BLDE
(DEEMED TO BE UNIVERSITY)

Competency Based Medical Education
(CBME)
Revised Curriculum

MBBS

Phase-I

2019-20

Published by
BLDE
(DEEMED TO BE UNIVERSITY)
Declared as Deemed to be University u/s 3 of UGC Act, 1956

The Constituent College
SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA
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Our Vision

"To be a Leader and be recognized as an Institution striving for maintenance and enhancement of Quality Medical Education and Healthcare"

Our Mission

- To be committed to promote sustainable development of higher education including Health science education, consistent with the statutory and regulatory requirements.
- Reflect the needs of changing technology and make use of the academic autonomy to identify the academic programs that are dynamic.
- Adopt global concepts in education in the healthcare sector.

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BLDE(DU)/REG/UG-Phase-I/2019-20/1603 October 16, 2019

NOTIFICATION

Sub: Competency Based Medical Education (CBME) based Revision of Curriculum of MBBS Phase-I, 2019-20.

Ref: 1. Medical Council of India Regulation on Graduate Medical Education, 1997 and subsequent amendments of the same from time-to-time.
2. Minutes of the meeting of the 29th Academic Council of the University held on September 30, 2019.
3. Minutes of the meeting of the 49th Board of Management of the University held on October 01, 2019.

On approval of the 29th Meeting of Academic Council the CBME based Revised Curriculum for **MBBS Phase-I** Course is approved.

The revised curriculum shall be effective from the Academic Session 2019-20 onwards, for MBBS Phase-I course in the constituent College of the University viz. Shri B. M. Patil Medical College, Hospital and Research Centre.

REGISTRAR
REGISTRAR
BLDE (Deemed to be University)
Vijayapura-586103, Karnataka

Copy to:
- The Secretary, UGC, New Delhi
- The Dean, Faculty of Medicine and Principal
- The Dean, Faculty of Allied Health Sciences
- The Medical Superintendent
- The Vice Principal
- The Vice Principal (Academic)
- The Controller of Examinations
- The Dean, Student Affairs
- The Dean, R&D
- The Coordinator, IQAC
- The Prof. & HoDs of Pre, Para and Clinical Departments
- PS to the Hon'ble Chancellor
- PS to the Hon'ble Vice-Chancellor

Introduction

The revised M.B.B.S curriculum of The Medical Council of India (MCI) came into effect from May 1997 and it has undergone amendments thereof. The BLDE Deemed to be University has implemented the new regulations for the batches of students admitted to the M.B.B.S course from the academic year 2008-09 and onwards. Later the curriculum was revised in 2012-13 and 2016-17. This fourth revision will be implemented for the batches of students admitted to the M.B.B.S Course from the academic year 2019-20 onwards. The fourth revision, in consonance with MCI, adopts Competency Based Medical Education from the year 2019-20.

SECTION - I

Objectives of Medical Education

(As stated in MCI Regulations, 1997 amended up to May 2018)

This section contains the goals and general objectives of graduate medical education as stated in MCI Regulations.

Competencies for the Indian Medical Graduate

This content is cited from "Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate, 2018. (Vol.1; pages 14-20.)"

Section 1 provides the global competencies extracted from the Graduate Medical Education Regulations, 2018. The global competencies identified as defining the roles of the **Indian Medical Graduate** are the broad competencies that the learner has to aspire to achieve. Teachers and curriculum planners must ensure that the learning experiences are aligned to this Manual.

Extract from the Graduate Medical Education Regulations, 2018

Objectives of the Indian Graduate Medical Training Programme

The undergraduate medical education program is designed with a goal to create an "Indian Medical Graduate" (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. To achieve this, the following national and institutional goals for the learner of the Indian Medical Graduate training program are hereby prescribed:

2.1. National Goals

At the end of undergraduate program, the Indian Medical Graduate should be able to:

a) Recognize “health for all” as a national goal and health right of all citizens and by undergoing training for medical profession fulfill his/her social obligations towards realization of this goal.
b) Learn every aspect of National policies on health and devote herself/himself to its practical implementation.
c) Achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.
d) Develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.
e) Become exemplary citizen by observance of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

2.2. Institutional Goals

In consonance with the national goals, each medical institution should evolve institutional goals to define the kind of trained manpower (or professionals) they intend to produce. The Indian Medical Graduates coming out of a medical institute should:

a) Be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.
b) Be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.
c) Appreciate rationale for different therapeutic modalities, be familiar with the administration of the "essential drugs" and their common side effects.
d) Be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities
e) Possess the attitude for continued self learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.

