Highlighted on Pg. No. 13 & 14

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
Grade 'A' Accredited by NAAC
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CHOICE BASED CREDIT SYSTEM

(CBCS)

(with effect from 2019-2020 Batches)

Curriculum for

M.Sc. Medical Physiology

Amended upto AC-41/2021, Dated 27/08/2021

Amended History

1. Approved as per Resolution No. 3.2.1.6.i, of BOM – 57/2019, dated 26/04/2019.
2. Amended as per Resolution No. 3.1.1.4 of BOM – 59/2019, dated 11/11/2019.
3. Amended as per Resolution No. 3.2.1.5 of BOM-62/2020, dated 16/09/2020.
4. Amended as per Resolution No. 3.2.1.6 of BOM – 62/2020, dated 16/09/2020.
5. Amended as per Resolution No. 4.11 of AC-41/2021, dated 27/08/2021.

MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI

LEARNING OUTCOME BASED CURRICULAM FRAMEWORK

MSc. Medical Physiology Course

Sr. No.		
1	Objectives	• **Learning Objectives No.1 : Acquisition of Knowledge** A post graduate student upon successfully qualifying in the M.Sc Medical physiology examination should be able to : 1. Understand and deal with all aspects of general, systemic and applied Physiology. 2. 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. 3. Understand general principles of medical education (use of appropriate teaching techniques and resources). 4. Interpret and evaluate research publications critically. 5. Use the library facilities (Literature database using computer, CD ROM, internet search and any other available newer techniques). 6. Conduct relevant research which may have significant bearing on human health and patient care. 7. Interpret the research findings in the light of its basic and applied significance. 8. Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering. 9. Interact with the allied departments and render services in advanced laboratory investigations. 10. Acquire administrative skills to set up concerned department / laboratories 11. Function as a member of a teaching or research team. • **Learning Objectives No.2 : Teaching and Training** The student should be able to effectively teach the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) and their management to undergraduate students in medicine (MBBS) and allied health science courses (Dentistry, Nursing, Physiotherapy, BSc.allied sciences).

		Plan, execute and evaluate teaching assignments in Medical Physiology. Conduct research. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research. • **Learning Objectives No.3 : 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 .
2	Generic Graduate Attributes	**Scholarly Attitude :** At the end of the course the student shall be able to: 1. Conduct experiments designed for study of physiological phenomena. 2. Interpret experimental/ investigate data. 3. Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory • Encouraged to participate in seminars ,workshop, conferences/CME. **Research Aptitude :** • Encouraged to apply for research funding, ICMR Fellowship • Research Methodology training programs • Plan, execute, analyze and present the research work in Medical Physiology at various conferences. • Encouraged to write papers and publish them in Indexed journals. **Exemplary Leadership** • Organizes/ helps in organizing various conferences, CMEs and workshops • Organizes cultural festivals, Annual fest Student magazines
3	Desired Learning Outcomes of Degree	**Element of Critical thinking** In addition to didactic lectures to provide a holistic education students are exposed to the following teaching-learning practices/programs • Journal Clubs • Slide discussions • Seminars • Participate in workshop, conferences/CME.

		Dynamic Professionalism • Encouraged to participate in various conferences, CMEs and workshops and do paper presentations (Oral/Poster).
4	Proportion of knowledge / Skill / Soft Skill in Curriculum	**Knowledge** Understand and Teach all aspects of general, systemic and applied human body Physiology. **Skills** Haematology practicals, amphibian & mammalian experiments, human experiments, Clinical examination of various systems. **Soft skills** Effective Communication Skills • Microteaching • Formative and summative assessment of Communication and teaching skills in the form of Microteaching & seminar presentations
5	Curriculum and Employability	**Global Competencies :** Teaching Medical Physiology Research Physiological laboratories(PFT, ECG,NCV) Yoga Exercise Physiology Food & nutrition

Name of the Degree: M.Sc. MEDICAL PHYSIOLOGY

AIMS OF THE PROGRAM

Physiologistis in demand in today's Sports, Yoga & nutrition fields in India & abroad

APhysiology Postgraduate has a career as teaching faculty with research aptitude and ability of applying physiology to clinical fields.

Postgraduate qualification Physiology can earn to placements in Medical teaching institute,research laboratories run by the government and the corporate sector. Private sector placements are in teaching,technical and managerial positions. The demand is growing at an accelerated rate, which makes career prospects in this field bright.

In academics, one can go for higher qualifications like Ph.D. in various field of Physiology. There is a great demand of this course abroad as most of the foreign countries are looking for expert in this field. After completion of the course, one can work as Tutor or Medical Physiologist in a Medical set up or as a Research Associate in Research Laboratories, also as Exercise Physiologist-Training of sports people, Nutrition Physiologist: Sensory – metabolic interactions in control of food intake, ontogeny of food habits and food preferences&As researcher in yoga :Stress, life style and its impact on mind body interactions.

Duration of Study: The duration of the study for M.Sc. Medical Physiology will be of six semesters spread over three years.

Program pattern- Commencement of Semester

- First Semester: August
- Second Semester: February
- Third Semester: August
- Fourth Semester: February
- Fifth Semester: August
- Sixth Semester: February

Eligibility Criteria: As a minimum criterion of eligibility, aspiring candidates are needed to have attained a B.Sc. in any discipline of Life Sciences, Biosciences, Bachelor's degree in any of Physics, Biological Sciences, M.B.B.S, BDS, BAMS, BHMS, B.Pharm., Bachelor's Degree in Agricultural, Veterinary and Fishery Sciences, or equivalent examination with a minimum aggregate score of 50%.

For any query visit the website: www.mgmuhs.com

CURRICULUM FOR M. Sc. MEDICAL PHYSIOLOGY

1st YEAR

Semester I							
	Syllabus Ref. No.	**Subject**	**Credits**	**Teaching hours**	**Marks**		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP101T	**Medical Anatomy**	**4**	**4**	**20**	**60**	**80**
	MP102T	**Medical Physiology**	**4**	**4**	**20**	**60**	**80**
	MP103T	**Medical Biochemistry**	**4**	**4**	**20**	**60**	**80**
	MP104T	**Medical Pharmacology**	**4**	**4**	**20**	**60**	**80**
	MP105T	**Medical Microbiology**	**4**	**4**	**20**	**60**	**80**
	Practical						
	MP101P	**Medical Anatomy**	**1**	**2**	**20**	**50**	**70**
	MP102P	**Medical Physiology**	**1**	**2**	**20**	**50**	**70**
	MP103P	**Medical Biochemistry**	**1**	**2**	**20**	**50**	**70**
	MP104P	**Medical Pharmacology**	**1**	**2**	**20**	**50**	**70**
	MP105P	**Medical Microbiology**	**1**	**2**	**20**	**50**	**70**
	Total		**25**	**30**	**200**	**550**	**750**

SEMESTERII

	Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP201T	**Medical Anatomy**	**4**	**4**	**20**	**60**	**80**
	MP202T	**Medical Physiology**	**4**	**4**	**20**	**60**	**80**
	MP203T	**Medical Biochemistry**	**4**	**4**	**20**	**60**	**80**
	MP204T	**Medical Pharmacology**	**4**	**4**	**20**	**60**	**80**
	MP205T	**Medical Microbiology**	**4**	**4**	**20**	**60**	**80**
	MP206T	**Research Methodology & Biostatistics (Core Course)**	**4**	**4**	**20**	**60**	**80**
	Practical						
	MP201P	**Medical Anatomy**	**1**	**2**	**20**	**50**	**70**
	MP202P	**Medical Physiology**	**1**	**2**	**20**	**50**	**70**
	MP203P	**Medical Biochemistry**	**1**	**2**	**20**	**50**	**70**
	MP204P	**Medical Pharmacology**	**1**	**2**	**20**	**50**	**70**
	MP205P	**Medical Microbiology**	**1**	**2**	**20**	**50**	**70**
	MP206P	**Research Methodology & Biostatistics (Core Course)**	**1**	**2**	**20**	**50**	**70**
	Total		**30**	**36**	**240**	**660**	**900**

2ND YEAR

SEMESTERIII							
	Syllabus Ref. No.	**Subject**	**Credits**	**Teaching hours**	**Marks**		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP301T	1.General Physiology 2. Blood 3.Nerve-Muscle physiology	4	4	20	100	120
		Core Elective course* **	4	4	Internal Exam 80 Marks *		
	MP302CET	Clinical Nutrition					
	MP303CET	Neurophysiology					
	MP304	Clinical Postings	6	18		20*	20
	MP305	Dissertation/Project Proposal**	5	10		20*	20
	MP306	Seminar	2	2		20*	20
	Practical						
	MP301P	1. Blood: HaematologyPracticals 2.Nerve-Muscle physiology:- Amphibian graphs Human experiment graphs	2	4	20	100	120
	MP302CEP MP303CEP	Core Elective practical*** • Clinical nutrition • Neurophysiology	1	2	Internal Exam 50 Marks*		
		Total	24	44	40	260	300

