NATIONALMEDICALCOMMISSION

Postgraduate Medical Education Board

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GUIDELINES FOR COMPETENCYBASED POSTGRADUATE TRAININGPROGRAMME FOR MD IN PHYSIOLOGY

GUIDELINES FOR COMPETENCY BASEDPOSTGRADUATE TRAINING PROGRAMME FOR MDINPHYSIOLOGY

Implementation of Revised Competency Based Post Graduate Training Programme for MD in physiology as per the guidelines prepared by the National Medical Commission through Subject Expert Groups{ Date of Bos 21.07.2022 Ref :SBKSMIRC/Dean/Outward No.1301/2021-22, Date of Academic council :29.07.2022 Ref :SVDU/NOTFN/O370/2021-22 dated 30.07.2022}

Preamble

The purpose of postgraduate medical education in Physiology is to produce expertswith necessary knowledge, skills and attitude to function as competent physiologistswhoactivelycontributetowardsgrowthofthesubjectthroughresearchandi ntellectual contribution, participate in the training of budding health professionals,participate meaningfully in patient care and lifestyle disorders, stay abreast with theadvancements in the field and serve the community at large. Physiology being thebasis of entire practice of Medicine, a postgraduate in Physiology needs to acquire allnecessarycompetenciesthatwouldenablehimorhertofunctionefficientlyindomainso fpreclinical,para-clinicalandclinicalsciences.

Thepurposeofthisdocumentistoprovideteachersandlearnersillustrativeguidelines to achieve defined outcomes. The Expert group of the National MedicalCommission has endeavored to render uniformity without compromise to purpose andcontent of this document. The revision within the document are mainly aimed tointroducecompetenciesthatensureapplicationofPhysiologybeyondpreclinicalbound ariesandtherebyimprovehealthoutcomes,embraceresearchandpedagogyasa vital part of training and reduce redundancy of contents. This document envisions acompetent Physiologist who performs the roles of a Medical Teacher, Researcher,Member of Health Care Team (Clinical Physiologist), Administrator and Life Longl earnerwithequalzealandefficiency.

SUBJECTSPECIFICLEARNINGOBJECTIVES

The goals to have uniform standards in the teaching of Physiology at the post graduate level throughout the country. The guidelines will help in achieving suchstandards which will ensure availability of competent physiologists equipped withrequired skillsfor teaching,patientcare (diagnostic,therapeutic and rehabilitative)andappliedresearch.

Learning Objectives

A postgraduate student having qualified for the MD (Physiology) examination shouldbe ableto:

1. Achievecomprehensiveknowledgeofgeneral,systemicandappliedPhysiology.
2. Teach effectively the basic physiological mechanisms of human body in thecontextof pathophysiologicalbasisof evolution,clinicalpresentationandmanagementof diseasestates toundergraduate andpostgraduate medical,dentalandparamedicalcourses.
3. Acquirein-depthknowledgeof physiologywhilecateringtothelearningneedsofspecific courses suchas sportsphysiology,speechpathologyetc.
4. Understandgeneralprinciplesofmedicaleducation(useofappropriateteachingtechniquesandresources)andapplytheoreticalframeworksinpedagogy.
5. Interpretandevaluateresearchpublicationscritically.
6. Conduct research in core physiology, applied physiology and Education whichmay have significant application towards improving health, patient care andstudentlearning.
7. GeneratecredibleevidencetowardsadvancementofPhysiologyanditsapplicationinbasicandappliedsignificance.
8. Acquire skills in conducting collaborative research in the field of physiologywithalliedsciences,clinicalsciencesandbiomedicalengineering.
9. Explainhowtheknowledgeofphysiologycanbeeffectivelyappliedindiagnostic andtherapeuticclinicalsettings.
10. IntegratephysiologywithDiagnostic,Therapeutic,PreventiveandRehabilitative Medicine.
11. Interact with the allied departments and render services in advanced laboratoryinvestigations.

12. Interact effectively with other paraclinical, clinical and allied health sciencesdepartmentstodevelopintegratedmodulesinbasicsciencesandteachcompetenciesrelatedtothesame.
13. Acquire administrative skills to set up concerned department / laboratories andinitiate purchase procedures and procure necessary items for running suchlaboratories.
14. Be an efficient Leader andmember of academic, research and health careteam.
15. Participateactivelyinvariousworkshops/seminars/journalclubsofalliedsubjects toacquirevariousskillsforcollaborative research.

SUBJECTSPECIFICCOMPETENCIES

Attheend ofthecourse,thepostgraduatestudentshouldbeableto:

A. Predominant inCognitiveDomain

1. Demonstratein-depthunderstandingofbasicphysiologicalconcepts,theirclinical applications and physiological demands in special circumstances suchassports,environmentalchanges,yoga,meditationetc.
2. Demonstratecomprehensiveknowledgeofphysiologyofspecificorgansystems to cater to the learning needs of specialized courses such as speechpathology,kinesiology,aerospace physiologyetc.
3. Impart knowledge about the basic physiological mechanisms of human bodywith reference to their implications in the pathophysiology of disease and thephysiologicbasisoftheirmanagementtoundergraduatemedicalandparamedicalstudents.
4. Demonstrate knowledge of integrated study of basic sciences as per the needsofcurrentCBME.
5. Demonstratehigherorderthinkingandproblem-solvingskillstoexhibitinteractive teaching techniques and facilitate contextual study of physiology invariousteachinglearningsessions.
6. Demonstrate knowledge and ability to participate in the present student centricTL strategies of CBME such as ECE, SDL, AETCOM and AITo (Aligned andIntegratedTopic).
7. Demonstrate knowledge of the current assessment practices in undergraduateCBMEsuchas DOAP.
8. Demonstrateknowledgeofresearchmethodologiesandstatistics.
9. Conductsuch clinical and experimental research,as wouldhave a significantbearingonhumanhealthandpatientcare.