f) Be familiar with the basic factors which are essential for the implementation of the National Health Programs including practical aspects of the following:
    - Family Welfare and Maternal and Child Health (MCH);
    - Sanitation and water supply;
    - Prevention and control of communicable and non-communicable diseases;
    - Immunization;
    - Health Education;
    - Indian Public Health Standards (IPHS) at various level of service delivery;
    - Bio-medical waste disposal; and
    - Organizational and or institutional arrangements.

g) Acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, General and hospital management, principal inventory skills and counseling.

h) Be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.

i) Be able to work as a leading partner in health care teams and acquire proficiency in communication skills.

j) Be competent to work in a variety of health care settings.

k) Have personal characteristics and attitudes required for professional life including personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

All efforts must be made to equip the medical graduate to acquire the skills as detailed in Table 11 Certifiable procedural skills – A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate, as given in the Graduate Medical Education Regulations, 2018

2. 3. Goals for the Learner

In order to fulfil this goal, the Indian Medical Graduate must be able to function in the following roles appropriately and effectively:

2.3.1. Clinician who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.

2.3.2. Leader and member of the health care team and system with capabilities to collect, analyze, synthesize and communicate health data appropriately.

2.3.3. Communicator with patients, families, colleagues and community.

2.3.4. Lifelong learner committed to continuous improvement of skills and knowledge.

2.3.5. Professional, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

3. Competency Based Training Programme of the Indian Medical Graduate

Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations. In order to effectively fulfil the roles as listed in clause 2, the Indian Medical Graduate would have obtained the following set of competencies at the time of graduation:

3.1. Clinician, who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.

3.1.1 Demonstrate knowledge of normal human structure, function and development from a molecular, cellular, biologic, clinical, behavioral and social perspective.

3.1.2. Demonstrate knowledge of abnormal human structure, function and development from a molecular, cellular, biological, clinical, behavioural and social perspective.

3.1.3 Demonstrate knowledge of medico-legal, societal, ethical and humanitarian principles that influence health care.

3.1.4 Demonstrate knowledge of national and regional health care policies including the National Health Mission that incorporates National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM), frameworks, economics and systems that influence health promotion, health care delivery, disease prevention, effectiveness, responsiveness, quality and patient safety.

3.1.5. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is complete and relevant to disease identification, disease prevention and health promotion.

3.1.6. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is contextual to gender, age, vulnerability, social and economic status, patient preferences, beliefs and values.

3.1.7 Demonstrate ability to perform a physical examination that is complete and relevant to disease identification, disease prevention and health promotion.

3.1.8 Demonstrate ability to perform a physical examination that is contextual to gender, social and economic status, patient preferences and values.

3.1.9 Demonstrate effective clinical problem solving, judgment and ability to interpret and integrate available data in order to address patient problems, generate differential diagnoses and develop individualized management plans that include preventive, promotive and therapeutic goals.

3.1.10 Maintain accurate, clear and appropriate record of the patient in conformation with legal and administrative frameworks.

3.1.11 Demonstrate ability to choose the appropriate diagnostic tests and interpret these tests based on scientific validity, cost effectiveness and clinical context.

3.1.12 Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies for the following:

i) Disease prevention,
ii) Health promotion and cure,
iii) Pain and distress alleviation, and
iv) Rehabilitation and palliation Demonstrate ability to provide a continuum of care at the primary and/or secondary level that addresses chronicity, mental and physical disability.

3.1.13 Demonstrate ability to appropriately identify and refer patients who may require specialized or advanced tertiary care.

3.1.14 Demonstrate familiarity with basic, clinical and translational research as it applies to the care of the patient.

3*.2. Leader and member of the health care team and system*

3.2.1 Work effectively and appropriately with colleagues in an inter-professional health care team respecting diversity of roles, responsibilities and competencies of other professionals.

3.2.2 Recognize and function effectively, responsibly and appropriately as a health care team leader in primary and secondary health care settings.

3.2.3 Educate and motivate other members of the team and work in a collaborative and collegial fashion that will help maximize the health care delivery potential of the team.

3.2.4 Access and utilize components of the health care system and health delivery in a manner that is appropriate, cost effective, fair and in compliance with the national health care priorities and policies, as well as be able to collect, analyze and utilize health data.

3.2.5 Participate appropriately and effectively in measures that will advance quality of health care and patient safety within the health care system.

3.2.6 Recognize and advocate health promotion, disease prevention and health care quality improvement through prevention and early recognition in a) life style diseases and b) cancer, in collaboration with other members of the health care team.

