



UNIVERSITY OF JAMMU

(NAAC ACCREDITED A++ GRADE UNIVERSITY)

Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Email: academicsectionju14@gmail.com

NOTIFICATION

(20/july/Adp/35)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, has been pleased to authorize the adoption of the Guidelines and Revised Syllabus of the following **M.D./M.S Courses** as per National Medical Commission for the Examinations to be held in the years 2025, 2026, 2027 and onwards:

1. **Anatomy**
2. **Pharmacology**

The Syllabi of the course is available on the University Website:
www.jammuuniversity.ac.in

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DEAN ACADEMIC AFFAIRS

No. F.Acd/III/26/4117-26
Dated: 27/07/2026

Copy for information & necessary action to:-

1. Principal & Dean, Faculty of Medical Science.
2. Sr. P.A to the Controller of Examinations.
3. Head, Department of Anatomy Govt. Medical College, Jammu.
4. Head, Department of Pharmacology Govt. Medical College, Jammu.
5. Principal, ASCOMS, Sidhra, Jammu.
6. C.A to C.E
7. Deputy/Assistant Registrar (Exams. Prof./Confidential/Evaluation Prof.).
8. Incharge, University Website.


Assistant Registrar (Academics)

ANATOMY — M D

OBJECTIVES

At the end of the three years post-graduate training programme in Anatomy the student should be able to:

1. Acquire in depth knowledge of structure of human body from the gross to the molecular level, and correlate it with the functions.
2. Comprehend the principles underlying the structural organization of body and provide anatomical explanations for disturbed functions.
3. Acquire knowledge of basic principles of normal growth and differentiation. Understand critical periods of human growth and development as well as ontogeny of all the organ systems of body. Analyze the congenital malformations, know the etiological factors including genetic mechanisms involved in abnormal development and their effects on functions.
4. Have comprehensive knowledge of the basic structure and correlated function of the nervous system in order to understand altered state in the various disease processes.
5. Plan and implement teaching programmes for under-graduate medical students. Be familiar with and be able to use different teaching methods and modern learning resources for under-graduate teaching. Plan and conduct evaluation of under-graduate teaching.
6. Develop/acquire an attitude of scientific enquiry and learn contemporary research techniques. Be familiar with recent scientific advances, identify lacunae in the existing knowledge in a given area and be able to plan investigative procedures for research, analyze data critically and derive logical conclusions.

LEARNING ACTIVITIES, TRAINING AND EVALUATION

During the course students have formal teaching and are trained for teaching and research.

I Didactic Teaching

Topics in gross anatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics, along with related practical sessions.

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Dr. R. S. K.
Dr. R. S. K.
Dr. R. S. K.
Dr. R. S. K.

II Training

- Communications skills – Journal club, seminars
- Hands on experience – Techniques in Micro, Neuro, Gross Anatomy, Embryology, Histochemistry, Genetics, Electron and Confocal microscopy.
- Teaching experience – taking UG classes : Demonstrations and practicals for two semesters (one academic year).
- Educational technology – preparation of AV aids for teaching, posters/manuscripts for presentation in conferences/workshops and publication in journals. Setting objective questions – SAQs, MCQs and OSPE. Prepare teaching modules & museum specimens, casts. Participation in organization of symposia/ workshops.

III Research

- Thesis – progress monitoring every semester.
- Presenting paper/poster at conferences/preparing manuscripts for documentation.
- Thesis work presentation.
- Thesis submission at the end of 2 & 1/2 yrs.

IV Evaluation of Training

- Written/ practical assessment every semester. Feedback on teaching/training programmes.

M D ANATOMY EXAMINATIONS

- Final examination at the end of the course has theory, practical and viva-voce.
- The details of syllabus of Theory and Practical examinations are attached along with.

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Dr. J. K.

Dr. S. K.

Dr. J. K.

Dr. S. K.

Course: - MD/MS

Title: - Anatomy

Course no: - Paper I- MSAN000001

Paper II- MSAN000002

Paper III- MSAN000003

Paper IV- MSAN000004

Duration: - 03 Hours.

Maximum Marks: - 100

Theory: - (Paper-I - 100 Marks)

(Paper-II - 100 Marks)

(Paper-III - 100 Marks)

(Paper IV- 100 Marks)

SYLLABUS FOR MD ANATOMY

A. General Anatomy

- Tissues of the body.
- Bones in General.
- Arthrology
- Muscle & Fascia
- History of anatomy.
- Embalming- including medico- legal aspects & knowledge of anatomy act.

Gross Anatomy

- Detailed gross anatomy of the human body, including cross sectional anatomy. Anatomical basis of clinical conditions.

Radiological Anatomy

- Principles involved in plain radiography, Special investigative procedures and newer imaging techniques such as ultrasound, CT- scans, MRI, PET etc.