*** Exam to be taken at Departmental Level**

Semester IV							
	Syllabus Ref. No.	**Subject**	**Credits**	**Teaching hours**	**Marks**		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP401T	**Systems:** 1. Respiratory system 2.Cardiovascular system 3.Gastrointestinal system 4. Food & Nutrition	4	4	20	100	120
		General elective ***	4	4			
	MP402GE	Bioethics, Biosafety, IPR & Technology Transfer	**Internal Exam of 80 Marks***				
	MP403GE	Disaster Management and Mitigation Resources					
	MP404GE	Human rights					
	MP405	Clinical Postings	7	21		20*	20
	MP406	Dissertation / Project**	5	10		20*	20
	MP407	Seminar	2	2		20*	20
	Practical						
	MP401P	**i.Clinical examination:** 1.Respiratory system 2.Cardiovascular system 3.Alimentory system **ii**.Amphibian graphs iii.Human experiment graphs iv.Mammalian graphs v.Practicals for food & nutrition	2	4	20	100	120
		Total	24	45	40	260	300

***Exam to be taken at Departmental Level**

III[rd] YEAR

Semester V							
	Syllabus Ref. No.	**Subject**	**Credits**	**Teaching hours**	**Marks**		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP501T	1.Excretory system 2.Endocrine system 3.Reproductive system 4.Exercise Physiology	4	4	20	100	120
	MP502	Clinical Postings	6	18		20*	20
	MP503	Dissertation / Project**	10	20		20*	20
	MP504	Seminar/Journal Club	2	2		20*	20
	Practical						
	MP501P	Practicals:- Excretory system Endocrine system Reproductive system Exercise Physiology	1	2	20	100	120
		Total	23	46	40	260	300

***Exam to be taken at Departmental Level**

SEMESTER VI							
	Syllabus Ref. No.	**Subject**	**Credits**	**Teaching hours**	**Marks**		
	Theory				**Internal Assessment**	**Semester Exam**	**Total**
	MP601T	Central Nervous system Special senses	4	4	20	100	120
	MP602	Clinical Postings	5	15		20*	20
	MP603	Seminar/Journal Club	1	1		20*	20
	Practical						
	MP601P	**Clinical examination in** : Central Nervous system Special senses	2	4	20	50	70
	MP602P	**Dissertation/ Project****	12	24		70	70
		Total	24	48	40	260	300

***Exam to be taken at Departmental Level**

****(a) *Dissertation / Project* Course commences in II nd Semester.**

Students should undergo ICMR Online Course of Research Methodology before submitting the protocol for their Dissertation. (Ist / II nd Semester)

Allotment of Guide	II nd Semester (On or Before 30 April)
Submission of Protocol for Scientific and Ethical Committee Approval	III rd Semester (On or Before 14 th Aug)
Scientific and Ethical Approval	III rd Semester (On or Before 14 th October)
Commencement of Research Work	III rd Semester 15th October
Submission of Thesis	VI th Semester 31 st March

***** (Elective): Any one subject is to be chosen from the subjects offered** (Subjects offered may change from time to time depending on the availability of expertise)

Elective courses may or may not have practical and/or field work.

Resolution No 4.11 of AC-41/2021: Resolved to include the clinical posting and practical session details in the M.Sc. Medical Physiology syllabus, with effect from the batch admitted in 2021-22 onwards.

Annexure-30 of AC-41-2021

M.Sc. Medical Physiology -CBCS syllabus

The department should generate **liaison with clinical department**and provide experiential learning experiences for the clinical postings.

III Semester1-month clinical posting

1. Pathology & Diagnostic (1 month)

1. **IHBT – 1 week** (Blood transfusion)
2. **Pathology Laboratory-** (Automated Hematological tests and Semen analysis: sperm count and motility)- **1 week**
3. **Biochemistry Laboratory** (Blood Biochemical parameters , Cardiac markers, Lipid profile, Renal profile)- **1 week**
4.

2. Neurology Laboratory – (1 month)

1. Electromyography
2. Nerve conduction studies
3. Any other newer technology

IV Semester- 2 months clinical postings

1.Medicine (1 month) Focus on Respiratory and Cardiac clinical cases

1. OPD-1 week
2. Ward-1 week
3. ICU-1 week
4. Casuality-1 week

2.Cardiac Lab–1 week

1. Electrocardiography
2. Blood-gas Analysis
3. Laboratory for Blood flow measurements (Impedence plethysmograph/Laser flow meter/ Doppler flow meter)

3.Respiratory Laboratory -1 week

1. Computerized multifunctional spirometery
2. Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)

4. Biochemistry Laboratory (Blood Biochemical parameters, Cardiac markers, Lipid profile, Renal profile) - **1 week**

5.Clinical nutrition lab -1 week

1. Measurement of BMR.
2. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.

V Semester 1-month clinical posting

1.Medicine (1 month)Focus on Renal and endocrine clinical cases

1. OPD-1 week
2. Ward -1 week
3. ICU-1 week
4. Casuality-1 week

2. School of Physiotherapy/Sports Medicine department -1 week

Tests for physical fitness: Cardio – respiratory responses to steady state exercise using

1. Harvard step test
2. Bicycle Ergometry
3. Treadmill test for determination of VO2 max

VISemester- 2 months clinical postings

1. Medicine (1 month) Focus on Neurology

1. OPD-1 week
2. Ward-1 week
3. ICU-1 week
4. Casuality-1 week

2. Ophthalmology: 1 week

1. Visual acuity
2. Perimetry – mapping out of visual field and blind spot
3. Fundoscopy

3. ENT Department: Audiometry room. 1 week

1. Test for hearing
2. Audiometry

4. Sleep Lab 1 week

1. Polysomnography

5. Neurophysiology Lab 1 week

1. Electroencephalography
2. Evoked potential recording
3. Autonomic nervous system (ANS) testing

Annexure – G – IIa

ACADEMIC SYLLABUS FOR SEMESTER-I

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**PHYSIOLOGY Part1**

Course Objective (Teaching Objectives)	• To teach basic physiological concepts related to General Physiology, Haematology, Nerve Muscle Physiology, Respiratory and Cardiovascular physiology
Course Outcomes (learning Objectives)	• To understand the basic physiological concepts of General physiology • To understand the basic physiological concepts of Haematology, • To understand the basic physiological concepts of Nerve Muscle Physiology, • To understand the basic physiological concepts of Respiratory physiology • To understand the basic physiological concepts of Cardiovascular physiology

Unit no.	**Theory Topics**	**Hours allotted No. of 45hrs**
1.	**General Physiology** • Homeostasis, feedback mechanisms • Structure & function of cell & organelles • Transport across Cell Membrane	**4 hrs**
2.	**Hematology** • Composition 7 functions of blood, plasma protein • RBC, Erythropoeisis • Haemoglobin, Anaemia • Blood Groups • WBC • Immunity • Haemostasis • platelets • Coagulation of blood • Lymph, reticuloendothelial / Tissue Macrophage System	**10 Hrs**
3.	**Nerve Muscle Physiology** • Structure, function & classification of Nerve Fibres • Properties of Nerve Fibres • Resting membrane Potential, Action Potential • Neuromuscular Junction • Structure of skeletal muscle • Mechanism of muscle contraction, Excitation Contraction coupling • Properties of skeletal muscle	**8 Hrs**

4.	**Respiratory System** • Introduction, physiological anatomy& Functions of RS • Lung volume & capacities • Mechanism of breathing • Diffusion • Transport of O2 • Transport of Co2 • Neural Regulation • Chemical regulation • Hypoxia	**10 Hrs**
5.	**Cardiovascular system** • Introduction – functional anatomy, structure of cardiac muscle • Properties of cardiac muscle • Cardiac impulse • ECG • Cardiac cycle • Cardiac output • CVS regulation • Heart Rate • Blood Pressure • Hemodynamics • Coronary circulation	**13 Hrs**
	Total	**45 HRS**

Unit no.	Tutorial Topics	Hours allotted No. of 15hrs
1.	Transport of cell	**1**
2.	Erythropoeisis	**1**
3.	Blood Groups	**1**
4.	Resting membrane potential & Action Potential	**1**
5.	Hemostasis	**1**
6.	Immunity	**1**
7.	E-C coupling & Mechanism of contraction	**1**
8.	Mechanism of breathing	**1**
9.	Neuromuscular Junction	**1**
10.	Transport of O2 & CO2	**1**
11.	Regulation of respiration	**1**
12.	Cardiac impulse	**1**
13.	ECG	**1**
14.	Cardiac output	**1**
15.	Blood pressure & its regulation	**1**
	Total	**15hrs**

Unit no.	Practical Topics	Hours allotted No. of 30 hrs
1.	**Haematology** 1. Microscope, collection of blood 2. smear preparation 3. Haemoglobin 4. Total Leukocyte count 5. RBC count 6. DLC 7. BT & CT 8. Blood Group	**19hrs**
2.	**Clinical** 1. General Physical Examination 2. Pulse 3. Blood pressure	**7 Hrs**
3.	**Human Experiments** 1. Spirometry 2. ECG	**4Hrs**
	Total	**30 HRS**

REFERENCE BOOKS:

List of the books recommended
MSc- Medical Physiology

Semester	Name of the Books	Author/ Editor
I&II	Concise Human Physiology	A K Jain
	Essential Of Medical Physiology	K Sembulingam
	Physiology: Prep Manual For Undergraduates	Joshi, V.D.
	Manual of Practical Physiology	A K Jain