3.3. ***Communicator with patients, families, colleagues and community***

3.3.1 Demonstrate ability to communicate adequately, sensitively, effectively and respectfully with patients in a language that the patient understands and in a manner that will improve patient satisfaction and health care outcomes.

3.3.2 Demonstrate ability to establish professional relationships with patients and families that are positive, understanding, humane, ethical, empathetic, and trustworthy.

3.3.3 Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs confidentiality and privacy.

3.3.4 Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision making.

3.4. ***Lifelong learner committed to continuous improvement of skills and knowledge***

3.4.1. Demonstrate ability to perform an objective self-assessment of knowledge and skills, continue learning, refine existing skills and acquire new skills.

3.4.2. Demonstrate ability to apply newly gained knowledge or skills to the care of the patient.

3.4.3. Demonstrate ability to introspect and utilize experiences, to enhance personal and professional growth and learning.

3.4.4. Demonstrate ability to search (including through electronic means), and critically revaluate the medical literature and apply the information in the care of the patient.

3.4.5. Be able to identify and select an appropriate career pathway that is professionally rewarding and personally fulfilling.

3.5. ***Professional who is committed to excellence, is ethical, responsive and accountable to patients, community and the profession***

3.5.1. Practice selflessness, integrity, responsibility, accountability and respect.

3.5.2. Respect and maintain professional boundaries between patients, colleagues and society.

3.5.3. Demonstrate ability to recognize and manage ethical and professional conflicts.

3.5.4. Abide by prescribed ethical and legal codes of conduct and practice.

3.5.5. Demonstrate a commitment to the growth of the medical profession as a whole.

Broad Outline on training format

4.1. In order to ensure that training is in alignment with the goals and competencies listed in sub-clause 2 and 3 above:

4.1.1 There shall be a "Foundation Course" to orient medical learners to MBBS programme, and provide them with requisite knowledge, communication (including electronic), technical and language skills.

4.1.2 The curricular contents shall be vertically and horizontally aligned and integrated to the maximum extent possible in order to enhance learner's interest and eliminate redundancy and overlap.

4.1.3. Teaching-learning methods shall be learner centric and shall predominantly include small group learning, interactive teaching methods and case based learning.

4.1.4. Clinical training shall emphasize early clinical exposure, skill acquisition, certification in essential skills; community/primary/secondary care-based learning experiences and emergencies.

4.1.5. Training shall primarily focus on preventive and community based approaches to health and disease, with specific emphasis on national health priorities such as family welfare, communicable and non communicable diseases including cancer, epidemics and disaster management.

4.1.6. Acquisition and certification of skills shall be through experiences in patient care, diagnostic and skill laboratories.

4.1.7. The development of ethical values and overall professional growth as integral part of curriculum shall be emphasized through a structured longitudinal and dedicated programme on professional development including attitude, ethics and communication.

4.1.8. Progress of the medical learner shall be documented through structured periodic assessment that includes formative and summative assessments. Logs of skill-based training shall be also maintained.

4.2. Appropriate Faculty Development Programmes shall be conducted regularly by institutions to facilitate medical teachers at all levels to continuously update their professional and teaching skills, and align their teaching skills to curricular objectives.

SECTION - II

REGULATIONS GOVERNING M.B.B.S. DEGREE COURSE

(Eligibility for Admission, Duration, Attendance and Scheme of Examination as per the norms laid down in the Regulations on Graduate Medical Education of Medical Council of India and the amendments thereof (May 2018); admission to UG course - MBBS)

1. ELIGIBILITY

1.1 Qualifying Examination

Student seeking admission to first MBBS course:

i) Shall have passed two year Pre University examination conducted by Department of Pre University Education, Karnataka State, with English as one of the subjects and Physics, Chemistry and Biology as optional subjects. The candidate shall have passed subjects of English, Physics, Chemistry and Biology individually.

OR

ii) Shall have passed any other examination conducted by Boards / Councils / Intermediate examination established by State Governments / Central Government and recognized as equivalent to two year Pre University examination by the BLDE Deemed to be University / Association of Indian Universities (AIU), with English as one of the subjects and Physics, Chemistry and Biology as optional subjects and the candidate shall have passed subjects of English, Physics, Chemistry and Biology individually.

OR

iii) Shall have passed Intermediate examination in Science of an Indian University / Board / council or other recognized examining bodies with Physics, Chemistry and Biology, which shall include a practical test in these subjects and also English as compulsory subject. The candidate shall have passed subjects of English, Physics, Chemistry and Biology individually.