EMBRYOLOGY

- General Embryology
- Embryology of all systems of the body including variations and congenital anomalies.

Genetics

- Structure of chromosomes.
- Structure of gene.
- Karyotype
- Chromosomal aberrations.
- Inheritance

- Basic Molecular genetics
- Common Genetic disorders.

Histology

- Histological and Museum Techniques.
- Microscopes- All types
- Care and maintenance of light microscope.
- General histology.
- Histology of all the systems of the body including their electronmicroscopic appearance.

Neuro-anatomy

- Structural organization of various parts of the nervous system with particular reference to their connections and functions.
- Localisation and effects of lesions in different parts of the central nervous system and nerve injuries.
- Neuroanatomical techniques for demonstration of nissl substance, processes, myelin sheath.

Applied Anatomy including Radio Logical Anatomy and Recent Advances.

- Applied aspects of Human anatomy surgical approaches to various structures and organs.
- Principles of newer imaging techniques.
- Determination of age, stature and race from skeletal remains.
- Application of anatomical knowledge to fertility control.
- Sectional anatomy.
- Principles and Interpretation of CT scan, Sono graphy and MRI.
- Surface anatomy
- Principles of physical anthropology.

B. PRACTICAL:-

- Dissections of head and neck, central nervous system, thorax, abdomen, pelvis, upper & lower extremities.
- Osteology of all regions.
- Histology both general and systemic of all organs/systems, histological techniques and museum techniques.

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- Embryology both general and systemic of all organs/systems including genetics.
- Surgical, applied and living anatomy of whole body, topographical anatomy.
- Radiological anatomy, X-rays, ultrasounds, CT scan, MRI.

C. VIVA (Oral Examination):-

- Covering both theory and practical course of studies as defined under A and B.

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Course: - MD/MS
Title: - Anatomy
Course no: - Paper I- MSAN000001
Paper II- MSAN000002
Paper III- MSAN000003
Paper IV- MSAN000004
Duration: - 03 Hours.

Maximum Marks: - 100
Theory: - (Paper-I - 100 Marks)
(Paper-II - 100 Marks)
(Paper-III - 100 Marks)
(Paper IV- 100 Marks)

Four papers shall cover the syllabus as under:-

Paper-I (EXTERNAL EXAMINER-I)

- General Anatomy.
- General Histology.
- General Embryology.
- Evolution & Comparative Anatomy.
- Histological & Museum techniques.
- Embalming techniques including medico-legal aspects & knowledge of anatomy act.

Paper-II (EXTERNAL EXAMINER-II)

- Gross Anatomy
- Systemic embryology
- Systemic Histology.

Paper-III (INTERNAL EXAMINER-I)

- Neuro anatomy & its applied anatomy.

Paper-IV (INTERNAL EXAMINER-II)

- Human Genetics.
- Clinical & applied anatomy.
- Recent advances in anatomy.

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Course: - MD/MS

Title: - Anatomy

Course no: - Paper I- MSAN000001

Paper II- MSAN000002

Paper III- MSAN000003

Paper IV- MSAN000004

Duration: - 03 Hours.

Maximum Marks: - 100

Theory: - (Paper-I - 100 Marks)

(Paper-II - 100 Marks)

(Paper-III- 100 Marks)

(Paper IV- 100 Marks)

Instructions for Paper Setters: - Paper-I, Paper-II, Paper-III, Paper- IV.

- 1) Paper - I & II to be set by external examiner and Paper- III & IV by Internal examiner and each will carry 100 marks. (Copy of Syllabus enclosed).
- 2) All Questions are compulsory.
- 3) Attempt Questions in serial order.
- 4) Illustrate your answers with well labelled diagrams wherever necessary.
- 5) MCQ's should not be more than 20% of entire Paper.

Format of theory paper:-

	Type of Question/Number of Questions	Marks per Question
Q.no-1	Scenario based MCQ/10-20	1-2
Q.no-2	Long Answer question/02	20
Q.no-4	Short Answer Questions/ 4-5	10

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Course: - MD/MS

Title: - Anatomy

Course no: - Paper I- MSAN000001

Paper II- MSAN000002

Paper III- MSAN000003

Paper IV- MSAN000004

Duration: - 03 Hours.

Maximum Marks: - 100

Theory: - (Paper-I - 100 Marks)

(Paper-II - 100 Marks)

(Paper-III- 100 Marks)

(Paper IV- 100 Marks)

FORMAT FOR PRACTICAL

Practical + Oral -400 MARKS

Total- 800 Marks

Oral/Viva- (100 Marks)

- Hard Part
- Soft Part including Neuro- Anatomy, Embryology & Models.