Annexure – G – IIb

ACADEMIC SYLLABUS FOR SEMESTER-II

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**Physiology Part2**

Course Objective (Teaching Objectives)	To teach basic physiological concepts related to Gastrointestinal system, Excretory system, Endocrine system, Reproductive system, Central Nervous system, special senses
Course Outcomes (learning Objectives)	• To understand the basic physiological concepts of Gastrointestinal system • To understand the basic physiological concepts of Excretory system, • To understand the basic physiological concepts of Endocrine system • To understand the basic physiological concepts of Reproductive system • To understand the basic physiological concepts of Central Nervous system • To understand the basic physiological concepts of special senses

Unit no.	**Theory Topics**	**Hours allotted No. of-45hrs**
1	**GIT** 1. Introduction – functional organisation & innervation 2. Salivary secretion, Deglutition 3. Stomach: Structure, Motor function of stomach, Gastric secretion 4. Liver-functions, bile secretion 5. Pancreas – Pancreatic juice secretion 6. Small intestine – movements, function defecation 7. Large intestine - movements, function defecation 8. Digestion & absorption of carbohydrates, fats & proteins	**8 Hours**

2.	**Excretory system** 1. Functional anatomy, Nephron, Functions of kidney 2. Glomerular filtration 3. Tubular Reabsorption and secretion 4. Concentration & dilution of urine 5. Physiology of Micturition 6. Regulation of body temperature	**6 Hrs**
3	**Endocrine** 1. Introduction – mechanism of hormone action 2. Pituitary – anterior, posterior, Growth Hormone, ADH, Oxytocin 3. Thyroid Hormones 4. Adrenocortical hormones 5. Adrenal medulla 6. Parathormone, calcitonin, vitamin D 7. Endocrine Pancreas-Insulin	**7 Hrs**
4	**Reproduction** 1. Male reproductive system Functional anatomy Spermatogenesis, Testosterone 2. Female reproductive system-functional anatomy, menstrual cycle 3. Estrogen, Progesterone 4. Pregnancy, Lactation 5. Contraception	**4 Hrs**
5	**CNS** 1. Organization of nervous system 2. Synapse 3. Receptors	**13 Hrs**

	4. Reflex 5. Sensory system 6. Motor system 7. Autonomic nervous system 8. Cerebellum 9. Basal ganglia, Thalamus 10. Hypothalamus, limbic system 11. Cerebral cortex, Higher functions 12. Muscle tone, Posture, Equilibrium, vestibular apparatus	
6	**Special Senses** 1. Eye structure, optics 2. Accommodation, Errors of refraction 3. Photochemistry of vision, color vision 4. Visual pathway 5. Hearing functional anatomy 6. Mechanism of hearing 7. Taste, olfaction	**7 Hrs**
	Total	**45 Hours**

Unit no.	Tutorial Topics	Hours allotted No. of 15-hrs
1.	Gastric secretion	**15 Hrs**
2.	Liver-functions, bile secretion	
3.	Glomerular filtration Rate	
4.	Physiology of Micturition	
5.	. Thyroid Hormones	
6.	Diabetes Mellitus- Insulin	
7.	Menstrual cycle	
8.	Synapse	
9.	Receptors	
10.	Descending Tracts	
11.	Ascending Tracts	
12.	Cerebellum	
13.	Hypothalamus	
14.	Accommodation, Errors of refraction	
15.	Mechanism of hearing	

	Practical Topics	Hours allotted No. of 30hrs
	Clinical examination (Practical) 1. Sensory system 2. Motor system I & II 3. Visual acuity & color vision 4. Tests for hearing & deafness	**18 Hours**
	Charts **Endocrine photographs** 1. Gigantism 2. Dwarfism 3. Acromegaly 4. Grave's disease 5. Myxedema 6. Cretinism 7. Cushing syndrome 8. Carpopedal spasm	**10 Hours**
	Renal 1. Calculation:- i. Effective filtration pressure (EFP) ii. Clearance creatinine, urea, inulin, PAH 2. Cystometrogram	
	Perimetry (Demonstration)	**2 Hours**
	Total	**30 hrs**

List of the Books recommended

MSc- Medical Physiology

	Name of the books	**Author/Editor**
Semester I & II	Concise Human Physiology	A K Jain
	Essential of Medical Physiology	K Sembulingam
	Physiology:- Prep Manual For Undergraduates	Joshi V d
	Manual of Practical Physiology	A k Jain

MGM INSTITUTE OF HEALTH SCIENCES M. Sc. Medical Students Syllabus for Research Methodology and Biostatistics		
	No. of Hours	
I. Research Methodology:	Theory	Practical
Scientific Methods of Research : Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research , Research Methods versus Methodology, Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report	5	—
Research Designs: Prospective, retrospective, Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case Control Studies, Cross sectional studies, Intervention studies, Panel Studies.	5	—
Sampling Designs : Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs (Probability sampling and non probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	4	0
Measurement in research: Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques, Possible sources of error in measurement, Tests of sound measurement	5	5
Methods of Data Collection: Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data	3	0
Ethics and Ethical practice in research and plagiarism	1	
Sampling Fundamentals : Need and importance for Sampling, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating the Population Mean Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level.	5	2
II. Biostatistics		

Data Presentation : Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs	3	3
Measures of Central Tendency and Dispersion : Mean, Median, Mode Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits).	3	3
Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, Normal distribution, data transformationImportant Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Testing the Equality of Variances of Two Normal Populations.	6	6
Chi-square Test: Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency.	2	2
Measures of Relationship: Need and meaning, Correlation and Simple Regression Analysis	2	2
Analysis of Variance and Covariance: Analysis of Variance (ANOVA):Concept and technique of ANOVA, One-way ANOVA, Two-way ANOVA, ANOVA in Latin-Square Design Analysis of Co-variance (ANOCOVA), ANOCOVA Technique.	4	4
Nonparametric or Distribution-free Tests: Important Nonparametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test Kruskal Walli's test, Friedman's test, and Spearman Correlation test.	3	3
Vital Health Statistics: Measurement of Population: rate, crude rate, specific rate, *Measurement of fertility***:** specific fertility rate, Total fertility rate, *Reproduction rate,* Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR) , Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity.	4	3
Computer Application Use of Computer in data analysis and research, Use of Software and Statistical package.	0	2
Total hours	55	35

Assessment Pattern for MSc Medical Courses (2019 Onwards)

1. LETTER GRADES AND GRADE POINTS:

MGMIHS has adopted the UGC recommended system of awarding grades and CGPA under Choice Based Credit Semester System for MSc Medical courses.

1. MGMIHS would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.
2. The UGC recommended 10-point grading system with the following letter grades will be followed:

Table 1: Grades and Grade Points

Letter Grade	**Grade Point**
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B (Good)	7
C (Above Average)	6
F (Fail)/ RA (Reappear)	0
Ab (Absent)	0
Not Completed (NC)	0
RC (<50% in attendance or in Internal Assessment)	

a. A student obtaining Grade RA shall be considered failed and will be required to reappear in the examination.

b. Candidates with NC grading are those detained in a course (s); while RC indicate student not fulfilling the minimum criteria for academic progress or less than 50%in attendance or less than 50% in internal assessments (IA). Registrations of such students for the respective courses shall be treated as cancelled. If the course is a core course, the candidate has to re-register and repeat the course when it is offered next time.

c. CBCS Grading System - Marks Equivalence Table

Table 2: Grades and Grade Points

Letter Grade	Grade Point	% of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60 -69
B (Good)	7	55 -59
C (Above Average) – **Pass both for UG and PGs**	6	50- 54
F (Fail))/ RA (Reappear)	0	Less than 50
Ab (Absent)	0	-
NC- not completed	0	-
RC- Repeat the Course	0	0

Table 3: Cumulative Grades and Grade Points

Letter Grade	Grade Point	CGPA
O (Outstanding)	10	9.01 - 10.00
A+ (Excellent)	9	8.01 – 9.00
A (Very Good)	8	7.01 – 8.00
B (Good)	7	6.00 - 7.00
C (Above Average)	6	5.01 - 6.00

d. **Assessment of a Course:** Evaluation for a course shall be done on a continuous basis. Uniform procedure will be adopted under the CBCS to conduct continuous internal assessments (IA), followed by one end-semester university examination (ES) for each course.

e. Courses in programs wherein Theory and Lab are assessed jointly, the minimum passing head has to be 50% Grade each for theory and practical's separately. RA grade in any one of the components will amount to reappearing in both components. i.e. theory and practical.

2. Eligibility to appear for the end-semester examinations for a course includes:

2.1 Candidates having ≥ 75% attendance and obtaining the minimum 35% in internal assessments in each course to qualify for appearing in the end-semester university examinations.

2.2 The students desirous of appearing for university examination shall submit the application form duly filled along with the prescribed examination fee.

2.3 Incomplete application forms or application forms submitted without prescribed fee or application form submitted after due date will be rejected and student shall not be allowed to appear for examination.

3. Passing Heads

3.1 The minimum passing head shall be 50% in both Theory and practicals separately including the internal assessment.

3.2 Elective subjects – the minimum prescribed marks for a pass in elective subject should be 50%. The marks obtained in an elective subjects should be communicated to the university before the commencement of the university examination. (From IIIrdSem Onwards)

4 Detention:

A student not meeting any of the above criteria may be detained (NC) in that particular course for the semester. In the subsequent semester, such a candidate improve in all, including attendance and/or IA minimum to become eligible for the next end-semester examination.