OR

iv) Shall have passed first year of the three year degree course of a recognized University with Physics, Chemistry and Biology including a practical test in these subjects provided the examination is an ‘University Examination’ provided that the candidate

shall have passed subjects of English, Physics, Chemistry and Biology individually in the Pre University or other examinations mentioned in the clauses above.

OR

v) Shall have passed B.Sc. Examination of an Indian University, provided that he/she has passed the B.Sc. examination with not less than two of the following subjects: Physics, Chemistry, Biology (Botany, Zoology) provided that candidate has passed subjects of English, Physics, Chemistry and Biology individually in the qualifying examinations mentioned in clauses (i) (ii) and (iii).

Note: Candidates who have passed "Physical Science" instead of Physics and Chemistry as two separate subjects are not eligible for admission to MBBS course as per Medical Council of India Regulations vide letter MCI-37(2)/2001/Med.922 dated 14.02.2001

1.2 Marks

The selection of students shall be based on merit provided that:

a) In case of admission on the basis of qualifying examination, a candidate for admission to MBBS course must have passed individually in the subjects of Physics, Chemistry, Biology and English and must have obtained not less than 50% marks for general category,40% for SC,ST and OBC students taken together in Physics, Chemistry and Biology in the qualifying examination.

The minimum marks shall not be less than 45% taken together in Physics, Chemistry and Biology for physically handicapped candidates with lower limb locomotor disability of 40 to 70%.

b) The student shall appear for All India National Eligibility cum Entrance Test [NEET] and must qualify securing valid rank.

1.3 Age: The candidate should have completed 17 years of age on or before 31st day of December of the year of admission.

Eligibility criteria for admission to the MBBS Course shall be as per Graduate Medical Education regulations of Medical Council of India and its amendments there of existing at the time of admission.

PHASE WISE TRAINING AND TIME DISTRIBUTION FOR PROFESSIONAL DEVELOPMENT

The Competency based Undergraduate Curriculum and Attitude, Ethics and Communication (AETCOM) course, aspublished by the Medical Council of India and also made available on the Council's website, shall be the curriculum for the batches admitted in MBBS from the academic year 2019-20 onwards.

Provided that in respect of batches admitted prior to the academic year 2019-20, the governing provisions shall remain as contained in the Part I of these Regulations.

7. **Training period and time distribution**:

7.1. Every learner shall undergo a period of certified study extending over 4 ½ academic years, divided into nine semesters from the date of commencement of course to the date of completion of examination which shall be followed by one year of compulsory rotating internship.

7.2. Each academic year will have at least 240 teaching days with a minimum of eight hours of working on each day including one hour as lunch break.

7.3. Teaching and learning shall be aligned and integrated across specialties both vertically and horizontally for better learner comprehension. Learner centered learning methods should include problem oriented learning, case studies, community oriented learning, self- directed and experiential learning.

7.4. The period of 4 ½ years is divided as follows:

7.4.1 Pre-Clinical Phase [(Phase I) - First Professional phase of 13 months preceded by Foundation Course of one month]: will consist of preclinical subjects – Human Anatomy, Physiology, Biochemistry, Introduction to Community Medicine, Humanities, Professional development including Attitude, Ethics & Communication (AETCOM) module and early clinical exposure, ensuring both horizontal and vertical integration.

7.4.2 Para-clinical phase [(Phase II) - Second Professional (12 months)]: will consist of Para-clinical subjects namely Pathology, Pharmacology, Microbiology, Community Medicine, Forensic Medicine and Toxicology, Professional development including Attitude, Ethics & Communication (AETCOM) module and introduction to clinical subjects ensuring both horizontal and vertical integration.

The clinical exposure to learners will be in the form of learner-doctor method of clinical training in all phases. The emphasis will be on primary, preventive and comprehensive healtcare. A part of trainduring clinical postings should take place at the *primary level* of health care. It is desirable to provide learning experiences in secondary health care, wherever possible**.** This will involve:

(a) Experience in recognizing and managing common problems seen in outpatient, inpatient and emergency settings,

(b) Involvement in patient care as a team member,

(c) Involvement in patient management and performance of basic procedures.

7.4.3 Clinical Phase – [(Phase III) Third Professional (28 months)]

(a) Part I (13 months) - The clinical subjects include General Medicine, General Surgery, Obstetrics & Gynaecology, Pediatrics, Orthopaedics, Dermatology, Otorhinolaryngology, Ophthalmology, Community Medicine, Forensic Medicine and Toxicology, Psychiatry, Respiratory Medicine, Radiodiagnosis & Radiotherapy and Anaesthesiology & Professional development including AETCOM module.