Practical-

Histology- (120 Marks)

- Slides identifications & Viva on slides- 100 marks
- Section Cutting, Staining & Viva- 20 Marks

Dissection- 100 Marks

Surface Marking- 20 Marks

Radiology- 20 Marks

Micro- Teaching- 20 Marks

Thesis- 20 Marks

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Course: - MD/MS

Title: - Anatomy

Course no: - Paper I- MSAN000001

Paper II- MSAN000002

Paper III- MSAN000003

Paper IV- MSAN000004

Duration: - 03 Hours.

Maximum Marks: - 100

Theory: - (Paper-I - 100 Marks)

(Paper-II - 100 Marks)

(Paper-III- 100 Marks)

(Paper IV- 100 Marks)

CRITERIA FOR EVALUATION OF MS COURSES.

S.no	Description	MS/MD Courses
1	Theory	
	Number of theory Paper	04
	Marks for each theory paper	100
	Total marks for theory paper	400
	Passing minimum for theory	200/400
2	PRACTICAL/CLINICAL	300
3	VIVA VOCE	100
	Passing minimum for Practical/Clinical including Viva voce.	200/400
The candidate shall secure not less than 50% marks in each of passing which shall include:-		
• Theory-aggregate 50% (In addition, in each theory paper a candidate has to secure minimum of 40%) • Practical/Clinical and Viva voce-aggregate-50% • If any candidate fails even under one head, he/she has to re-appear for both theory and Practical/Clinical and Viva voce examination. • 5% of mark of total marks of Clinical/Practical and Viva Voce (20 Marks) will be of Dissertation/Thesis and it will be part of clinical/practical examination marks. External examiner outside the state will evaluate dissertation/thesis and take viva voce on it and marks will be given on quality of dissertation/thesis and performance on its viva voce. • No grace mark is permitted in Postgraduate examination either for theory or for Practical.		

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Practical/Clinical and Oral/viva voce examination Practical examination

practical examination should be spread over two days and include various major components of the syllabus focusing mainly on the psychomotor domain.

First Day Practical: To submit the duly signed gross anatomy file, histology file & the log book and thesis

- a) Gross Anatomy Dissection and related viva voce, Major and minor dissections to be included.
- b) Histology Spotting (10 spots) and viva voce Techniques of tissue processing, paraffin block making, section cutting and staining (H and E stain) with related viva.

Second Day Practical:

- a) Microteaching of a short topic to assess teaching skills
- b) A short synopsis of the thesis work should be presented by the post graduate student
- c) Grand viva including Gross anatomy, cross sectional anatomy, radiological Anatomy, Surface Anatomy, Embryology.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

Practical Examination to be organized as per details given below:

- Dissection on cadaver
- Histology spotting
- Histological techniques
- Surface Marking
- Radiology
- Teaching ability
- Thesis presentation

Oral / Viva-voce Examination

Grand viva

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

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Recommended reading:

Books (latest edition)

Gross Anatomy:

- Susan Strandring: Gray's Anatomy: The anatomical basis of clinical practice, Churchill Livingstone Elsevier.
- Keith and Moore Clinically Oriented Anatomy. Lippincot Williams and Wilkins.
- R.J. Last. Anatomy Regional and Applied. Churchill Livingston.
- Frank H. Netter. Atlas of Human Anatomy. Saunders Elsevier.
- ML Ajmani. Embalming: Principles and Legal Aspects. Jaypee Brothers.

Histology

- Young B. and Heath J. Wheater's Functional Histology. Churchill Livingstone.
- M.H. E Ross. Histology: A textbook and atlas. Williams and Wilkins.
- Harold A Davenport. Histological and Histochemical Techniques. W.B Saunders Company.

Genetics

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

Embryology

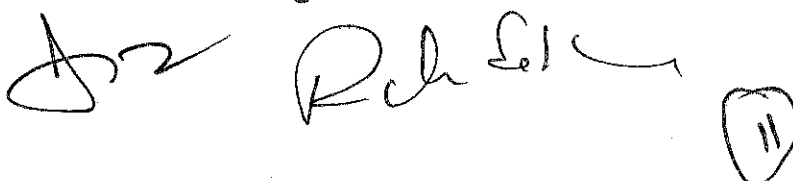
- TW Sadler. Langman's Medical Embryology. Lippincotts, Williams and Wilkins
- Keith L Moore and T.V.N. Persaud. The Developing Human. Saunders.

Neuroanatomy

- Richard S. Snell. Clinical Neuroanatomy for Medical Students. Williams and Wilkins.

Statistics

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



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Radiology

- J.B. Walter et.al. Basic Atlas of Sectional Anatomy with correlated imaging. Saunders Elsevier.

Surface anatomy

- SP John, Lumley editors. Surface Anatomy, The Anatomical basis of clinical examination. London: Churchill Livingstone.