10. Incubateideasandcontributetowardsgenerationofpatentsandcopyrightsrelatedtothesubject.
11. Interact with other departments by rendering services in advanced laboratoryinvestigationsandrelevantexpertopinion.
12. Participateactivelyinvariousworkshops/seminars/journalclubs/demonstration in the allied departments, to acquire various skills forcollaborative research.
13. Contributetosocietybyimpartingphysiologicalunderstandingofhealthproblems.Disseminateknowledgeofhumanphysiology,theclinicalapplications and research as per the needs or specific demands of the society atlarge.
14. Outline the components of a basic physiology curriculum, demonstrate abilitytodeveloporimplementthe sameinfuture academic career.
15. Serveasinterfacewithsocietyatlarge.

B Predominating Affective domain

Attheend ofthecourse,thepostgraduatestudentshouldbeableto:

1. Demonstrateresponsibility,professionalismandethicalconductinallprofessionalundertakings.
2. Demonstrateethicalconductin biomedicaloranimalresearch.
3. Followethicalguidelineswithregardsto researchandpublications.
4. Demonstrateappropriatebehaviorofnotlettinghis/herpersonalbeliefs,prejudicesandlimitationscomeinthewayofduty.
5. Displayprinciplesofintegrityandsocialaccountabilityasateacher.
6. Appreciatetheissuesofequityandsocialaccountabilitywhileexposingstudent stoearlyclinicalexposure (Equityandsocialaccountability).
7. Mentor/counselstudentstofacilitatetheirholisticdevelopment.
8. Communicateeffectivelywithpeers,studentsandteachersinvariouscurricular[teaching-learning,research]activities.
9. Function effectively as a member of the department, professional bodiesandmaintain professional conductininteractionswithstudents,peers,patientandstaff.
10. Demonstratetheabilitytogiveeffectivestudentfeedbacktoundergraduatestudents.
11. Demonstratetheabilitytoreceivefeedbackfromteachersandpeers.
12. Developthecapacitytoreflectonownacademicprogress,developself-directedlearningskillsandassessown learningneeds.

C. Predominant in Psychomotor Domain

The postgraduate student should acquire practical competencies in the followingtasks:

At theend ofthecoursethe postgraduatestudentshould beableto:

1. Demonstratephysiologicalconceptsofvariousorgansystemsbyperforming amphibianexperimentsusingsimulatedmodels.
2. Demonstratephysiologicalconceptsofspecificorgansystemsbyperforming mammalianexperimentsusingsimulatedmodels.
3. Performand interpret acompletehematologicalprofile.
4. Performclinicalexaminationofvarious organsystems.
5. Performhumanexperimentspertainingtospecificorgansystemsandinterpretresults ofthesame.
6. Perform human experimentsrelatedtophysiological challengessuchasexercise,yogaandmeditation.
7. Performstudiesinstimulatedenvironment-microgravity;highaltitude;hotandcoldenvironment.

Syllabus

Coursecontents:

A:Cognitivedomain

Paper-I:General and Cellular Physiology including Genetic Basis and Historicalperspectives:

1. Physiologyofcell,variouscellularmechanismsandgeneticcontrolmechanisms.
2. VariousprinciplesofPhysicsandPhysicalChemistryinvolvedinphysiologicalphenomenone.g.haemo-dynamics,bio-electricalpotentials,bodyfluids,methodsofmeasurements.
3. HistoryofPhysiology,Noebllauratesand discoveries.
4. Biostatistics,Biophysics,Biochemistry,Micro-anatomy.
5. GrowthandDevelopmentincludingaging.
6. Excretion,pH,waterand electrolytebalance.
7. ComparativeAnimalPhysiology

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

1. BloodandImmunity.
2. CardiovascularSystem.
3. RespiratorySystem.
4. Gastro-IntestinalTract(GIT)anddietaryrequirements.

Paper-III:SystemicPhysiology(systemconcernedwithprocreation,regulationandneuralcontrol)

1. Nerve-MusclePhysiologyincludingmusclemechanics
2. EndocrinePhysiology
3. NervousSystem(Central,peripheraland autonomic)
4. SpecialSenses
5. Reproduction&familyplanning/fetal&neonatalPhysiology

Paper-IV:AppliedPhysiologyincludingrecentadvances

1. Recent advancesrelevanttoPhysiology
2. Patho-physiologypertainingtosystemicPhysiology
3. Physiologicalbasisofvariousclinical investigationtests
4. Interactionofhumanbodyinambientenvironment-highaltitude,spaceanddeepsea
5. Exercise&Sportsphysiology
6. TransgenderPhysiology
7. IntegratedPhysiology
8. Yogaand Meditation
9. Socialresponsibilitiesofphysiologists
10. ApplicationofArtificialIntelligenceinPhysiology

B:Psychomotordomain:

A. Thepostgraduatestudentduringthetrainingperiodmust PERFORMindependentlyt

hefollowingprocedures:

i. Hematologicalprofile

1. Estimationofhemoglobin
2. DeterminationofTotalErythrocyte(RBC)CountandRBCIndices(BloodStandards)
3. DeterminationofTotalLeucocytes (WBC)Count:TLC
4. PreparationofaperipheralBloodSmearandDeterminationofDifferentialLeucocyte Count:DLC
5. DeterminationofArnethCount
6. DeterminationofBleedingTime(BT) andClottingTime(CT)
7. DeterminationofBlood groups(A,B,Oand Rhsystem)
8. DeterminationofErythrocyteSedimentationRate(ESR)andPackedcellvolume (PCV)
9. DeterminationofOsmoticFragilityofRedBlood Cells
10. DeterminationofPlateletCount
11. DeterminationofReticulocyte Count

ii. HumanPhysiology

a. ClinicalPhysiology

1. Detailed clinicalexaminationofvarioussystems.

b. Nervemusclephysiology

1. Ergographyand hand grip spring dynamographyand studyofhuman fatigue.

2. Recordingofelectromyography(EMG)anditsapplication.

3. Recordingofnerveconduction.

c. Cardiovascularsystem(CVS)

1. ClinicalexaminationofCVS

2. Examinationofarterial&venouspulses

3. Measurementsofarterialblood pressureand effectofhead-up/head-downtilt

4. Recordingof12leadElectrocardiography(ECG)andits interpretation

5. Measurementofbloodflow

6. Heartratevariability

7. AmbulatoryBloodpressure monitoring

d. Respiratorysystem

1. Clinicalexaminationofrespiratorysystem.

2. Stethography–studyofrespiratorymovementsandeffectofvariousfactors.

3. Assessmentofrespiratoryfunctions(spirometry,vitalography,andgasanalysis).

5. MeasurementofBMR.

6. Cardio pulmonaryresuscitation(CPR)andArtificialrespiration.

e. Gastrointestinalsystem:

1. Clinicalexaminationofabdomen.

f. IntegrativePhysiology/Excretorysystem

1. Recordingofbodytemperature/effectofexposuretocoldandhotenvironment

g. Reproductivesystem

1. Determinationofovulationtimeby basal bodytemperaturechartandpregnancydiagnostic test-ImmunologicalTests.

2. Semenanalysis:spermcount,motilityandspermmorphology.

h. NervousSystemincludingSpecialsenses

1. Clinicalexaminationofthenervoussystemanditsphysiologicalbasis.

2. Examinationofhighermentalfunctions.

3. Examinationofcranialnerves.

4. Examinationofsensorysystem.

5. Examinationofmotorsystemincludingreflexes.

6. Clinicalexaminationofspecialsenses:

(i) SmellandTaste

(ii) Testforhearingto differentiatedeafness

(iii) Physiologyofeye:

(a) Clinicalexaminationoftheeye and pupillaryreflex

(b) Visualacuity

(c) Perimetery–mapping outofvisualfield andblind spot

(d) Accommodation

(e) Fundoscopy

(f) Colourvisionandcolourblindness

7. Reaction(visualandauditory) andreflextime.

8. Electroencephalography(EEG)andPolysomnography

9. AutonomicNervousSystem(ANS)Testing.
10. **Neuro-electrodiagnostictechniques:**Nerveconductionstudy,Visualevokedpotential(VEP),Brainstem auditory evokedpotential(B.A.E.P),Somato-sensoryevokedpotential(SEP),Motorevokedpotential(MEP).
11. Useofvarioustestbatteriesforpsychologicalevaluationofsubject.

i. SportsPhysiology

Testsforphysicalfitness:Cardio–respiratoryresponsestosteadystateexercise using:

(i) BodyComposition
(ii) ConductingtheClinicalExerciseTest
(iii) Harvard steptest
(iv) BicycleErgometry
(v) TreadmilltestfordeterminationofVO$_2$max

j. YogaandMeditationPhysiology

i. Physical,MentalandEmotionalwellbeing
ii. Effectofyogaandpranayamaonphysiologicalparameters
iii. Mindfulness
iv. Concentration,anxietyandstress
v. Counselinginhealthanddiseases

k. Others

1. Constructionofdietarychartforgrowingchildren,pregnantwoman,elderlyindividuals,hypertensivepatients,&diabetesmellituspatients.
2. BasicLifeSupport andCardiacLifeSupport
3. EffectiveDigitalpresentation,medicalphotography,GoodClinicalPractice,Humanities andBioethics.

iii. Amphibian(Frog)Experiments

AllanimalexperimentsmustbecompliantwithGovenmentofIndiaRegulations, notifiedfromtimetotime).ExperimentsinAmphibian/Dog/Cat should be conducted by computer assisted simulationmodels/ facilities. Other experiments should be performed as permissibleby CPCSEAguidelines.

1. Effectoftemperatureonsimplemuscletwitch.
2. Effectoftwo successivestimuli(ofsamestrength)onskeletalmuscle.
3. Effectofincreasing strengthofstimulionskeletalmuscle.
4. Effectofincreasingfrequencyofstimulionskeletalmuscle(genesisoftetanus).
5. Effectoffreeloadandafter loadonskeletalmuscle.
6. Effectofrepeatedstimulionskeletalmuscle(studyofphenomenonofFatigue).
7. Studyofisometriccontraction inskeletalmuscle.
8. Determinationofconductionvelocityofsciaticnerveandeffectofvariableson it.
9. Propertiesofcardiacmuscle–Refractory period,All-or-NoneLaw,extra-systole andcompensatorypause,beneficialeffect.
10. RegulationofHeart,Vagusdissectionandeffectof VagalandWCLstimulation.
11. Effectofphysiologicalandpharmacologicalvariablesonintactfrog'sheart.
12. Perfusionofisolatedfrog'sheart-roleofsodium,potassium,calciumionsanddrugs.