(b) Electives (2 months) :

To provide learners with opportunity for diverse learning experiences, to do research/community projects that will stimulate enquiry, self directed experimental learning and lateral thinking [9.3].

(c) Part II (13 months) - Clinical subjects include:

i. Medicine and allied specialties (General Medicine, Psychiatry, Dermatology Venereology and Leprosy (DVL), Respiratory Medicine including Tuberculosis)

ii. Surgery and allied specialties (General Surgery, Orthopedics [including trauma]), Dentistry, Physical Medicine and rehabilitation, Anaesthesiology and Radiodiagnosis)

iii. Obstetrics and Gynecology (including Family Welfare)

iv. Pediatrics

v. AETCOM module

7.5 Didactic lectures shall not exceed one third of the schedule; two third of the schedule shall include interactive sessions, practicals, clinical or/and group discussions. The learning process should include clinical experiences, problem oriented approach, case studies and community health care activities.

7.6 Universities shall organize admission timing and admission process in such a way that teaching in the first Professional year commences with induction through the Foundation Course by the 1st of August of each year.

(i) Supplementary examinations shall not be conducted later than 90 days from the date of declaration of the results of the main examination, so that the learners who pass can join the main batch for progression and the remainder would appear for the examination in the subsequent year.

(ii) A learner shall not be entitled to graduate later than ten (10) years of her/his joining the first MBBS course.

7.7 No more than four attempts shall be allowed for a candidate to pass the first Professional examination. The total period for successful completion of first Professional course shall not exceed four (4) years. Partial attendance of examination in any subject shall be counted as an attempt.

7.8 A learner, who fails in the second Professional examination, shall not be allowed to appear in third Professional Part I examination unless she/he passes all subjects of second Professional examination.

7.9 Passing in third Professional (Part I) examination is not compulsory before starting part II training; however, passing of third Professional (Part I) is compulsory for being eligible for third Professional (Part II) examination.

7.10 During para-clinical and clinical phases, including prescribed 2 months of electives, clinical postipostings of three hours duration daily as specified in Tables 5, 6, 7 and 8 would apply for various departments.

8. Phase distribution and timing of examination

8.1 Time distribution of the MBBS programme is given in Table 1.n

8.2 Distribution of subjects by Professional Phase-wise is given in Table 2.

8.3 Minimum teaching hours prescribed in various disciplines are as under Tables 3-7.

8.4 Distribution of clinical postings is given in Table 8.

8.5 Duration of clinical postings will be:

8.5.1 Second Professional : 36 weeks of clinical posting (Three hours per day - five days per week : Total 540 hours)

8.5.2 Third Professional part I: 42 weeks of clinical posting (Three hours per day - six days per week : Total 756 hours)

8.5.3 Third Professional part II: 44 weeks of clinical posting (Three hours per day - six days per week : Total 792 hours)

8.6 Time allotted excludes time reserved for internal / University examinations, and vacation.

8.7 Second professional clinical postings shall commence before / after declaration of results of the first professional phase examinations, as decided by the institution/ University. Third Professional parts I and part II clinical postings shall start no later than two weeks after the completion of the previous professional examination.

8.8 25% of allotted time of third Professional shall be utilized for integrated learning with pre- and para- clinical subjects. This will be included in the assessment of clinical subjects.

DURATION OF THE COURSE

i) Every student shall undergo a period of certified study extending over $4^1/_2$ Academic years from the date of commencement of this study for the subject comprising the medical curriculum to the date of completion of the examination followed by one year compulsory rotating Internship.
The $4^1/_2$ years course has been divided into three Phases.

Table 1: Time distribution of MBBS Programme & Examination Schedule

<table>
<tr><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Foundation Course</td><td colspan="4">I MBBS</td></tr>
<tr><td colspan="8">I MBBS</td><td>Exam I MBBS</td><td colspan="3">II MBBS</td></tr>
<tr><td colspan="8">II MBBS</td><td>Exam II MBBS</td><td colspan="3">III MBBS</td></tr>
<tr><td colspan="9">III MBBS Part I</td><td>Exam III MBBS Part I</td><td colspan="2">Electives & Skills</td></tr>
<tr><td colspan="12">III MBBS Part II</td></tr>
<tr><td>Exam III MBBS Part II</td><td></td><td colspan="10">Internship</td></tr>
<tr><td colspan="2">Internship</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

One month is provided at the end of every professional year for completion of examination and declaration of results.