5 The maximum duration for completing the course will be 6 years (minimum duration of course x 2) i.e. (3x2) =6 years for PG Courses, failing which his/her registration will be cancelled. Full fees of entire course of three years may be liable to be paid by the students.

6 Carry over benefit:

6.1 A candidate who fails in any two main subjects of previous semester shall be permitted to carry over those subjects to the next semester.

6.2 A candidate shall not be allowed to appear in the final semester examination unless the candidate has cleared all the previous semester examinations.

7 Grace Marks for PG Courses:

No grace marks will be awarded for PG Exams.

8. University End-Semester Examination

8.1 There will be one final university examination at the end of every semester.

8.2 A candidate must have minimum 75% attendance (Irrespective of the type of absence) in theory and practical in each subject to be eligible for appearing the University examination.

8.3 The Dean shall send to the university a certificate of completion of required attendance and other requirements of the applicant as prescribed by the university, two weeks before the date of commencement of the written examination.

8.4 A candidate shall be eligible to sit for the examination only, if she / he has secured minimum 35% in internal assessment of that subject. The internal examinations will be conducted at college/ department level.

8.5 Notwithstanding – anything in any examination, a deficiency of attendance at lectures or practical maximum to the extent of 10% - may be condoned by the Dean.

8.6 If a candidate fails either in theory or in practical, he/ she have to re-appear for both.

8.7 There shall be no provision of re- evaluation of answer sheets. Candidates may

apply to the university following due procedure for recounting of theory marks in the

Presence of the subject experts.

8.8 Internal assessments shall be submitted by the Head of the Department to the university

through the Dean MGMMC at least two weeks before commencement of University theory examination.

8.9 Supplementary examination: There shall be no supplementary examination

8.10 Re-Verification -There shall be provision of retotaling of the answer sheets, candidate shall be permitted to apply for recounting/retotaling of theory papers within 8 days from the date of declaration of results.

8.11 Scheme of University Exam Theory PG Program: General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs are given in the following tables.

8.12 Theory Question Paper Pattern for Core Subjects in University Examinations (For 1st & 2nd Semester)

Under CBCS - 60Marks

Question Type	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	7	6	1X 10	60

General Instructions (Theory):

A. Time duration of each Theory Paper will be of Three (3) Hrs .
B. Total Marks of each Theory Paper will be 60 Marks

8. 13 Practical Question Paper Pattern For University Examinations Under CBCS - 50 Marks

Exercise	Description	Marks
Q No 1	Practical exercise – 1	1 x15=15 M
Q No 2	Station exercise	5x5M=25 M
Q No 3	VIVA	10 M
		Total = 50 M

General Instructions (Practical):

A. All the students have to remain present at the examination center 15 minutes before the scheduled time for examination.

B. Students have to carry with them certified journal, I-card or examination receipt, and other necessary requirements for examination.

C. Candidate should not leave the practical hall without the permission of examiner.

D. Use of calculator is allowed but the use of mobile phones is strictly prohibited.

E. The candidate has to leave the laboratory only after the submission of all the answer sheets of the exercises performed.

8.14 Internal examination pattern (Theory) : 30marks

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Brief Answer Questions	4	3	1X10	30

8.15 Breakup of theory IA calculation for 20 marks

Internal exam (Department -30 Marks)	15 marks
Seminar	5 marks
	Total = 20 M

8.16 Internal Examination Pattern (Practical): 30 Marks

Practical Exercise	10marks
Station Exercise	10 marks
Viva	10 marks
Total practical	30 Marks

8.17 Breakup of practical IA calculation:

Internal exam (Department -30 Marks)	15 marks
Journal	5 marks
	Total = 20 M

Internal Assessment marks should be submitted to the university by respective departments at least 15 days prior to onset of university examination.

9. Submission of Protocol of Dissertation: Students should undergo Online Course of Research Methodology (MCI- PG) before submitting the protocol for their Dissertation.

MGM Institute of Health Sciences, Navi Mumbai

MGM MEDICAL COLLEGE

Academic Year 2019 – 2020

Academic Calendar For M.Sc. (3 Years) Medical Courses

(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)

SCHEDULE OF ACTIVITY	DATES
Commencement of First Semester	01.08.2019
Receipt of completed Eligibility forms at MGMIHS from Respective college without late fees Receipt of completed Eligibility forms at MGMIHS from Respective college with late fees (Only for new admission)	On or before 30.10.2019 On or before 30.11.2019
Commencement of Internal Exam	3rd Week of November 2019
Winter Vacation for Staff	16.10.2019 to 15.11.2019
Notification of First Semester University Examination	As per MGMIHS
Commencement of First Semester University Examination	1 Week of January 2020
Conclusion of respective semesters	Last week of January 2020
Declaration of final Result	As per MGMIHS
Commencement of Second Semester	1st Week of February 2020
Commencement of Internal Examination	3rd Week of April 2010
Allotment of Guide for Dissertation	On or Before 30 th April 2020
Notification of Second Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2020 to 10.06.2020
Commencement of Second Semester University Examination	1 Week of July 2020
Conclusion of Second Semester	15 July 2020
Declaration of final Result	As per MGMIHS
Commencement of Next Academic Session	16.07.2020

MGM Institute of Health Sciences, Navi Mumbai

MGM MEDICAL COLLEGE

Academic Year 2019 – 2020

Academic Calendar For M.Sc. (3 Years) Medical Courses

(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology

SCHEDULE OF ACTIVITY	DATES
Commencement of Third Semester	16.07.2020
Submission of Protocol for Scientific and Ethical Approval	14.08.2020
Commencement of Internal Exam	3rd Week of November 2020
Winter Vacation for Staff	16.10.2020 to 15.11.2020
Notification of First and Third Semester University Examination	As per MGMIHS
Commencement of Third Semester University Examination	1 Week of January 2021
Conclusion of respective semesters	15 January 2021
Declaration of final Result	As per MGMIHS
Commencement of Fourth Semester	3rd week of January 2021
Commencement of Internal Examination	2nd Week of April 2021
Notification of Fourth Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2021 to 10.06.2021
Commencement of Fourth Semester University Examination	3rd Week of June 2021
Conclusion of Respective Semesters	30 June 2021
Declaration of final Result	As per MGMIHS
Commencement of Next Academic Section	1.07.2021

MGM Institute of Health Sciences, Navi Mumbai

MGM MEDICAL COLLEGE

Academic Year 2019 – 2020

Academic Calendar For M.Sc. (3 Years) Medical Courses

(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology

SCHEDULE OF ACTIVITY	DATES
Commencement of Fifth Semester	1.07.2021
Commencement of Internal Exam	3rd Week of November 2021
Winter Vacation for Staff	16.10.2021 to 15.11.2021
Notification of First, Third and Fifth Semester University Examination	As per MGMIHS
Commencement of Fifth Semester University Examination	First Week of December 2021
Conclusion of Fifth semester	Second Week of December 2021
Declaration of final Result	As per MGMIHS
Commencement of Sixth Semester	16 December 2021
Submission of Dissertation	31 March 2022
Commencement of Internal Examination	2nd Week of April 2022
Notification of Fourth Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2022 to 10.06.2022
Commencement of Sixth Semester University Examination	1st June 2022
Conclusion of Respective Semesters	30 June 2022
Declaration of final Result	As per MGMIHS

DEPARTMENT OF PHYSIOLOGY
MGM MEDICAL COLLEGE, KAMOTHE, NAVI MUMBAI

ACADEMIC SYLLABUS FOR SEMESTER-III

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**Physiology**

Course Objective (Teaching Objectives)	**To teach basic physiological concepts related to General Physiology, blood, Nerve muscle Physiology**
Course Outcomes (learning Objectives)	• **To understand the basic physiological concepts of General physiology** • **To understand the basic physiological concepts of Blood,** • **To understand the basic physiological concepts of Nerve-Muscle physiology**

Unit no.	**THEORY TOPICS**	**No. of-Hours allotted 45hrs**
1	**Introduction to physiology: the Cell and General Physiology** 1. Functional organization of the human body : cell as the living unit of the body 2. Control of the 'internal environment': Homeostasis & feedback mechanisms 3. The cell, cell organelles and its functions 4. Genetic code , its expression and genetic control of protein synthesis, cell reproduction 5. Transport of substances across cell membranes 6. Intercellular junction & Apoptosis 7. Membrane potentials: RMP and Action Potential 8. Body fluid compartments	**8 Hours**
2.	**Haematology** 1. Composition and function of blood 2. Plasma proteins	**20 Hrs**

	3. Red blood cells 4. Haemoglobin 5. Anaemia, and Polycythemia 6. Jaundice 7. Leukocytes, granulocytes, the Monocyte-macrophage system, and inflammation 8. Physiology of immunity and allergy, Innate immunity 9. Humoral immunity 10. Cellular immunity 11. Blood group & types 12. Blood transfusion; tissue and organ transplantation 13. Hemostasis 14. Role of Platelets in hemostasis & applied aspects of platelets 15. Blood coagulation, 16. Anticoagulants & Fibrinolytic system 17. Bleeding disorders & tests 18. Comparative and Applied Physiology 19. Recent advances	
3	**.Nerve and Muscle Physiology** 1. Structure, functions of neuron,neuroglia, nerve growth factors 2. Classification and Properties of nerve fibres 3. Degeneration and regeneration of nerve fibre 4. Excitation of skeletal muscle: neuromuscular transmission 5. NM blockers & Myasthenia gravis 6. Types of Muscle & structure of skeletal muscle 7. Contraction of skeletal muscle: Sarcotubular system & excitation-contraction coupling 8. Molecular mechanism of muscle contraction 9. Energetics of muscle contraction 10. Properties of skeletal muscle 11. Mode of muscle contraction & gradation of muscle activity 12. Muscular dystrophies & Myopathy 13. Excitation and contraction of smooth muscle 14. Comparative and Applied Physiology 15. Recent advances	**17 Hrs**
	Total	**45 Hours**