B. The postgraduate student during the training period mustASSISTinthefollowingprocedures:

HumanPhysiology

i. Cardiovascularsystem(CVS)

- CardiacTMTHolterMonitoring
- CollectionandAssessmentofArterialbloodgas

ii. NervousSystemincludingSpecialsenses

- Intraoperativeneuromonitoring(IONM)

C. The postgraduate student during the training period mustOBSERVEthefollowingprocedures:

i. Hematologicalprofile

- DeterminationofAbsoluteEosinophilCount
- StudyofHaemopoietic Cellspresentinthe Bone Marrow

- Other high end hematological investigations (specify): Flowcytometry,Plateletfunctions,DDimers,coagulationprofileetc.

ii. HumanPhysiology

- **Cardiovascularsystem(CVS)**
  - Echocardiography
  - Centralvenouslineinsertion,CVP monitoring
- **Respiratorysystem**
  - IntroductiontoworkingofcontinuouspositiveairwaypressureandBilevel positiveairwaypressure(CPAP&BiPAP)Therapy oVentilatorsetting
- **Gastrointestinalsystem:**
  - GIManometry
- **Reproductivesystem**
  - Ovulationstudybyusingultrasonography
- **IntegrativePhysiology/Excretorysystem**
  - PressureandPHstudiesinesophagus,stomach, intestineandrectum
- **Others**
  - Genetictestingandintroductiontoproceduralskillsforclinicalgenetics/prenataldiagnosis/adultgenetics-birthdefects,genetichematology,dysmorphology,skeletaldysplasia,neurologicalandmuscular disorders, primary immunodeficiency diseases, autoimmuneandmulti-factorialdisorders,biologyandgenetics ofcancer.
  - Interaction of human body in ambientenvironment- high altitude,space anddeepsea
  - Exercise&Sportsphysiology
  - IntegratedPhysiology
  - YogaandMeditation
  - Socialresponsibilitiesofphysiologists
  - ApplicationofArtificialIntelligenceinPhysiology

iii. MammalianExperiments(Dog/Rabbit/Guineapig/Rat/Mice)

- Generalmanagementofmammalianexperiments.

- Recording of heart rate, blood pressure and respiration and study theeffectsofvariousfactors;drugs;asphyxia;occlusionofcommoncarotid artery.
- Effect of stimulation of central and peripheral end of vagus on arterialbloodpressure andrespirationaftervagotomy.
- Effect of stimulation and distension of carotid sinus on blood pressureandrespiration.
- Effectofstimulationofsplanchnicnerve.
- Effectofstimulationofperipheralsomaticnerve(sciaticnerve).
- Studyofhypovolemicshockanditsreversal.
- Perfusionofisolatedmammalianheartandstudytheeffectsofdrugsandio ns.
- RecordingofIsolatedIntestinalmovementandtoneandstudyingtheeffect ofdrugs andions.
- Studyofvariousstagesofmenstrualcycle,cervicalsmearandvaginalsmear .

Departmentalresources

Itis tobemandatory forthe departmenttoestablish and develop thefollowinglaboratories. In addition to teaching, these laboratories should be involved in activeresearchandinpatientcare servicesinone ormorewelldefinedfields.

1. ClinicalNeurophysiologyLaboratory

Thedepartmentshouldgenerateliaisonwithclinicaldepartmentandprovideroutineservicesfor healthmonitoringanddiagnostics (disease).

(i) Electroencephalography

(ii) Evokedpotentialrecording

(iii) Electromyography

(iv) Nerveconductionstudies

(v) Autonomicnervoussystem(ANS) testing

(vi) AnyothernewertechnologylikeFunctionalNearinfraredspectroscopy(fN IRS),Intraoperativeneuromonitoring(IONM),polysomnography

(vii) Diabeticneuropathyassessmentkit

(viii) Reactiontime apparatus

(ix) Electroretinography

2. Cardio-RespiratoryLaboratory

Thedepartmentshouldgenerateliaisonwithclinicaldepartmentandprovideroutineservicesforhealthmonitoringanddiagnostics(disease).

(i) Electrocardiography

(ii) Blood-gasAnalysis

(iii) Computerizedmultifunctionalspirometry

(iv) Laboratoryformeasuringpulmonarydiffusioncapacityandfunctionalresidualcapacity(FRC)

(v) Whole-bodyplethysmography

(vi) Laboratory for Blood flow measurements (Impedanceplethysmograph/Laserflowmeter/ Dopplerflowmeter)

(vii) Ankle brachialpressure index/VascularDoppler

3. Exercise Physiology Laboratory

Thedepartmentshouldgenerateliaisonwithsportsauthoritiesandclinicaldepartments to provide services for testing and grading exercise and physicalefficiency for health monitoring and diagnostics (disease). This should be donebyusingthefollowingtechniques:

(i) Twosteptestexerciser

(ii) BicycleErgometry

(iii) Treadmill

(iv) Respiratorygasanalysisandmeasurementofbasalmetabolicrate(BMR)

4. Metabolic/Endocrinology/ReproductiveBio-medicinelaboratory

Thislaboratoryshouldperformvarioustestspertainingtogastrointestinal,renal,metabolic,endocrinal andreproductivebio-medicine.Thedepartmentshouldgenerateliaisonwithclinicaldepartmentsandprovideroutineservicesforhealthmonitoringanddiagnostics(disease).

1. BodyFatAnalysis
2. Spectrophotometer
3. pHmeter
4. ElisaReader/Washer

5. Luminometer
6. Semi-autoanalyzer
7. Artificialreproductivetechniques/semenlaboratory/infertilitylaboratory

Post graduate students should be posted in the above laboratories and extend therequiredservices onroutinebasis.

The Departmentshould be equipped with general facilities like PG resource roomwith internet access and a departmental library with books especially those related topertinent higher studies in Physiology and field of research. The college/departmentshouldmakeimportantjournalsavailable(atleastfourIndianjournals andtwointernationaljournals–Online/Offline).

TEACHINGANDLEARNINGMETHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, suchtraining should be skills oriented. Learning in the program, essentially autonomousand self-directed, and emanating from academic and clinical work, shall also includeassistedlearning.Theformalsessionsaremeantto supplementthiscoreeffort.

All students joining the postgraduate (PG) courses shall work as full-time (junior)residents during the period of training, attending not less than 80% of the trainingactivity during the calendar year, and participating in all assignments and facets of theeducational process. They shall maintain a log book for recording the training theyhave undergone, and details of the procedures done during laboratory and clinicalpostingsinrealtime.

Teaching-Learning methods

This should include ajudiciousmixof demonstrations,symposia,journal clubs,clinical meetings, seminars, small group discussion, bed-side teaching, case-basedlearning,simulation-basedteaching,self-directedlearning,integratedlearning,interdepartmentalmeetingsandanyothercollaborativeactivitywiththeallieddepartments.Methodswithexposuretotheappliedaspectsofthesubjectrelevantto

basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency ofvariousbelowmentionedteaching-learningmethodscanvarybasedonthesubject's requirements, competencies, work load and overall working schedule intheconcernedsubject.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lecturesper year in the concerned PG department is suggested. Topics to be selected as
persubjectrequirementsAllpostgraduatetraineeswillberequiredtoattendtheselectures .Lectures cancovertopicssuchas:

1. Subjectrelatedimportanttopicsasperspecialtyrequirement
2. Recentadvances
3. Researchmethodologyandbiostatistics
4. **Salientfeaturesof**Undergraduate/Postgraduatemedicalcurriculum
5. Teachingandassessmentmethodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics andmedicaleducationworkshopsintheinstitute.

B. Journal club:Minimumofoncein1-2weeksissuggested.

Topics will include presentation and critical appraisal of original research paperspublished in peer reviewed indexed journals. The presenter(s) shall be assessed byfacultyandgrades recordedinthelogbook.

C. Student Seminar: Minimumofonceevery1-2 weeksissuggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminaras faculty moderator to help the studentprepare the topic well. Itshould aim atcomprehensiveevidence-based review of the topic. The student should be graded bythe facultyandpeers.

D. StudentSymposium:Minimum of onceevery 3months.

A broad topic of significance should be selected, and each part shall be dealt by onepostgraduate student. A teacher moderator should be allocated for each symposiumand moderator should track the growth of students. The symposium should aim at anevidence-based exhaustive review of the topic. All participating postgraduates shouldbe gradedbythefacultyandpeers.

E. Laboratorywork/ Bedsideclinics: Minimum-onceevery1-2 weeks.

Laboratorywork/Clinics/bedsideteachingshouldbecoordinatedandguidedbyfaculty from the department. Various methods like DOAP (Demonstrate, Observe,Assist, Perform), simulations in skill lab, and case-based discussions etc. are to beused. Faculty from the departmentshould participate in moderating the teaching-learningsessions duringclinicalrounds.

F. Interdepartmentalcolloquium

Faculty and students must attend monthly meetings between the main Department andotherdepartment/sontopicsofcurrent/commoninterestorclinicalcases.

G. a. Rotationalclinical/community/institutionalpostings

- Dependingonlocalinstitutionalpolicyandthesubjectspecialtyneeds,postgraduate trainees may be posted in relevant departments/ units/ institutionsincluding Medical Education Unit (MEU) or Department of Medical Education(DOME). The aim would be to acquire more in-depth knowledge as applicable totheconcernedspecialty.Postingswouldberotatedbetweenvariousunits/departments anddetailstobeincludedinthespecialty-basedGuidelines.
- **Clinical Postings:** Compulsory clinical postings infollowing departments mustbeundertakenasperspecifiednumberofdaysintable 1depicted below:

Table1: PlanofClinicalpostingsforMDPhysiology

Prof Year	Department	Period ofposting	Focusareas
1st year	Biochemistry	15days	1. Auto&SemiautoAnalyzer,Electrophoresis,Chromatography,RIA,Studyofserumchemistry(proteins, Lipid, glucose, electrolytes,enzymesetc.)–8days 2. Constituents of normal and abnormalurine,liverfunctiontests,Renalfunctiontests,Gastricfunctiontests–7days
I st year	Pharmacology	20days	1. Animal House (to learn technique ofAnimalHandling,Bloodsampling,anesthesia, Euthanasia, effective Analgesiaandinfectioncontrolafter

			surgery.StudyofAnimalbehaviorlikeeating,drinking,locomotion,sexualactivityetc.) 2.ExperimentalPharmacologylabtostudyongoinganimalexperimentalproceduresincludingdissectionforrat phrenic nerve hemidiaphragm andothers – 10days 2.Studyvariousguidelinesrelatedtoethical use of animals in experiments.Tostudypreparationofdifferentanimalmodelsandvariousteststostudy physiological parameters. – 15days
I[st]year	Pathology	30days	1. Blood bank - Cross matching, bloodStorage,Immunohistochemistry,Immunologicaltests –15days 2. Central Lab. - Tests for bleeding &clottingdisorders,studyofHaemopoieticCellspresentintheBone Marrow– 10days 3. Semenanalysis,determinationofovulationtimebybasalbodytemperaturechartandpregnancy diagnostictests– 5days
I[st]year	Microbiology	10days	1. Fluorescentmicroscopy,useofElisareader&Washer–5days 2. Immuno-physiology and otherfacilitiesavailableinthedept. –5 days
II[nd]year	Ophthalmology	15days	1. DirectandindirectOphthalmoscopy, Retinoscopy–8days 2. Slitlampmicroscopy,Tonometry,Pachymetry, Study of cornealtopology,Optometry ,Auto-refractometer –7days
II[nd]year	Tuberculosis&Chest Disease (PulmonaryMedicine)	15days	1. Wholebodyplethysmography–8days 2. Bronchoscopy & other facilities availableinthedept.–7days
II[nd]year	ENT	15days	1.Audiometry–7days