Distribution of the duration of various components of the MBBS Course

TABLE 2 DISTRIBUTION OF SUBJECTS PROFESSIONAL PHASEWISE HERE

Table 2: Distribution of subjects by professional phase

Phase & Year Of MBBB Training	Subjects & New Teaching Elements	Duration	University Examination
First professional MBBS	• Foundation course (1month) • Human Anatomy, Physiology& Biochemistry Introduction of Community Medicine ,Humanities • Early Clinical Exposure • Attitude. Ethics and Communication Module (AETCOM)	1+13 months	I Professional
Second Professional MBBS	• Pathology, Microbiology, Pharmacology, Forensic Medicine And Toxicology • Introduction to clinical subjects including community Medicine • Clinical postings • AETCOM	12 months	II Professional
Third Professional MBBS Part I	• General Medicine ,General Surgery, OBG. Paediatrics , Orthopaedics ,Dermatology,PyschiatryOtorhinolaryngology,Ophthalmology,community Medicine ,Forensic Medicine and Toxicology, Respiratory Medicine ,Radiodiagnosis & Radiotherapy, Anaesthesiology • Clinical Subjects /postings • AETCOM		III Professional (Part2)
Electives	* Electives ,skills and assessment	2 months	
Third Professional MBBS Part II	* General Medicine ,Paediatrics, General Surgery, Orthopaedics, Obstetrics and Gynaecology including Family welfare and allied specialties * Clinical Postings /subjects * AETCOM	13 months	III Professional (Part II)

*Assessment of electives shall be included in Internal Assessment

ATTENDANCE &ELIGIBILTY TO TO APPEAR FOR UNIVERSITY PROFESSIONAL EXAMINATION

[Based o nthe GMR 2019 Regulations 2019 clause no11.I &its subcauses page nos 82-83]

Eligibility to appear for Professional examinations

The performance in essential components of training are to be assessed, based on:

(a) Attendance 1. Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase – the learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.

2. If an examination comprises more than one subject (for e.g., General Surgery and allied branches), the candidate must have 75% attendance in each subject and 80% attendance in each clinical posting.

3. Learners who do not have at least 75% attendance in the electives will not be eligible for the Third Professional - Part II examination.

(b) Internal Assessment:

Internal assessment shall be based on day-to-day assessment. It shall relate to different ways in which learners participate in learning process including assignments, preparation for seminar, clinical case presentation, preparation of clinical case for discussion, clinical case study/problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test etc.

1. Regular periodic examinations shall be conducted throughout the course. There shall be no less than three internal assessment examinations in each Preclinical / Para-clinical subject and no less than two examinations in each clinical subject in a professional year. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year.

2.When subjects are taught in more than one phase, the internal assessment must be done in each phase and must contribute proportionately to final assessment. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently.

3.Day to day records and log book (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on competencies and skills.

4.The final internal assessment in a broad clinical specialty (e.g., Surgery and allied specialties etc.) shall comprise of marks from all the constituent specialties. The proportion of

the marks for each constituent specialty shall be determined by the time of instruction allotted to each.

5. Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject. Internal assessment marks will reflect as separate head of passing at the summative examination.

6. The results of internal assessment should be displayed on the notice board within a 1-2 weeks of the test. Universities shall guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason.

7. Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

The Principal should notify at the college the attendance details at the end of the each term without fail under intimation to this University. The candidate lacking in the prescribed attendance and progress in any subject(s) in theory or practical/clinical in the first appearance should not be permitted to appear for the examination in that subject(s).

New teaching / learning elements

9.1. Foundation Course

9.1.1 Goal: The goal of the Foundation Course is to prepare a learner to study medicine effectively. It will be of one month duration after admission.

9.1.2 Objectives: The objectives are to: (a) Orient the learner to: (i) The medical profession and the physician's role in society (ii) The MBBS programme (iii) Alternate health systems in the country and history of medicine (iv) Medical ethics, attitudes and professionalism (v) Health care system and its delivery (vi) National health programmes and policies (vii) Universal precautions and vaccinations (viii) Patient safety and biohazard safety (ix) Principles of primary care (general and community based care) (x) The academic ambience

(b) Enable the learner to acquire enhanced skills in: (i) Language (ii) Interpersonal relationships (iii) Communication (iv) Learning including self-directed learning (v) Time management (vi) Stress management (vii) Use of information technology

(c) Train the learner to provide: (i) First-aid (ii) Basic life support

9.1.3 In addition to the above, learners may be enrolled in one of the following programmes which will be run concurrently: (a) Local language programme (b) English language programme (c) Computer skills (d) These may be done in the last two hours of the day for the duration of the Foundation Course.