Unit no.	Tutorial Topics	Hours allotted No. of 15hrs
1.	Homeostasis	**1**
2.	Plasma proteins	**1**
3.	Transport across cell membrane	**1**
4.	Action potential	**1**
5.	Erythropoeisis	**1**
6.	Blood Groups	**1**
7.	Anaemia	**1**
8.	Haemostasis	**1**
9.	Immunity	**1**
10.	Degeneration & Regeneration of nerve fibres	**1**
11.	Action potential & mechanism of contraction in smooth muscle	**1**
12.	E-C coupling & Mechanism of contraction	**1**
13.	Classification and properties of nerve fibres	**1**
14.	Neuromuscular Junction	**1**
15.	Energetics of skeletal muscle	**1**
	Total	**15hrs**

PRACTICAL TOPICS	No. of Hours allotted 60hrs
Hematology 1. Microscope 2. Collection of blood, smear preparation 3. Haemoglobin 4. Total Leukocyte count 5. RBC count 6. DLC 7. BT & CT 8. Blood Group 9.Platelat count 10. Reticulocyte count 11. ESR 12. PCV 13. Osmotic fragility 14. Blood indices calculation 15. Blood Transfusion & its Hazards	**30Hours**
Animal Skeletal muscle graphs 1. Introduction & study of instruments 2. Simple Muscle Twitch 3. Gradation of stimuli 4. effect of Load 5. Fatigue 6. Tetanus **Graphs** 1. Strength Duration Curve 2. Action Potential 3. Compound Action Potential **Calculations** Blood indices & interpret	**20 Hours**
Charts 1. Strength duration Curve 2. Action Potential 3.Compound Action Potential	**4 Hours**
Human Experiments 1. Ergography	**6 Hours**

2. Hand grip dynamometer test	
Total	**60 hrs**

List of Books recommended
MSc- Medical Physiology

Semester III	**Name of the books**	**Author/Editor**
	Textbook of Medical Physiology	Guyton & Hall
	Textbook of Physiology, Vols-1&2	A K Jain
	Textbook of Medical *Physiology*	*Indu Khurana*
	Manual of Practical Physiology	A K Jain
	Textbook of Practical Physiology	PAL G K
REFERENCE BOOKS	*BEST & TAYLOR'S Physiological* Basis of Medical Practice	O.P.Tandon & Y.Tripathi
	Human Physiology: The Mechanisms Of Body Function	VANDER, A.J.
	Review of Medical physiology	Ganong

ELECTIVE CORE COURSE - I

Name of the Programme	**M.Sc. Medical physiology**
Name of the Course	**Clinical Nutrition (Principles of Nutrition)**
Teaching Objective	To apprehend the candidate with: • The basic concept of nutrition. • The importance of nutrients for the growth and maintenance of human body. • The nutrition through life cycle and the dietary guidelines during therapeutic conditions
Learning Outcomes	After the course accomplishment the student will be able to: • Discuss the role of nutrients for human health and certain disorders • Describe the different forms of nutrients and about the procurement and requirement of nutrients

	CORE ELECTIVE THEORY TOPICS (CLINICAL NUTRITION)	**No. of Hours allotted 60hrs**
1	**Basic Concepts of nutrition** Micro & macronutrients, food groups, Food pyramid,Balanced diet, BMI, BMR, TEE, IBW, Body composition,RDA	4
2	**Macronutrients:Carbohydrates, protein, Fat** Classification, Nutritional significance of Macronutrients, deficiency and toxicity Terapeutic significance of macronutrients	6
3	**Micronutrients**: Vitamins and Minerals Classification, Nutritional significance of Micronutrients Deficiency and toxicity	10

	Therapeutic significance of micronutrients	
4	**Nutrition through lifecycle:** Nutrition during pregnancy, lactation, infancy, toddlar, preschooler, school going kids, adolescents, adults, elderly	12
5	**Functional Foods and Nutraceuticals in Health & Disease:** History, Definition, Classification, Effects on human health and potential applications in risk reduction of diseases	4
6	**Therapeutic Nutrition:** Introduction, different types of hospital diets Dietary guidelines for febrile condition Dietary guidelines forGI disorders: diarhhea, constipation, peptic ulcer, ulcerative colitis Dietary guidelines for obese and underweight Dietary guidelines for diabetes Dietary guidelines for heart disease Dietary guidelines for renal and liver diseases	14
7.	**Sports Nutrition:** Evolution and growth of sports nutrition as a discipline, Anthropometric and physiological measurement Various techniques for measuring body composition, Work capacity, Physical fitness, Parameters of fitness, Fitness tests, Nutritional demands of sports and dietary recommendations	10
	Total	**60 hrs**

Sr. No.	CORE ELECTIVE PRACTICAL TOPICS Clinical Nutrition	No. of Hours allotted 30hrs
1	Anthropometric Assessments	3
2	Formation and use of 24 hour dietary recall	6
3	Food frequency table formation	3
4	Standardization of weight and measures	3
5.	Nutrition status assessment of children	3
6.	Nutrition status assessment of elderly people	3
7.	Nutritional status assessment of adults	3
8.	Physical fitness assessment	6
	Total	**30 hrs**

List of the
Books recommended for Clinical Nutrition

SR. No.	Name of Books for Clinical Nutrition	Name of Author
1.	Krause's Food Nutrition and Diet Therapy, 13th Edition, W.B. Saunders Ltd. .(2000)	Mahan, L.K. and Escott-Stump,S
2.	Advanced Textbook On Food & Nutrition Vol. 1 & N (2nd Ed. Revised _ Enlarged) Bapp Co. 1985.	Swaminathan S.:
3.	Basic Nutrition And Diet Therapy (8th Edition)	Robinson

ELECTIVE COURSE – II

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of theCore Elective Course	**Neurophysiology (** Electro diagnosis)
Course Objective (Teaching Objectives)	**To apprehend the candidate with:** **Neuro anatomy, Physiology of nerve & muscle ,Bioelectric potentials & conduction, effect of various current on nerve & muscle applicable for neurological condition, Advanced Diagnostic Skills in Electrophysiology, Physiology of EEG & Normal EEG patterns**
Course Outcomes (learning Objectives)	**After the course accomplishment the student will be able to:** **Neuro anatomy, Physiology of nerve & muscle ,Bioelectric potentials & conduction, effect of various current on nerve & muscle applicable for neurological condition, Advanced Diagnostic Skills in Electrophysiology, Physiology of EEG & Normal EEG patterns**

Topic No.	Topics and Details	No. of lectures
1	• Neuroanatomy • Basic Physiology & Physics • Nerve & Muscle Physiology • Physiology of excitable tissues • Membrane potentials, Equilibrium potentials, Generator potentials • Electronic conduction, Action potentials, Action potential propagation • Neurotransmitter release, receptor binding, post synaptic potentials	8
2	Basic Electro diagnosis: Use of various low frequency currents in Electro diagnosis – Faradic, Galvanic and Micro-currents. Strength-Duration curve, F-G Tests.	10
3	Advanced Diagnostic Skills in Electrophysiology: a. Principles of application of EMG& NCV b. Application of EMG& NCV in Neurogenic and myogenic disorders c. Single fiber EMG d. Repetitive Nerve Stimulation e. Evoked Potentials: Brainstem, Auditory, Visual, Motor and Cognitive(Somatosensory Evoked Potentials)	30
4	EEG - Neurological equipment- EEG machine, Physiology of EEG, normal and abnormal EEG patterns. Physiology of EEG. Normal EEG patterns- Adults & Children. Abnormal EEG patterns. Polysomnography.	6

5	Applied : Approach to a neurological case Common neurological problems Infections of central nervous system Epilepsies. Disorders of peripheral nerves and plexuses Disorders of Upper and lower motor neurons. Disorders of myoneural transmission. Disorders of skeletal muscle	6
	Total	**60 hrs**

	Practical Topic	**No. of Hrs allotted for Practical**
1	Autonomic Function tests	3
2	Clinical examination of Sensory system	3
3	Clinical examination of Motor system	3
4	Visual Pathways & Visual reflexes	2
5.	Tests for hearing	2
6.	NCV- sensory nerve conduction studies -Motor nerve conduction studies	4
7.	Basic Electromyography EMG	4
8.	Brainstem auditory Evoked Potential (BAEP)	3
9.	Visual evoked Potential (VEP)	3
10.	Somatosensory Evoked Potentials (SSEP)	3
Total		**30**

List of the Books recommended

Sr. No.	**Subject / Topic**	**Author/ Editor**	**Title of Book**	**Publisher**
1.	**Neurology**	**U .K. Misra & J. Kolita**	**Clinical Neurophysiology**	**Elsevier**
2.	**Neurology**	**Jun kimura,4th Edition. (2014)**	**Electro diagnosis in disease of nerve and muscles. Principles and Practice;**	**Oxford University Press**
3.	**Neurology**	**Sydney Sunderland,**	**Nerve and nerve injury**	**Churchill living stone. (1st edition)**
4.	**Neurology**	**U. K. Misra**	**Clinical EEG**	**Elsevier**

