Craford

9. Miller's Anesthesia

10. Stoelting RK, Miller RD Basics of Anaesthesia

11. ICU Book, Paul Marino

12. Text Book of Critical Care, by Fink et al

13. Regional Anaesthesia, P Prithviraj

14. Practical Management of Pain, Raj

15. Stoelting and Dierdorf: Anaesthesia and Co-existing Disease

16. Dorsch and Dorsch: Understanding Anaesthesia Equipments

17. ECG by Shamroth/Goldman

18. Anatomy for Anaesthetists by Harold Ellis

19. Clinical Anesthesia by P.G.Barash

20. LongneckersAnaesthesiology- Mcgraw Hill

Must refer:

1. Cucchiara and Michenfelder: Clinical Neuroanaesthesia

2. Cottrell and Smith: Anaesthesia and Neurosurgery

3. Complications in Anaesthesiology by Orkin

4. Complications in Anaesthesia by Raven

5. Airway management by JL Benumof

6. Obstetric Anaesthesia by Chestnut

Journals: 03-05 international Journals and 02 national (all indexed) journals.