9.1.4 These sessions must be as interactive as possible.

9.1.5 Sports (to be used through the Foundation Course as protected 04 hours / week).

9.1.6 Leisure and extracurricular activity (to be used through the Foundation Course as protected 02 hours per week)

9.1.7 Institutions shall develop learning modules and identify the appropriate resource persons for their delivery.

9.1.8 The time committed for the Foundation Course may not be used for any other curricular activity.

9.1.9 The Foundation Course will have compulsory 75% attendance. This will be certified by the Dean of the college.

9.1.10 The Foundation Course will be organized by the Coordinator appointed by the Dean of the college and will be under supervision of the heads of the preclinical departments.

9.1.11 Every college must arrange for a meeting with parents and their wards.

9.2. Early Clinical Exposure

9.2.1 Objectives: The objectives of early clinical exposure of the first-year medical learners are to enable the learner to: (a) Recognize the relevance of basic sciences in diagnosis, patient care and treatment, (b) Provide a context that will enhance basic science learning, (c) Relate to experience of patients as a motivation to learn, (d) Recognize attitude, ethics and professionalism as integral to the doctor-patient relationship, (e) Understand the socio-cultural context of disease through the study of humanities.

9.2.2 Elements

(a) Basic science correlation: i.e. apply and correlate principles of basic sciences as they relate to the care of the patient (this will be part of integrated modules).

(b) Clinical skills: to include basic skills in interviewing patients, doctor-patient communication, ethics and professionalism, critical thinking and analysis and self-learning (this training will be imparted in the time allotted for early clinical exposure).

(c) Humanities: To introduce learners to a broader understanding of the socio-economic framework and cultural context within which health is delivered through the study of humanities and social sciences.

9.3. Electives

9.3.1 Objectives: To provide the learner with opportunities: (a) For diverse learning experiences, (b) To do research/community projects that will stimulate enquiry, self-directed, experiential learning and lateral thinking.

9.3.2 Two months are designated for elective rotations after completion of the examination at end of the third MBBS Part I and before commencement of third MBBS Part II.

9.3.3 It is mandatory for learners to do an elective. The elective time should not be used to make up for missed clinical postings, shortage of attendance or other purposes.

9.3.4 Structure (a) The learner shall rotate through two elective blocks of 04 weeks each. (b) Block 1 shall be done in a pre-selected preclinical or para-clinical or other basic sciences laboratory OR under a researcher in an ongoing research project.

During the electives regular clinical postings shall continue. (c) Block 2 shall be done in a clinical department (including specialties, super-specialties, ICUs, blood bank and casualty) from a list of electives developed and available in the institution.

OR

as a supervised learning experience at a rural or urban community clinic. (d) Institutions will pre-determine the number and nature of electives, names of the supervisors, and the number of learners in each elective based on the local conditions, available resources and faculty.

9.3.5 Each institution will develop its own mechanism for allocation of electives.

9.3.6 It is preferable that elective choices are made available to the learners in the beginning of the academic year.

9.3.7 The learner must submit a learning log book based on both blocks of the elective.

9.3.8 75% attendance in the electives and submission of log book maintained during elective is required for eligibility to appear in the final MBBS examination.

9.3.9 Institutions may use part of this time for strengthening basic skill certification.

9.4. Professional Development including Attitude, Ethics and Communication Module (AETCOM)

9.4.1 Objectives of the programme: At the end of the programme, the learner must demonstrate ability to: (a) understand and apply principles of bioethics and law as they apply to medical practice and researcunderstand and apply the principles of clinical reasoning as they apply to the care of the patients, (b) understand and apply the principles of system based care as they relate to the care of the patient, (c) understand and apply empathy and other human values to the care of the patient, (d) communicate effectively with patients, families, colleagues and other health care professionals, (e) understand the strengths and limitations of alternative systems of medicine, (f) respond to events and issues in a professional, considerate and humane fashion, (g) translate learning from the humanities in order to further his / her professional and personal growth.

9.4.2 Learning experiences: (a) This will be a longitudinal programme spread across the continuum of the MBBS programme including internship, (b) Learning experiences may include – small group discussions, patient care scenarios, workshop, seminars, role plays, lectures etc. (c) Attitude, Ethics &Communication Module (AETCOM module) developed by Medical Council of India should be used longitudinally for purposes of instruction.

9.4.3 75% attendance in Professional Development Programme (AETCOM Module) is required for eligibility to appear for final examination in each professional year.