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

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DEPARTMENT OF PHARMACOLOGY, & THERAPEUTICS
(Postgraduate & Undergraduate)
GOVT. MEDICAL COLLEGE, JAMMU

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23; 23-24; 24-2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Title – MD PHARMACOLOGY

TOTAL MARKS -800

Paper I: General Pharmacology –	100 MARKS
Paper II: Systemic Pharmacology –	100 MARKS
Paper III: Clinical Pharmacology –	100 MARKS
Paper IV: Recent Advances in Pharmacology –	100 MARKS
Practical/clinical and Oral/viva voce examination -	400 MARKS

DURATION – 3HRS

BASED ON NATIONAL MEDICAL COMMISSION COMPETENCY BASED POSTGRADUATE TRAINING PROGRAM
Vide No: D 11011/1/22/AC/Guidelines/PG 08 Date: 01-08-2022 .

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

The job prospects for a medical pharmacologist are in academics, pharmaceutical industry/clinical research organization, government research institutions, in regulatory bodies and as scientific writer or science manager. Accordingly, a post graduate (MD) student in Pharmacology should be competent to meet the job requirements at all these places. The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This has necessitated retention of "domains of learning" under the heading "competencies".

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

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

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

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 and to eventually be able to guide postgraduates in their thesis work.

SUBJECT SPECIFIC COMPETENCIES

4 Acquisition of Skills The student should be able to develop and apply skills in pharmacology-based services (e.g. rational prescribing), in self-directed learning for evolving educational needs and scientific information, in conduct of research and in managerial assignments in the department/institution.

5. Professionalism, Ethics and Communication skills The student should be able to learn and apply principles of professionalism, ethics and effective communication in conduct of research, pharmacology-based services, educational activities and day to day work.

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COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Syllabus for course of study for MD Pharmacology

The course contents should cover the following broad topics:

- History of Pharmacology and medicine
- Basic and molecular pharmacology
- Drug receptors and Pharmacodynamics
- Pharmacokinetics (Absorption, Distribution, Biotransformation, Excretion & kinetic parameters)
- Therapeutic Drug Monitoring
- Drugs acting on synaptic and neuroeffector junctional sites
- Autonomic pharmacology
- Drugs acting on central nervous system
- Drugs modifying renal functions
- Drugs acting on cardiovascular system and hemostatic mechanisms
- Reproductive Pharmacology
- Agents affecting calcium homeostasis
- Autacoids and related pharmacological agents (analgesics) and drugs used in Rheumatoid arthritis and Gout
- Drugs acting on Gastrointestinal system
- Pharmacology of drugs affecting the respiratory system
- Chemotherapy- General principles and various antimicrobials
- Chemotherapy of neoplastic disease
- Drugs used in Autoimmune disorder and Graft versus Host Disease
- Dermatological pharmacology
- Ocular pharmacology
- Use of drugs in special population
- Immunomodulators - immunosuppressants and immunostimulants
- Pharmacology of drugs used in endocrine disorders
- Drug delivery systems
- Heavy metal poisoning
- Non-metallic toxicants - air pollutants, pesticides etc.
- Research methodology and biostatistics
- Pharmacogenomics, pharmacovigilance, pharmacoeconomics and pharmacoepidemiology
- Over the counter drugs, essential medicines, P-drug, commonly used Over-The-Counter (OTC) drugs, generic drugs, drugs banned in India
- Principles of rational use of drugs and rational prescribing
- Dietary supplements and herbal medicines
- Pathophysiological basis and management of common poisonings
- National programmes for infectious and vector borne diseases including the regimes.
- Professionalism & ethics
- Clinical pharmacology
- Functioning of the Drugs and Therapeutics Committee.
- Hospital formulary development.
- Drug information services.
- Medication error detection and mitigation advice.

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

- Antimicrobial resistance and antibiotic stewardship.
- Prescription auditing
- Drug counseling - explain to patients, the effects and adverse effects of drugs, including the need for medication adherence
- Emergency drugs used in crash cart/ resuscitation
- Drug development research and Regulations
- Principles of Good Clinical Practice (GCP) and Good Laboratory Practice (GLP) guidelines, and Good publication practices
- Recent regulatory guidelines for drugs/research and clinical trials
- Drug development and research and ethical issues involved in it
- Research protocol development, research study conduct, experimental observations, analysis of data using currently available statistical software
- Emergency use authorization for drugs eg., vaccine development
- Pharmacometrics - methods of drug evaluation.
- General screening and evaluation of:
 - analgesics, antipyretics, anticonvulsants, anti-inflammatory drugs, antidepressants, antianxiety and antipsychotics, sedatives, muscle relaxants, antihypertensives, hypocholesterolemic agents, anti-arrhythmic drugs, diuretics, adrenergic blocking drugs, local anaesthetics, antifertility agents, antidiabetics, drugs used in peptic ulcer diseases and drugs affecting learning and memory in animals and man.