			2.Oto-rhino-laryngoscopy,directandIndirectLaryngoscopy, BERA, BSAEP –8days
III[rd]year	General Medicine	20days	1. TMT,Holteranalysis,ABG,ECG–10days 2. EMG,NCV–10days
III[rd]year	Psychiatry	10days	1. EEG 2. Biofeedback
III[rd]year	Casualty	15Days	1. Toknowbasicsofhowtohandleemergency 2. Minorprocedures

Every posting shouldhaveits definedlearning objectives.It is recommended thatthe departments draw up objectives and guidelines for every posting offered inconjunction with the collaboratingdepartment/s orunit/s.This will ensure thatstudents acquire expected competencies and are not considered as an additionalhelping hand for the department / unit in which they are posted. The PG studentmust be tagged along with those of other relevant departments for bedside casediscussion/basic science exercises as needed, under the guidance of an assignedfaculty.

Gb. Postingunder" District Residency Programme"(DRP):

To consider and approve the tmpte Students admitted in the 2021-22 batch as per the NMC notifications vide letter F.No. NMC23(1)(25)12021/PG/053909 dated 2211212022 and Clarification issued by NMC vide tetter F. N o. N M C/23 (1) (25) 12021 I Med. I 00 1 866 d ated 1 9 I Ot t 2023 Resolution ' with reference to the NMC notifications vide letter F.No. NMC-23(1)(25)t2o21tpcto53g0g dated 2211212022 and Clarification issued by NMC vide letter F.No.NMC/23(1)(25)t2021/Med./001g66 dated 1910112023. the District Residency Program (DRP) shall be implemented for the students admitted in 2021-22 batch onwards. The said notification and clarification from NMC were considered and passed unanimously.

The communication from National Medical Commission vide no. NMC-23 (1) (25) / 2021 / PG / 053909, dated 22.12.2022 regarding Implementation of District Residency Programme, and National Medical Commission vide no. NMC-23(1)(25)/2021/Med./001866, dated 19.01.2023 regarding Clarification on implementation of District Residency Programme, is adopted for execution.

(BOS-Ref :SBKSMIRC/Dean/Outward No.1158/2022-23, Date of Academic council : 11/02/2023)

(BOM-Ref. No.: SVDU/R/2431-A/2022-23, Date of Academic council : 29/05/2023)

Opportunities to present and discuss infectious disease cases through bedsidediscussionandward/grandroundswithspecialists/cliniciansindifferenthospital settings must be scheduled to address antimicrobial resistance

issuesandstrategiestodealwithit.

- With reference to the Notification vide no. MC!-18(1)12020-Med.1121415, dated 16.09.2020, related to 'Postgraduate Medical Education (Amendment) Regulations 2020'; all the postgraduate students pursuing MD / MS in broad specialties in Sumandeep Vidyapeeth Deemed to be University, as a part of course curriculum, shall undergo a compulsory Residential rotational posting in the 3rd or 4th or Sth semester of the Postgraduate programme, for a duration of three months, in the District Hospitals / District Health System, is confirmed and approved for execution.

- (Board of Studies letter no.:SBKS/DEAN/1576/2020,dated 0/10/2021 and Vide Notification of Board of Management Resolution : Ref no. SVDU/R/1271-1/2020-21, dated - 30th December 2020)

  - To introduce Basic life support (BLS) and Advanced Cardiac Life Support (ACLS) trainingforalltheFirstyearPostgraduateResidentDoctorsfromacademicyear2017-18

  - To introduce New chapter / topic 'Intellectual Property Rights (IPR) foralltheFirstyearPostgraduateResidentDoctorsfromacademicyear2020-2021 of duration of 4hrs (Board of Studies letter no.: SBKS/DEAN/742/2021,dated 05/06/2021 and Vide Notification of Board of Management Resolution Ref no.:SVDU/R/3051-1/2020-21, dated - 29" July 2021)

    List of topics :

1. Introduction-ConceptofIntellectualProperty,Historicalviewof Intellectual Property system in India and International Scenario, Evolution of Intellectual Property Laws in India, Legal basis of Intellectual Property Protection, Need for Protecting Intellectual Property, Theories on concept of property - Major IP Laws in India.
2. Types of IPR: Patents, Copyright, Trademark Industrial Designs, TradeSecrets.
3. Patents: Concept of Patent, Criteria of Patentability, Inventions NOT patentable, Process of Obtaining a Patent, Duration of Patents, Rights of Patentee, Limitation of rights, Infringement andEnforcement.
4. Copyrights: Meaning of Copyright, Copyright Vs. Moral rights, Copyrighteligibility,TermofCopyright,RegistrationofCopyright, Infringement andRemedies
5. Trademark: Meaning of Trademark, Criteria for trademark, Procedure for Trademark Registration, Term of protection, Infringement andRemedies.
6. Industrial Designs: Meaning of Industrial Designs, Rights in Industrial Designs: Nature, Acquisition and duration ofrights.
7. Trade Secrets: Meaning of Trade Secrets, Need to protectTrade secrets, Criteria of Protection, Procedure for registration, Infringement.
8. Commercialization of IPR: Traditional IP and Evolving IP, Assignment, Licensing, Cross License, Patent Pool, Negotiations, Defensive Publications, TechnicalDisclosures, Patent Pooling, Patent Trolling, Brand Management, Brand and Pricing Strategies.