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**Physiology**

Course Objective (Teaching Objectives)	To teach basic physiological concepts related to Respiratory system, Cardiovascular system, Gastrointestinal system, Food & Nutrition
Course Outcomes (learning Objectives)	• To understand the basic physiological concepts of Respiratory system • To understand the basic physiological concepts of Cardiovascular system • To understand the basic physiological concepts of Gastrointestinal system • To understand the basic physiological concepts of Food & Nutrition

Unit no.	**THEORY TOPICS**	**Hours allotted No. of-45hrs**
I	**Respiratory System** 1. Physiological anatomy and functions of respiratory system 2. Pulmonary ventilation 3. Pulmonary circulation, pulmonary edema, pleural fluid 4. Physical principles of gas exchange; diffusion of oxygen and carbon dioxide through the respiratory membrane 5. Transport of oxygen and carbon dioxide in blood and tissue fluids 6. Regulation of respiration 7. Respiratory insufficiency - pathophysiology, diagnosis, oxygen therapy 8. High altitude, Aviation and Space Physiology 9. Physiology of deep sea diving and hyperbaric conditions 10. Comparative and applied Physiology 11. Recent advances	**15 Hours**
	Cardiovascular system 1. Physiological anatomy and functions of Cardiovascular system 2. Cardiac muscle: the heart as a pump and function & properties of the heart muscles 3. Cardiac cycle 4. Rhythmical excitatory and conductive system of the heart 5. The normal electrocardiogram 6. Cardiac arrhythmias and electrocardiographic findings in cardiac and systemic	**18 Hrs**

II	disease 7. Herat rate 8. Overview of the circulation; medical biophysics of pressure, flow, and resistance 9. Dynamics of blood and lymphatic flow: arterial and arteriolar circulation, capillary circulation, lymphatic circulation, venous circulation 10. Cardiac output 11. Blood pressure 12. Cardiovascular regulatory mechanism 13. Regional circulation: muscle blood flow, cutaneous circulation 14. Coronary circulation 15. Cardiovascular pathophysiology: Ischemic Heart Disease, Cardiac failure, Circulatory shock, valvular and congenital heart defects 16. Comparative and applied Physiology 17. Recent advances	
III	**Gastrointestinal physiology** 1. General principles of gastrointestinal function - motility, nervous control, and splanchnic circulation 2. Propulsion and mixing of food in the alimentary canal- deglutition, gastric emptying, Peristalsis 3. Secretory functions of the alimentary tract – saliva gastric juice, pancreatic juice, bile, intestinal juice 4. Digestion and absorption in the gastrointestinal tract 5. Physiology of gastrointestinal disorders 6. Comparative and applied Physiology 7. Recent advances	**7 Hrs**
IV	**Food & Nutrition** 1. Energy metabolism, BMR 2. Regulation of food intake 3. Essential dietary components 4. Concept of balance diet 5. Malnutrition: Obesity and its implication, protein energy malnutrition, vitamin and mineral deficiencies	**5 Hrs**
	Total	**45 Hours**

Unit no.	Tutorial Topics	Hours allotted No. of 15hrs
1.	Mechanics of respiration	**1**
2.	Pulmonary ventilation	**1**
3.	Transport of O2 & CO2	**1**
4.	Regulation of respiration	**1**
5.	High altitude & acclimatisation	**1**
6.	Cardiac impulse	**1**
7.	ECG & arrythmias	**1**
8.	Cardiac output & its regulation	**1**
9.	Blood pressure & its regulation	**1**
10.	Regulation of CVS	**1**
11.	Shock	**1**
12.	Gastric secretion	**1**
13.	Liver-functions, bile secretion	**1**
14.	Gastrointestinal movements	**1**
15.	Energy metabolism, BMR, Regulation of food intake	**1**
	Total	**15hrs**

PRACTICAL TOPICS	No. of Hours allotted 60hrs
Clinical Examination: 1. Respiratory System 2. Cardiovascular System 3. Abdomen System	**20 Hours**
Human Experiments 1. Stethography 2. Spirometry 3. ECG 4. Cardiac efficiency tests 5. PFT 6. CPR / Basic life support / Artificial respiration 7.Ergography 8. PEFR	**10 Hours**
CVS Amphibian graphs 1. Normal Cardiogram 2. Vagus & crescent stimulation 3. Vagal Escape 4. Properties of cardiac muscles	**10 Hours**

5. Effect of Ach, Adr, Nicotine 6. Effect of ions Na+, K+ Ca+ on perfused frog's heart	
Human Graphs & Charts 1. Pressure volume changes in left ventricle 2. BMI – WHR 3. Cardiac action potential 4. BMR 5. Balanced diet 6. Skin fold calliper	**8 Hours**
Mammalian Graphs 1. BP 2. Respiration 3. Intestinal movements 4. Perfusion of isolated heart – Langendorffs apparatus	**8 Hours**
Practicals for food & nutrition	**4 Hours**
Total	**60 hrs**

List of Books recommended

MSc- Medical Physiology

Semester IV	**Name of the books**	**Author/Editor**
	Textbook of Medical Physiology	Guyton & Hall
	Textbook of Physiology, Vols-1&2	A K Jain
	Textbook of Medical *Physiology*	*Indu Khurana*
	Manual of Practical Physiology	A K Jain
	Textbook of Practical Physiology	PAL G K
REFERENCE BOOKS	*BEST & TAYLOR'S Physiological* Basis of Medical Practice	O.P.Tandon & Y.Tripathi
	Human Physiology: The Mechanisms Of Body Function	VANDER, A.J.
	Review of Medical physiology	Ganong

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**BIOETHICS, BIOSAFETY, IPR & TECHNOLOGY TRANSFER**

Course objective	The students will gain structural knowledge on: 1. To list the routes of exposure for a pathogen to a human being . 2. To demonstrate and assess the proper use of PPE, best practices,biological containment, and be prepared to safely conduct research 3. To identify the role of the Biosafety Professional inBiomedical Research Laboratories 4. To appreciate the importance of assertion in interpersonal communication and beintroduced to some key assertion strategies 5. To understand the interpersonal nature of giving feedback, receiving criticism and resolving conflicts. 6. To establish attentive listening as an assertion strategy
Course outcomes	Students will learn to: 1. Effectively manage the health and safety aspects of a biological laboratory. 2. Give reliable, professional and informed advice and information to colleagues and managers. 3. Help to ensure that their institution complies with relevant legislation, liaise effectively with enforcing authorities and be aware of the penalties for failing to comply. 4. Build a context of understanding through communication. 5. Mediate between other conflicting parties. 6. Exhibit de-escalatory behaviors in situations of conflict. 7. Demonstrate acknowledgment and validation of the feelings, opinions, andcontributions of others.

Unit no.	Topics	Hours allotted 60hrs
1	**Ethics**: Benefits of Ethics, ELSI of Bioscience, recombinant therapeutic products for human health care, genetic modifications and food consumption, release of genetically engineered organisms, applications of human genetic rDNA research, human embryonic stem cell research.	**15 hrs**
2	**Patenting:** Patent and Trademark, Bioscience products and processes, Intellectual property rights, Plant breeders rights, trademarks, industrial designs, copyright biotechnology in developing countries. Biosafety and its implementation, Quality *control in* Biotechnology.	**15 hrs**
	Introduction to quality assurance, accreditation & SOP writing : Concept of ISO standards and certification , National regulatory body for accreditation, Quality parameters, GMP & GLP, Standard operating procedures, Application of QA in field of genetics, Data management of clinical and testing laboratory	**15 hrs**
3	**Funding of biotech business** (Financing alternatives, funding, funding for Bioscience/ Medical Health Sector in India, Exit strategy, licensing strategies, valuation), support mechanisms for entrepreneurship (Bio-entrepreneurship efforts in India, difficulties in India experienced, organizations supporting growth, areas of scope, funding agencies in India, policy initiatives), Role of knowledge centers and R&D (knowledge centers like universities and research institutions, role of technology and up gradation)	**15 hrs**

Reference Books:

1. www.pdfdrive.net
2. www.khanacademy.org
3. www.acadeicearths.org
4. www.edx.org
5. www.open2study.com
6. www.academicjournals.org

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**DISASTER MANAGEMENT AND MITIGATION RESOURCES**

Course objective	The course will uplift about: 1. Understand and appreciate the specific contributions of the Red Cross/Red Crescent movement to the practice and conceptual understanding of disaster management and humanitarian response and their significance in the current context. 2. Recognize issues, debates and challenges arising from the nexus between paradigm of development and disasters. 3. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. 4. Respond to disaster risk reduction initiatives and disasters in an effective, humane and sustainable manner.
Course outcomes	At the successful completion of course the student will gain: 1. knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences. 2. Knowledge and understanding of the International Strategy for Disaster Reduction (UN-ISDR) and to increase skills and abilities for implementing the Disaster Risk Reduction (DRR) Strategy. 3. Ensure skills and abilities to analyse potential effects of disasters and of the strategies and methods to deliver public health response to avert these effects.