Bioassay methods

- Animal experiments: Ethical considerations, ethical approval, applicable Regulatory Guidelines, humane animal research (principles of 3Rs) and alternatives to animal experimentation. General and statistical considerations
- Anesthetics used in laboratory animals
- Principles of EC₅₀, ED₅₀, pD₂ and pA₂ values of drugs
- Describe methods of bioassay for estimation of:
 - Acetylcholine, skeletal neuromuscular junction blockers, adrenaline, noradrenaline, histamine, 5 HT, hormones, insulin, vasopressin/oxytocin, estrogen, progestins, ACTH
- Competitive antagonism - pA₂ values
- Immunoassays: Concept, types of bioassays and their application/s
- Animal experiments: Ethical consideration, Ethics Committee and ethical approval
- Regulatory Guidelines and alternatives to animal experimentation.

Biochemical Pharmacology

- Basic principles and applications of simple analytical methods
- Principles of quantitative estimation of drugs, endogenous compounds and poisons using Colorimetry, Spectrophotometry, flame photometry, High
- Performance Liquid Chromatography (HPLC) and enzyme-linked immunosorbent assay (ELISA).
- Education
 - Salient features of Undergraduate Medical Education Curriculum in India.
 - Postgraduate Medical Education Curriculum and Guidelines in India.
 - Principles of teaching - learning methods and technology
 - Principles of assessment of learners.

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COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

SUBJECT SPECIFIC COMPETENCIES

The competencies will have a judicious mix of all domains of learning and usually are predominant in one domain. The postgraduate student during the training program should acquire the following competencies to achieve the defined five goals:

A. Predominant in Cognitive domain

The MD Pharmacology student after training in the course should be able to:

General Pharmacology:

- 1) Demonstrate an understanding of the basic principles of Pharmacology including molecular pharmacology.
- 2) Demonstrate an awareness of the historical journey and contributions of scientists in the drug development process.
- 3) Describe the process of new drug development including preclinical and clinical phases.
- 4) Describe principles of pharmacokinetics of drugs and apply these to prescribe medicines for individualization of pharmacological therapy, including use of medicines in special categories (Pediatrics, Geriatrics, Pregnancy and Pathological states).
- 5) Explain the principles of pharmacodynamics and apply these in different therapeutic situations.
- 6) Describe mechanisms of drug-drug interactions and their clinical importance.
- 7) Describe the principles of pharmacogenomics and its clinical significance.
- 8) Describe pharmacological principles underlying the effects of drugs used in diagnosis, prevention and treatment of common systemic diseases in man.
- 9) Demonstrate an understanding of the factors that modify drug action.
- 10) Define Therapeutic Drug Monitoring (TDM), describe the methods of TDM and importance in therapeutic decision making.
- 11) Describe the principles and importance of Pharmacoeconomics in healthcare delivery. Describe the methods in pharmacoeconomic studies and the economic considerations in the use of medicines in individuals and in the community.
- 12) Describe the principles, methods and importance of pharmacoepidemiology, including drug utilization studies.
- 13) Define pharmacovigilance. Describe the importance of pharmacovigilance in ensuring patient safety and the various methods/procedures in pharmacovigilance.
- 14) Describe the role of Essential Medicines in rational therapeutics. Describe principles for selecting Essential Medicines for a defined healthcare delivery system.
- 15) Demonstrate an understanding of principles of rational prescribing.
- 16) Demonstrate an understanding of prescription analysis and be able to conduct prescription analysis in a healthcare facility.
- 17) Demonstrate an understanding of antimicrobial resistance, antibiogram, antimicrobial stewardship program and strategies for containment of antimicrobial resistance.

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Systemic Pharmacology:

1. Apply and integrate knowledge of pathophysiology of diseases and pharmacological principles underlying the effects of drugs, for the purpose of diagnosis, prevention and treatment of common systemic diseases in man including disorders of:

- Synaptic & neuroeffector junctional sites of the autonomic nervous system
- Neuromuscular junction
- Central nervous system
- Cardiovascular system
- Endocrine system
- Gastrointestinal system
- Respiratory system
- Renovascular system
- Hematological system
- Immunological system
- Autacoids

(Note: The above is only an indicative list).

- Describe the mechanism of action, pharmacological effects and therapeutic status of drugs used for prevention and management of microbial and parasitic infections/infestations and neoplastic disorders.
- Describe the pathophysiological basis and management of common poisonings.
- Demonstrate an awareness about the recent advances in pharmacology and therapeutics.
- Demonstrate an understanding of the special considerations in pharmacokinetics, mechanism of action, pharmacological effects and therapeutic status of drugs used for dermatological and ocular disorders.