I. Teachingresearchskills

Writing a thesis should be used for inculcating research knowledge and skills. Allpostgraduate students shall conducta research projectof sufficientdepth tobepresented to the University as a postgraduate thesis under the supervision of aneligible faculty member of the department as guide and one or more co-guides whomaybefromthe sameorotherdepartments.

In addition to the thesis project, every postgraduate trainee shall participate in atleast one additional research project that may be started or already ongoing in thedepartment. It is preferable that this project will be in an area different from thethesis work. For instance, if a clinical research project is taken up as thesis work, theadditional projectmay deal withcommunity/field/laboratory work.Diversity ofknowledge andskillscantherebybe reinforced.

J. Traininginteachingskills

MEU/DOME should train PG students in education methodologies and assessmenttechniques. The PG students shall conduct UG classes in various courses and afacultyshallobserve andprovidefeedbackonthe teachingskillsofthe student.

K. Logbook

During the training period, the postgraduate student should maintain a Log Bookindicating the duration of the postings/work done in Wards, OPDs, Casualty andother areas of posting (as specified in table 1) . This should indicate the proceduresassisted and performed and the teaching sessions attended. Thelog book entriesmust be done in real time. The log book is thus a record of various activities by

thestudentlike:(1)Overallparticipation&performance,(2)attendance,(3)participation insessions,(4)recordofcompletionofpre-determinedactivities,and (5) acquisitionofselectedcompetencies.

The purposeofthe LogBookisto:

a) helpmaintainarecordoftheworkdoneduring training,
b) enableFaculty/Consultantstohavedirectinformationabouttheworkdone andintervene,ifnecessary,
c) providefeedbackandassesstheprogressoflearningwithexperiencegained periodically.

The Log Book should be used in the internal assessment of the student, should bechecked and assessed periodically by the faculty members imparting the training.The PG students will be required to produce completed log book in original at thetimeoffinalpracticalexamination.ItshouldbesignedbytheHeadoftheDepartment.

A proficiency certificate from the Head of Department regarding theclinical competence and skillful performance of procedures by the student will besubmittedbythePG studentatthetime oftheexamination.

The PG students shall be trained to reflect and record their reflections in log bookparticularly of the critical incidents. Components of good teaching practices must beassessed in all academic activity conducted by the PG student and at least twosessions dedicated for assessment of teaching skills must be conducted every year ofthe PG program. The teaching faculty are referred to the MCI Logbook GuidelinesuploadedontheWebsite.

L. Course in Research Methodology: All postgraduate students shall complete anonline course in Research Methodology within six months of the commencementof the batch and generate the online certificate on successful completion of thecourse.

Otheraspects

- Thepostgraduatetraineesmustparticipateintheteachingandtrainingprogramofundergraduate students andinternsattendingthedepartment.
- Traineesshallattendaccreditedscientificmeetings(CME,symposia,andconferences)atleastoncea year.
- Departmentshallencouragee-learningactivities.
- The postgraduate trainees should undergo training in Basic Cardiac Life Support(BCLS)andAdvancedCardiacLife Support(ACLS).
- The postgraduate trainees mustundergo trainingin information technology anduse ofcomputers.

Duringthetrainingprogram,patientsafetyisofparamountimportance;therefore, relevant clinical skills are to be learnt initially on the models, later tobe performed

under supervision followed by independent performance. For thispurpose,provisionofskillslaboratoriesinmedicalcollegesismandatory.

ASSESSMENT

FORMATIVEASSESSMENT,i.e.assessmenttoimprovelearning

Formative assessment should be continual and should assess medical knowledge,patient care, procedural & academic skills, interpersonal skills, professionalism,self-directedlearningandabilitytopracticeinthe system.

GeneralPrinciples

Internal Assessment should be frequent, cover all domains of learning and used toprovidefeedbacktoimprovelearning;itshouldalsocoverprofessionalismandcommunicationskills.

TheInternalAssessmentshouldbeconductedintheoryandpractical/clinicalexamination, should be frequent, cover all domains of learning and used to providefeedbacktoimprovelearning;itshouldalsocoverprofessionalismandcommunicationskills.

QuarterlyassessmentduringtheMDtrainingshouldbebasedon:

- Casepresentation,caseworkup, casehandling/management :once a week
- Laboratoryperformance :twice aweek
- Journalclub :once a week
- Seminar :onceafortnight
- Casediscussions :onceafortnight/month
- Interdepartmentalcaseorseminar :onceamonth

Note: Thesesessionsmaybeorganizedandrecordedasaninstitutionalactivityfor allpostgraduates.

- AttendanceatScientificmeetings,CMEprograms(atleast02each)

The student to be assessed periodically as per categories listed in appropriate(non-clinical/clinical)postgraduatestudentappraisal form(AnnexureI).

SUMMATIVEASSESSMENT,ie.,assessment at theendoftraining

Essentialpre-requisitesforappearingforexamination include:

1. **Log book** of work done during the training period including rotation postings,departmentalpresentations, andinternalassessmentreportsshouldbesubmitted.