Unit no.	Topics	Hours allotted 60hrs
1	**Introduction:** Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.	**08 hrs**
2	**Natural Disaster and Manmade disasters:**Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.	**15 hrs**
3	**Disaster Management, Policy and Administration:**Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flowchart showing the entire process.	**12 hrs**
4	**Financing Relief Measures:**Ways to raise finance for relief expenditure, role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events.	**13 hrs**
5	**Preventive and Mitigation Measures:**Pre-disaster, during disaster and post-disaster measures in some events in general structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans. Do's and don'ts in case of disasters and effective implementation of relief aids.	**12 hrs**

Reference Books:

1. ShailendraK.Singh : Safety & Risk Management, Mittal Publishers
2. J.H.Diwan : Safety, Security & Risk Management,APH
3. Stephen Ayers &Garmvik: Text Book of Critical Care, Holbook and Shoemaker
4. www.pdfdrive.net
5. www.khanacademy.org
6. www.acadeicearths.org
7. www.edx.org
8. www.open2study.com
9. www.academicjournals.org

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Name of the Course	**HUMAN RIGHTS**

Course objective	Students will comprehend on: 1. A branch of public international law, and relevant juridical mechanisms at global as well as regional levels, 2. Human rights as an object of study in history, philosophy and the social sciences, as well as a practical reality in national and international politics. 3. Different forms of promoting and implementing human rights, domestically as well as on the international level. 4. The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development. 5. Cholarly values such as transparency, impartiality, clarity, reliance and the importance of sound reasoning and empirical inference.
Course outcomes	Student will be able to virtue: 1. identify, contextualise and use information about the human rights situation in a given country 2. critically appraise source material, including cases from human rights committees and tribunals and reports and summary records from treaty bodies 3. analyse a country's situation or an international situation in terms of human rights and formulate human rights-based initiatives and policies 4. Promote human rights through legal as well as non-legal means. 5. Participate in legal, political and other debates involving human rights in a knowledgeable and constructive way

Unit no.	Topics	Hours allotted 60hrs
1	*Background*: Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights	**08 hrs**
2	*Human rights at various level* : Human Rights at Global Level UNO, Human Rights – UDHR 1948 – UN Conventions on Human Rights: International Covenant on civil and Political Rights 1966, International Convent on Economic, Social and Cultural Right, Racial Discrimination -1966 International, Instruments: U.N. Commission for Human Rights, European Convention on Human Rights.	**15 hrs**
3	*Human rights in India* : Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman	**12 hrs**
4	*Human Rights Violations*: Human Rights Violations against Women, Human Rights Violations against Children, 35 Human Rights Violations against Minorities SC/ST and Trans-genders, Preventive Measures.	**13 hrs**
5	*Political issues*: Political Economic and Health Issues, Poverty, Unemployment, Corruption and Human Rights, Terrorism and Human Rights, Environment and Human Rights, Health and Human Rights	**12 hrs**

Reference Books:

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
2. Ram Ahuja: Violence Against Women Rawat Publications JewaharNager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

Evaluation Pattern- MSc Medical Physiology (Admission Batch 2019 Onwards)

Evaluation Pattern for III rd and IV th Semester Exam (Core Subject)

Final Theory Marks will be 120 Marks (100 Marks University Theory Exam + 20 Marks Internal Assessment)

Theory Marks 100 (Time 3 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	11	10	10 X 10	100

Practical Exam Pattern- Marks 100

Exercise	Description	Marks
Q No 1	Practical exercise	2 x25=50 M
Q No 2	Station exercise	5x5M=25 M
Q No 3	VIVA	25 M
		Total = 100 M

Internal Examination (Mid-Semester Exam)

Theory Marks 50 (Time 1 1/2 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	6	5	5 X 10	50

Practical Marks 50

Exercise	Description	Marks
Q No 1	**Practical exercise – 1**	1 x25=25 M
Q No 2	**Station exercise**	5x2M=10 M
Q No 3	**VIVA**	15 M
		Total = 50 M

For Calculation of Internal Assessment

The Marks obtained in Internal Examination out of 50 will be converted to out of 20 for Theory and Practical Internal Assessment.

Evaluation Pattern for III rd and IV th Semester Exam
(Elective Subjects & PG Activity)

Elective Subjects

- III rd Semester students have a choice to select one Core Elective Subject out of the two as mentioned above; for which there will be Internal Evaluation exam for Theory and Practical.

- IV th Semester students have a choice to select one General Elective Subject out of the three mentioned above; for which there will be Internal Evaluation exam for Theory.

Evaluation Pattern for Elective Subject (Theory)- Time 3 Hrs

Section	Question	Marks Distribution	Marks Alloted per section	Marks
Section A	MCQ	10 X 1 M=10	10	10
Section B	SAQ LAQ	3/4 X 5 M= 15 2/3 X10 M= 20	15 20	35
Section C	SAQ LAQ	3/4 X 5 M= 15 2/3 X10 M= 20	15 20	35
				Total 80

Practical Exam Pattern

Excercise	Discription	Marks
Q 1	**Practical Excercise**	1 X 20 = 20 M
Q 2	**Station Excercise**	2 X 5 = 10 M
Q 3	**Viva**	10 M
	Journal	10 M
		Total = 50 M

~~**Annexure – L 2**~~

ACADEMIC SYLLABUS FOR SEMESTER-V

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Course Code	
Name of the Course	**Physiology**

Course Objective (Teaching Objectives)	To teach basic physiological concepts related to Excretory system, Endocrine system, Reproductive system&Exercise Physiology
Course Outcomes (learningObjectives)	• To understand the basic physiological concepts of Excretory system • To understand the basic physiological concepts of Endocrine system, • To understand the basic physiological concepts of Reproductive system • To understand the basic physiological concepts of Exercise Physiology

Unit no.	**Theory Topics**	**Hours allotted No. of-45hrs**
1	**Excretory system** 1. The body fluids compartments: extracellular and intracellular fluids; interstitial fluid and edema 2. Urine formation by the kidneys: I. Glomerular filtration, renal blood flow, and their control 3. Urine formation by the kidneys: II. Tubular reabsorption and secretion 4. Urine concentration and dilution; regulation of extracellular fluid osmolarity and sodium concentration 5. Renal regulation of potassium, calcium, phosphate, and magnesium; integration of renal mechanisms for control of blood volume and extracellular fluid volume 6. Acid-base regulation 7. Diuretics and kidney diseases 8. Urinary bladder and micturition 9. Comparative and applied Physiology 10. Recent advances	**12Hours**
2.	**Endocrine system** 1. Introduction to endocrinology 2. Mechanism of action of hormones 3. Pituitary hormones and their control by the hypothalamus 4. Thyroid metabolic hormones 5. Adrenal hormones 6. Insulin, glucagon, and diabetes mellitus 7. Parathyroid hormone, calcitonin, calcium and phosphate metabolism, vitamin D, bone, and teeth 8. Endocrine functions of kidney, heart, pineal gland and local hormones 9. Comparative and applied Physiology 10. Recent advances	**16Hrs**

3	**Reproductive system** 1. Sexual growth & development 2. Male Reproductive Physiology 3. Female Reproductive Physiology 4. Physiology of coitus, pregnancy and Parturition 5. Physiology of lactation 6. Physiology of contraception 7. Comparative and applied Physiology 8. Recent advances	**10 Hrs**
4	**. Exercise Physiology** 1. Introduction: Exercise, Physical fitness, wellness 2. Types of exercise, Exercises grading, Exercise testing 3. Body response to exercise 4. Training adaptation 5. Sport Physiology	**7Hrs**
	Total	**45 Hours**

Unit no.	**Tutorial Topics**	**Hours allotted No. of 15-hrs**
1.	GFR	1
2.	Urine concentration & dilution	1
3.	Role of kidney in Acid Base balance	1
4.	Micturition	1
5.	Growth Hormone	1
6.	ADH & Oxytocin	1
7.	Thyroid Hormone	1
8.	Endocrine Pancreas & Diabetes	1
9.	Glucocorticoids & Aldosterone	1
10.	Calcium Homeostasis	1
11.	Testosterone, spermatogenesis	1
12.	Female sexual Cycle	1
13.	Physiology of Pregnancy & Contraception	1
14.	Male & female infertility – causes & treatment	1
15.	Body response to mild , moderate & severe type of exercises & Body adaptations to long term exercises	1

	Practical Topics	Hours allotted No. of 30hrs
	Endocrine 1. Case History 2. Problem Solving Exercise **Endocrine photographs** 1. Gigantism 2. Dwarfism 3. Acromegaly 4. Grave's disease 5. Myxedema 6. Cretinism 7. Cushing syndrome 8. Carpopedal spasm **RIA** **PCR**	**14 Hours**
	Renal **1. Calculation:-** i. Effective filtration pressure (EFP) ii. Clearance creatinine, urea, inulin, PAH **2. Cystometrogram** **3.** Problem solving exercises in renal system	**8 Hours**
	Pregnancy Test Problem solving exercises in reproductive system	**4 Hours**
	Cardiac Efficiency Test	**4 Hours**
	Total	**30 hrs**