Research:

- Demonstrate an understanding of the importance and ethical considerations of biomedical research in animals and man.
- Describe the principles and methods of biomedical research in animals and man.
- Describe the current principles of Good Clinical Practice (GCP) and Good Laboratory Practice (GLP) guidelines, as applicable.
- Demonstrate an understanding of the different tools and methods for literature search.
- Describe and apply the principles of biostatistics in the evaluation and interpretation of efficacy and safety studies of drugs in man. Apply and interpret the various statistical tools in biomedical research.
- Demonstrate an understanding of the principles of Good Publication practices as applicable to publication of research studies.
- Describe different methods of drug assays - biological, chemical, immune-assay including knowledge of analytical techniques like HPLC, TLC etc. and their applications in therapeutics.
- Describe the methods for screening/evaluation of analgesics, antipyretics, anticonvulsants, anti-inflammatory drugs, antidepressants, antianxiety and antipsychotics, sedatives, muscle relaxants, antihypertensives, hypocholesterolemic agents, antiarrhythmic drugs, diuretics, adrenergic blocking drugs, drugs affecting learning and memory in animals and man. (Note: This is only an indicative list).
- Describe the regulatory and ethical issues involved in drug development

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Teaching and Assessment:

1. Demonstrate awareness about the salient features of Undergraduate Medical Education Curriculum in India.
2. Demonstrate awareness about Postgraduate Medical Education Curriculum and Guidelines in India.
3. Describe the principles of teaching-learning technology and apply these to conduct classroom lectures, self-directed learning (SDL) sessions, Case-Based Learning (CBL), case discussions, integrated teaching, small group discussions, seminars, journal club and research presentations.
4. Describe the principles of assessment of learning and be able to use the different methods for assessment of undergraduate students in pharmacology.
5. Demonstrate knowledge about the utility of computer assisted learning and be able to use them efficiently to promote learning of pharmacology.

Note:

The list mentioned above is indicative. A postgraduate student is expected to be knowledgeable about all aspects of the subject and be updated about the contemporary advances and research in the subject. B. Predominant in Affective Domain to improve the skills and expertise towards continuous professional development.

B. Predominant Affective domain

The students after training in the MD (Pharmacology) course should be able to:

1. Effectively explain to patients, the effects, appropriate use and adverse effects of drugs, including the drugs, including drug interaction and the need for medication adherence.
2. Communicate effectively with students, peers, staff, faculty and other members of the health care team about rational use of medicines and improving spontaneous reporting of adverse drug reactions, with Pharmacological reasoning.
3. Demonstrate respect in interactions with peers, patients and other healthcare professionals.
4. Demonstrate professionalism, ethical behaviour and integrity in one's work
5. Demonstrate ability to generate awareness about the use of generic drugs in various conditions.
6. Acquire skills for self-directed learning to keep up with advances in the subject and to improve the skills and expertise towards continuous professional development.

C. Predominant in Psychomotor Domain a. Mandatory

i. The students after training in the MD (Pharmacology) course should be able to perform the following procedures independently or as a part of a team and/or interpret the results:

1. Predict, report, monitor and participate in the management and causality assessment of adverse drug reactions associated with use of drugs, as per national program.
2. Demonstrate skills for writing rational prescriptions and prescription analysis.
3. Demonstrate proper use of equipment following the SOPs e.g. organ bath, analgesiometer, physiograph, convulsiometer, plethysmograph, equipment for testing/measuring learning and memory, affective disorders, muscle relaxants, blood pressure, ECG, respiration and pain.
4. Prepare drug solutions of appropriate strength and volume.
5. Determine EC₅₀, ED₅₀, pD₂ and pA₂ values of drugs.
6. Demonstrate presentation skills in a classroom setting as well as in academic meetings at local and national levels.
7. Provide critical appraisal of a research paper.
8. Perform experiments to demonstrate and interpret the dose response curve and effect of agonists (in the presence or absence of an antagonist) on simulations.

Signature: Gupta, Anand, Singh, etc.

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

9. Perform the following:

- Design protocol for evaluation of a given drug for various phases of clinical trials.
- Prepare Informed Consent Form and Participant Information Sheet for clinical trials/research.
- Administer Informed Consent Form
- Evaluate promotional drug literature
- Prepare "Package insert"
- Calculate and interpret pharmacokinetic parameters of a drug from a given data
- Demonstrate skills to prepare material for teaching-learning and assessment.

ii. The students after training in the MD (Pharmacology) course should be able to do/perform following procedures under supervision:

10. Test and predict efficacy of drugs following appropriate guidelines and regulations e.g. drugs affecting memory and psychomotor functions (e.g. critical flicker fusion tests in human volunteers), pain, cardiovascular functions, respiratory functions etc.

11. Observe and understand basic principles of working of important contemporary drug analytical techniques, interpret the observations about the drug levels and their therapeutic applications.