2. At least **two presentations** at national level conference. One research paper shouldbe published / accepted in an indexed journal**. (It is suggested that the local orUniversity Review committee assessthe worksentforpublication).**

The summative examination would be carried out as per the Rules given in the latestPOSTGRADUATEMEDICALEDUCATIONREGULATIONS.Thetheory examination shall be held in advance before the Clinical and Practical examination, sothat the answer books can be assessed and evaluated before the commencement of theclinical/PracticalandOralexamination**.**

Thepostgraduateexaminationshallbeinthreeparts**:**

1. **Thesis**

   Thesis shall be submitted at least six months before the Theory and Clinical /Practicalexamination.Thethesisshallbeexaminedbyaminimumof threeexaminers;oneinternalandtwoexternalexaminers,whoshallnotbetheexaminers for Theory and Clinical examination. A postgraduate student in broadspecialtyshallbeallowedtoappearfortheTheoryandPractical/Clinicalexamination onlyaftertheacceptance oftheThesis bytheexaminers**.**

2. **Theoryexamination**

   Theexaminationsshallbeorganizedonthebasisof‘Grading’or‘Markingsystem’ to evaluate and to certify postgraduate student's level of knowledge, skillandcompetenceattheendofthetraining,asgiveninthelatestPOSTGRADUATEMEDICALEDUCATIONREGULATIONS.Obtaininga minimum of 50% marks in ‘Theory’ as well as ‘Practical’ separately shall bemandatory for passing examination as a whole. The examination for M.D./ M.Sshallbeheldatthe endof3rd academicyear.

   Thereshall befourtheorypapers(asperPGRegulations).

PaperI: Basic sciences as applied to the subject (General and CellularPhysiologyincludingGeneticbasisandhistoricalperspectives)

Paper II: Systemic Physiology (system providing transport, nutrition andenergy)includingcomparative Physiology

PaperIII: SystemicPhysiology(systemconcerned withregulation,neuralcontrolandprocreation)

PaperIV: Recentadvancesinthesubject(includingappliedPhysiology)

3. **Practical/clinicalandOral/vivavoceexaminationPrac ticalexamination**

Practical examination should be spread over **two** days and include various majorcomponentsofthesyllabusfocusingmainlyonthepsychomotordomain.

Oral/Vivavoceexaminationon definedareasshouldbeconductedby eachexaminer separately. Oral examination shall be comprehensive enough to test thepostgraduate student's overall knowledge of the subject focusing on psychomotorandaffectivedomain.

Thepracticalexaminationshould include:

- Casepresentationpertainingtomajor systems
- Stations forclinical, proceduralandcommunicationskills
- LogBookRecordsandreportsofday-to-dayobservationduringthetraining
- ItisemphasizedthatOral/vivavoceexaminationshallbecomprehensiveenoughto testthepostgraduatestudent'soverallknowledgeofthesubject

RecommendedReading:

Books(latestedition)

1. A.C.Guyton–TextbookofMedicalPhysiology
2. W.F.Ganong–ReviewofMedicalPhysiology
3. William'sTextbookofEndocrinology
4. J.E.Cotes-RespiratoryPhysiology
5. D.T.Harris–ExperimentalPhysiology
6. Wintrobe's–ClinicalHematology
7. **P**rinciplesofmedicalphysiology bySircar
8. BrownB.L.– Cellsignaling,Biologyandmedicineofsignaltransudation
9. BerneandLevy-MedicalPhysiology

10. TextbookofMedicinebyHarrison
11. PrinciplesofNeuralsciencesedited by E.R.Kandel,J.H.schwartzandT.M.Jessell
12. WilliamsHematologyedi.byM.A.Lichtman,E.Beutter, K.Kaushansxy,T.J.Kipps,U.Seligsohn,J.Prachal
13. MedicalPhysiology:byW.F.BoronandE.L.Boulpep
14. MedicatPhysiology:byA.RhodesandG.A.Tanner
15. Neuroscience:byDalePurves

PracticalBooks:

1. Hutchison'sClinicalMethods: AnIntegratedApproachto CtinicalPractice.
2. Macleod’sclinicalExamination
3. TextbookofPracticalPhysiology:byDr.G.K.PalandDr.PravatiPal
4. TextbookofPracticalPhysiology:byDr.C.L.Ghai
5. TextbookofPracticalPhysiology: byDr.Ranade
6. TextbookofPracticalPhysiology:byDr.A.K.Jain

Journals:

03-05 InternationalJournalsand02National(allindexed)journals

Annexure1

StudentappraisalformforMDinPhysiology

	Elements	Lessthan Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	**Scholasticaptitudeand learning**										
1.1	Has knowledgeappropriate for level oftraining										
1.2	Participation andcontribution to learningactivity (e.g.,JournalClub, Seminars,CMEetc)										
1.3	Conduct of research andother scholarly activityassigned(e.gPosters , publicationsetc.)										
1.4	Documentation ofacquisition ofcompetence (egLogbook)										
1.5	Performance in workbasedassessment s										
1.6	Self-directedLearning										
2	**Workrelatedtotraining**										
2.1	Practical skills that areappropriatefor thelevel oftraining										
2.2	Respectforprocessesand proceduresinthe workspace										
2.3	Abilitytoworkwithother membersoftheteam										
2.4	Participation andcompliance with thequality improvementprocess atthework environment										

2.5	Ability to record anddocumentworkaccurately andappropriateforlevelof training										

3	**Professionalattributes**										
3.1	Responsibility andaccountability										
3.2	Contributiontogrowthofle arningoftheteam										
3.3	Conductthatisethicallyapp ropriate andrespectfulatalltimes										
4	**Spaceforadditional comments**										
5	**Disposition**										
	Has this assessmentpatternbeend iscussedwiththe trainee?	Yes	No								
	Ifnotexplain.										
	NameandSignatureof theassesse										
	NameandSignatureof theassessor										
	Date										

SubjectExpertGroupmembersforpreparationofREVISEDGuidelines for competency based postgraduate training programmeforMDinPhysiology

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