List of the Books recommended
MSc- Medical Physiology

		NAME OF THE BOOKS	AUTHOR/EDITOR
Semester V& VI	**Theory Books**	Textbook of Medical Physiology	**Guyton & Hall**
		Textbook of Physiology, Vols-1&2	**A K Jain**
		Textbook of Medical *Physiology*	***InduKhurana***
	REFERENCE BOOKS	*BEST* & *TAYLOR'S Physiological* Basis of Medical Practice	**O.P.Tandon & Y.Tripathi**
		Review of Medical physiology	**Ganong**
	Practical Books	Manual of Practical Physiology	**A K Jain**
		Textbook of Practical Physiology	**PAL G K**

EVALUATION PATTERN MSC MEDICAL COURSES
(From Batch 2019-20 Onwards)

A. Evaluation Pattern For Vth SEMESTER EXAM

1. **Theory: Final Theory Marks will be 120 Marks (100 Marks University Theory Exam + 20 Marks Internal Assessment)**

   Theory Marks 100 (Time 3 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	11	10	10 X 10	100

2. **Practicals: Final Practical Marks will be 120 Marks (100 Marks University Practical Exam+ 20 Marks Internal Assessment)**

   Practical Exam - Marks 100

Exercise	Description	Marks
Q No 1	Exercise 1(Table Exercise/ Stations)	50
Q No 2	Exercise 2 (Table Exercise/ Spots)	25
Q No 3	VIVA	25
		Total = 100 M

B. Evaluation Pattern for V th Semester INTERNAL EXAMINATION

1. **Theory: Theory Marks 50 (Time 1 1/2 Hours)**

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	6	5	5 X 10	50

2. **Practical: Practical Marks 50**

Exercise	Description	Marks
Q No 1	**Exercise -1(Table Exercise/ Statios)**	25
Q No 2	**Exercise-2 (Table Exercise/ Spots)**	15
Q No 3	**VIVA**	10 M
		Total = 50 M

C. For Calculation of Internal Assessment

The Marks obtained in Internal Examination out of 50 will be converted to out of 20 for Theory and Practical Internal Assessment.

	Internal Exam Marks	Internal Assessment Marks
Theory	**50**	**20**
Practical	**50**	**20**

D. Assessment of PG Activities

- The record of Clinical Postings, Dissertation/ Project/ Seminars will be maintained in Logbook. Each of the activity will be evaluated as per the evaluation format given in the Logbook and will be signed by the Departmental Co-ordinator before Semester end Examination.

Allotment of Marks for PG Activities

PG Activity	Marks Alloted
Clinical & Sectional Postings	20
Seminars/ Journal Clubs	20
Dissertation/ Project Work	20

Note: The Marks obtained in the Internal Assessment and PG Activities to be sent to MGMIHS before the Semester End Examination as per the date announced by the university.

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ACADEMIC SYLLABUS FOR SEMESTER-VI

Name of the Programme	**M. SC MEDICAL PHYSIOLOGY**
Course Code	
Name of the Course	**Physiology**

Course Objective (Teaching Objectives)	To teach basic physiological concepts related to:The nervous system: A. General principles and sensory physiology To teach basic physiological concepts related to:The nervous system: B. Motor and integrative neurophysiology To teach basic physiological concepts related toHigher structure and function To teach basic physiological concepts related toSpecial senses
Course Outcomes (learning Objectives)	To understand the basic physiological concepts of The nervous system: A. General principles and sensory physiology To understand the basic physiological concepts of The nervous system: B. Motor and integrative neurophysiology To understand the basic physiological concepts of Higher structure and function To understand the basic physiological concepts of Special senses

Unit no.	**Theory Topics**	**Hours allotted No. of-45hrs**
I	**A. General principles and sensory physiology** 1. Organization of the nervous system, basic functions of synapses 2. Sensory receptors, neuronal circuits for processing information 3. Somatic sensations: I. General organization, the tactile and position senses and ascending tracts 4. Somatic sensations: II. Pain, headache, and thermal sensations 5. Comparative and applied Physiology 6. Recent advances **B. Motor and integrative neurophysiology** 1. Motor functions of the spinal cord; the cord reflexes 2. Cortical and brain stem control of motor function, descending tracts 3. Contributions of the cerebellum and basal ganglia to overall motor control 4. Muscle tone and posture 5. Vestibular apparatus and equilibrium 6. Comparative and applied Physiology 7. Recent advances **Higher structure and function** 1. Cerebral cortex, intellectual functions of the brain, learning and memory 2. Behavioral and motivational mechanisms of the brain - the limbic system and the hypothalamus 3. States of brain activity - sleep, brain waves, epilepsy, psychoses 4. The autonomic nervous system and the adrenal medulla 5. Cerebral blood flow, cerebrospinal fluid, and brain metabolism 6. Comparative and applied Physiology 7. Recent advances	**30 Hours**

II	**The special senses** 1. The eye: I. Optics of vision 2. The eye: II. Receptor and neural function of the retina 3. The eye: III. Central neurophysiology of vision 4. The sense of hearing 5. The chemical senses - taste and smell 6. Comparative and applied Physiology 7. Recent advances	**15 Hrs**
	Total	**45 Hours**

Unit no.	**Tutorial Topics**	**Hours allotted No. of 15-hrs**
1.	Neurotransmitters	**15 Hrs**
2.	synapse	
3.	Receptors	
4.	Ascending & Descending Tracts	
5.	ANS	
6.	Pain	
7.	Muscle tone	
8.	Lesions of spinal cord	
9.	Posture & equilibrium	
10.	Sleep	
11.	Hypothalamus &Limbic system	
12.	Accomodation in eye & errors of refraction	
13.	Photochemistry of vision	
14.	Visual Pathway&Neurophysiology of vision	
15.	Mechanism of Hearing	

	Practical Topics	Hours allotted No. of 30hrs
	Clinical: CNS examination **1**. Higher function 2. Sensory system 3. Motor system 4. Cranial nerves	**20 Hou**
	Clinical: Special senses examination 1. Vision – Visual acuity 2. Color vision visual reflex 3. Hearing: Tests of hearing & deafness. 4. Tests for taste, olfaction 5. Demo – opthalmoscopy Retinoscopy . – Audiometry	**10 Hours**
	Total	**30 hrs**

List of the Books recommended
MSc- Medical Physiology

		NAME OF THE BOOKS	AUTHOR/EDITOR
Semester V& VI	**Theory Books**	Textbook of Medical Physiology	**Guyton & Hall**
		Textbook of Physiology, Vols-1&2	**A K Jain**
		Textbook of Medical *Physiology*	***InduKhurana***
	REFERENCE BOOKS	*BEST & TAYLOR'S Physiological* Basis of Medical Practice	**O.P.Tandon & Y.Tripathi**
		Review of Medical physiology	**Ganong**
	Practical Books	Manual of Practical Physiology	**A K Jain**
		Textbook of Practical Physiology	**PAL G K**

EVALUATION PATTERN MSC MEDICAL COURSES
(From Batch 2019-20 Onwards)

A. EVALUATION PATTERN FOR VIth SEMESTER EXAM

1. THEORY: Final Theory Marks will be 120 Marks (100 Marks University Theory Exam + 20 Marks Internal Assessment)

Theory- Marks 100 (Time 3 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	11	10	10 X 10	100

2 PRACTICAL EXAMINATION

a. Practical Marks will be 70 Marks (50 Marks University Practical + 20 Marks Internal Assessment)

Exercise	Description	Marks
Q No 1	Exercise 1	25
Q No 2	Exercise 2	15
Q No 3	VIVA	10
		Total = 50 M

b.THESIS Evaluation – Marks 70

	Subject Knowledge	Objectives, Concept and Methodology	Result, Discussion and Outcome	External Examiner Viva	Internal Examiner Viva	Total Marks
Marks Alloted	**10**	**10**	**10**	**20**	**20**	**70**

B. Internal Examination (Mid-Semester Exam)

Theory Marks 50 (Time 1 1/2 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	6	5	5 X 10	50

Practical Marks 50

Exercise	Description	Marks
Q No 1	Excercise1(Table exercise/spots)	15
Q No 2	Exercise 2 (Thesis Defence/stations)	25
Q No 3	VIVA	10
		Total = 50 M

C. For Calculation of Internal Assessment

The Marks obtained in Internal Examination out of 50 will be converted to out of 20 for Theory and Practical Internal Assessment.

	Internal Exam Marks	**Internal Assessment Marks**
Theory	**50**	**20**
Practical	**50**	**20**

D. Evaluation of PG Activities

- The record of Clinical Postings, Dissertation/ Project/ Seminars will be maintained in Logbook. Each of the activity will be evaluated as per the evaluation format given in the Logbook and will be signed by the Departmental Co-ordinator before Semester end Examination.

Allotment of Marks for PG Activities

PG Activity	Marks Alloted
Clinical & Sectional Postings	20
Seminars/ Journal Clubs	20

The Marks obtained in the Internal Assessment and PG Activities to be sent to MGMIHS before the Semester End Examination as per the date announced by the university.

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PG Activities

- The record of Clinical Postings, Dissertation/ Project/ Seminars will be maintained in Logbook. Each of the activity will be evaluated as per the evaluation format given in the Logbook and will be signed by the Departmental Co-ordinator before Semester end Examination.

Allotment of Marks for PG Activities

PG Activity	Marks Alloted
Clinical & Sectional Postings	20
Seminars/ Journal Clubs	20
Dissertation/ Project Work	20

The Marks obtained in the Internal Assessment, Elective Subjects and PG Activities to be sent to MGMIHS before the Semester End Examination as per the date announced by the university.

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

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