12. Demonstrate skills for contributing to antibiotic stewardship program of the institute to manage antimicrobial resistance.

13. Demonstrate Standard Operating Procedures (SOPs) for various methods and techniques used in pharmacology including SOPs in clinical trials and research.

14. Administer drugs by various routes (subcutaneous, intravenous, intraperitoneal) in simulations and hybrid models.

15. Demonstrate acquisition of writing skills for scientific publications and research projects for funding agencies and approval by Ethics Committee.

16. Demonstrate scientific writing skills. 10 b. Desirable: The students after training in the MD (Pharmacology) course should be able to:

17. Collect blood samples and oral gavage from experimental animals.

18. Administer drugs by various routes (subcutaneous, intravenous, intraperitoneal) in experimental animals.

19. Perform in vivo and in vitro animal experiments or simulated experiments, interpret the observations and relate these to potential clinical applications of the experimental drug: e.g. - effect of mydriatics and miotics on rabbit eye, - effect of anti-epileptic drugs using appropriate animal models of epilepsy, - effect of analgesics using appropriate animal models of analgesia, and - effect of drugs on learning, memory and motor coordination and effect of local anesthetics. These are examples, but the list is not limited to this only.

20. Perform experiments to demonstrate and interpret the dose response curve and effect of agonists (in the presence or absence of an antagonist) on various biological tissues.

Animal Experiments: All animal experiments must be compliant with the Regulations of Government of India, notified from time to time. Amphibian/Dog/Cat experiments should be conducted by computer assisted simulation models/facilities. Other experiments can be performed, but as permissible by existing 'Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA)' guidelines and other Government regulations.

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Teaching-Learning methods Postgraduate teaching programme Teaching methodology

Learning in a PG program is primarily self-directed and in Pharmacology consists of laboratory and academic work. The formal sessions are merely meant to supplement this 8 core effort. Acquisition of practical competencies thus becomes the cornerstone of postgraduate medical education in Pharmacology

Formal teaching sessions

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

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

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

- Attend accredited scientific meetings (CME, symposia, and conferences).
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
 - Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to experimentation are suggested.
 - There should be a training program on Research methodology for existing faculty to build capacity to guide research and for keeping abreast with rapidly evolving methods and techniques in related disciplines.
 - The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

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

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

- I Theory: (lectures, seminars, group discussion, journal club) (at least 6 hours a week, daily 2 hours for 3 days)
- II Rotation: 9 Practical training in the following suggested areas: (8 hours a week, daily 4 hours for 2 days) •
- Experimental Pharmacology: In vitro (including bioassays), in vivo (including common methods of drug evaluation) experiments, computer simulations and toxicity tests

Supb *Ames* *Syph* *As* *As*

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

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

- **Clinical Pharmacology:**

I Evaluation of drugs in healthy volunteers as well as patients

II Critical evaluation of drug literature, pharmacoeconomics, pharmacovigilance and pharmacoepidemiology.

III Thesis on a suitable problem

IV Training in undergraduate teaching

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

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

Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

ASSESSMENT

FORMATIVE ASSESSMENT, i. e., assessment to improve learning

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

General Principles

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

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up,
- case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

- Interdepartmental case or seminar : once a month
- Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.
- Attendance at Scientific meetings, CME programmes (at least 02 each) Important instructions:
- The feedback should be given to students timely and frequently so that they get a chance to improve.
- All teachers of the Department should be involved in assessment.
- The records and Log book shall be checked and assessed periodically by the faculty members imparting the training.
- The student to be assessed periodically as per categories listed in postgraduate student appraisal form.

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

Essential pre-requisites for appearing for examination include:

1. Log book of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least two presentations at national level conference. One research paper should be published / accepted in an indexed journal. (It is suggested that the local or University Review committee assess the work sent for publication).

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

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

2. Theory examination

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

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

There shall be four theory papers:

Paper I: General Pharmacology

Paper II: Clinical Pharmacology

Paper III: Systemic Pharmacology

Paper IV: Recent Advances in Pharmacology

3. Practical/clinical and Oral/viva voce examination

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

THEORY EXAMINATION TOTAL MARKS - 800

Paper I: General Pharmacology – 100 MARKS

Paper II: Clinical Pharmacology - 100 MARKS

Paper III: Systemic Pharmacology – 100 MARKS

Paper IV: Recent Advances in Pharmacology – 100 MARKS

Practical/clinical and Oral/viva voce examination - 400 MARKS

Paper II: Systemic pharmacology
Paper III: Cl-pharmacology. (P)
Experimentation,
Research; Biostatistics
& Education

Distribution of Marks:

Structured Essay Questions- 2 x 15 Marks=30

Marks Short Notes -10x5Marks =50Marks

Reasoning out -4x5Marks =20 Marks

100Marks

10. SCHEME OF PRACTICAL EXAMINATION:

Practical/clinical and Oral/viva voce examination Detail plan

Practical examination

Practical examination should be spread over two days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Practical Examination Exercises:

a) long exercises:

- Protocol design for a given scenario
- Case audit for a given case
- Perform experiments or simulated experiments (as per PG Regulations)

The exercises should be observed, response of student noted and assessed. The question related to these exercises can be asked

b) short exercises:

- Interpretation of results of a previous tracing - Table exercise
- Demonstration of effects of drugs/interpretation of results in human
- Demonstration of effects of drugs/interpretation of results in small, animals - optional (as per Regulations notified)

The exercises should be observed and assessed.

c) OSPE exercises: Objective Structured Practical Examination (OSPE)

OSPE should have 10-15 stations. Stations should be mixture of observed (observer present) and unobserved stations (without an observer). Few examples are given below:

- Various drug delivery systems
- Calculating pharmacokinetic parameters
- Pharmaceutical calculations
- Statistical exercise
- Pharmacoeconomics
- Critical appraisal of a published paper
- Abstract writing of a published paper
- Evaluation of drug promotional literature.
- Adverse Drug Reaction (ADR) reporting and causality assessment
- Assessment of preclinical toxicity data
- Analysis of rational and irrational formulations
- Selecting a P-drug and writing rational prescriptions
- Analytical instruments - use and interpretation
- Identifying ethics related dilemmas / mistakes in clinical trial documents

d) Assessment of teaching/presentation skills

- e.g., presentation of a UG lecture, making Question paper, Learning Objectives
- Discussion on dissertation

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Recommended Reading Material Books (latest edition)

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics, ed. Laurence Brunton, Bruce A. Chabner, Bjorn Knollman.
2. Essentials of Medical Pharmacology, by KD Tripathi
3. Basic and Clinical Pharmacology, by Bertram G. Katzung and Anthony J. Trevor
4. Drug Discovery and Evaluation: Pharmacological Assays Editors: Vogel, Hans Clinical Pharmacology by Laurence, Bennett and Brown
5. Rang and Dale's Pharmacology by H.P. Rang
6. Koda Kimble and Youngs Applied Therapeutics by Brian K Alldredge and Robin L Corelli

Medical Publishers Private Ltd: New Delhi 2019.

6. M. N. Ghosh. Fundamentals of Experimental Pharmacology. 7th Edition. Hilton & Company, 2019.

7. Badyal D. Practical Manual of Pharmacology. Jaypee Brothers Medical Publishers; 3rd edition 2020.

8. Vogel HJ. Drug Discovery and Evaluation: Pharmacological Assays Springer; 3rd edition, 2007.

9. Sharma S, Velpandian T. Illustrated Reviews Pharmacology. WolterKluver, South Asian Edition, 2019.

10. Medhi B, Prakash A. Practical Manual of Experimental & Clinical Pharmacology. Jaypee Brothers Medical Publishers, 2nd edition, 2017.

11. Alldredge BK, Corelli RL, Ernst ME, Guglielmo Jr. BJ, Jacobson PA, Kradjan WA, Williams BA. Koda-Kimble and Young's Applied Therapeutics Lippincott Williams and Wilkins, 10th edition, 2012.

12. Cheston B Cunha, Burke A Cunha. Antibiotic essentials. Jaypee Brothers Medical Publishers 17th edition, 2021.

COURSE CONTENT

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MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

Journals to be Preferred

1. IndianJournalofPharmacology
2. IndianJournalofPhysiology&Pharmacology
3. Trends inPharmacologicalSciences
4. AnnualReviewofPharmacologyandToxicology
5. PharmacologicalReviews
6. Drugs
7. IndianDrugs
8. ClinicalPharmacologyandTherapeutics
9. BritishJournalofPharmacology
10. BritishJournalofClinicalPharmacology
11. JournalofPharmacologyandExperimentalTherapeutics
12. EuropeanJournalofClinicalPharmacology
13. NewEnglandJournalofMedicine
14. Lancet

ANNEXURE 1

PostgraduateStudentsAppraisalForm

DepartmentofPharmacology

Name of the PGS tudent :

PeriodofTraining : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		123	456	789	
1.	Journal based/recent Advances learning				
2.	Laboratory or Skill Based learning				
3.	Self directed learning and teaching				

COURSE CONTENT

Title: MD Pharmacology (Theory & Practical)

MD PHARMACOLOGY examination to be held on (2022-23;23-24;24- 2025)

COURSE CODE – MDPH000001, MDPH000002, MDPH000003, MDPH000004

4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities/CMEs				
6.	Thesis/Research work				
7.	Log Book Maintenance				

Publications

Yes/No

Remarks* _____

***REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation is suggested. Individual feedback to postgraduate student is strongly recommended.