9.4.4 Internal Assessment will include: (a) Written tests comprising of short notes and creative writing experiences, (b) OSCE based clinical scenarios / viva voce.

9.4.5 At least one question in each paper of the clinical specialties in the University examination should test knowledge competencies acquired during the professional development programme.

9.4.6 Skill competencies acquired during the Professional Development Programme must be tested during the clinical, practical and viva voce.

9.5. Learner-doctor method of clinical training (Clinical Clerkship)

9.5.1 Goal: To provide learners with experience in: (a) Longitudinal patient care, (b) Being part of the health care team, (c) Hands-on care of patients in outpatient and inpatient setting.

9.5.2 Structure:

(a) The first clinical posting in second professional shall orient learners to the patient, their roles and the specialty.

(b) The learner-doctor programme will progress as outlined in Table 9.

(c) The learner will function as a part of the health care team with the following responsibilities: (i) Be part of the unit's outpatient services on admission days, (ii) Remain with the admission unit until 6 PM except during designated class hours, (iii) Be assigned patients admitted during each admission day for whom he/she will undertake responsibility, under the supervision of a senior resident or faculty member, (iv) Participate in the unit rounds on its admission day and will present the assigned patients to the supervising physician, (v) Follow the patient's progress throughout the hospital stay until discharge, (vi) Participate, under supervision, in procedures, surgeries, deliveries etc. of assigned patients (according to responsibilities outlined in table 9), (vii) Participate in unit rounds on at least one other day of the week excluding the admission day, (viii) Discuss ethical and other humanitarian issues during unit rounds, (ix) Attend all scheduled classes and educational activities, (x) Document his/her observations in a prescribed log book / case record.

(d) No learner will be given independent charge of the patient

(e) The supervising physician will be responsible for all patient care decisions

9.5.3 Assessment:

(a) A designated faculty member in each unit will coordinate and facilitate the activities of the learner, monitor progress, provide feedback and review the log book/ case record.

(b) The log book/ case record must include the written case record prepared by the learner including relevant investigations, treatment and its rationale, hospital course, family and patient discussions, discharge summary etc.

(c) The log book should also include records of outpatients assigned. Submission of the log book/ case record to the department is required for eligibility to appear for the final examination

Integration and Alignment in teaching and learning :

As per the new curriculum to ensure that the learner attains the broad outcomes of Integration & Alignment in the curriculum, teaching topics that are similar together reducing redundancy and allowing the learner to integrate the concept will be done under Integration and Aligning the teaching of subject material that occurs under a particular organ system/ disease concept from the same phase in the same time frame i.e, temporal coordination shall be done in respective subjects.

Sharing of topics or correlation of topics by using an integration or linker session shall be in a small proportion - not to exceed 20% of the total curriculum .The integration session preferably will be a case based discussion in an appropriate format ensuring that elements in the same phase (horizontal) and from other phases are addressed. As much as possible the necessary correlates from other phases must also be introduced while discussing a topic in a given subject - Nesting Topics that cannot be aligned and integrated must be provided adequate time in the curriculum throughout the year .

The above content is sited from Curriculum Implementation Support Program of the Competency Based Undergraduate Medical Education Curriculum, 2019, Relevant Extract from GMR, pp65-66

Details of the course contents, schedule of Teaching –Learning,hours allotted for subjects etc are as follows:

TABLE :3 Foundation course

Subjects / Contents	Teaching hours	Self directed learning (hours)	Total hours
Orientation [1]	30	0	30
Skills module [2]	35	0	35
Field visit to community health centre	8	0	8
Introduction to professional development & AETCOM module	-	-	10
Sports and extracurricular activities	22	0	22
Enhancement of language / Computer skills [3]	50	0	50
	-	-	155

1. Orientation course will be completed as single block in the first week and will contain elements outlined in 9.1.
2. Skills modules will contain elements outline in 9.1.
3. Based on perceived need of learners, one may choose language enhancement (English or local spoken or both) and computer skills. This should be provided longitudinally through the duration of the foundation course.
4. Teaching of foundation course will be organized by preclinical departments.

Table:4 First Professional teaching hours

Subjects	Lecture hours	Small group teaching / tutorials / integrated learning/ practical (hours)	Self directed learning (hours)	Total (hours)
Human anatomy	220	415	40	675
Physiology *	160	310	25	495
Biochemistry	80	150	20	250
Early clinical exposure	90	-	0	90
Community Medicine **	20	27	5	52
Attitude, Ethics & Communication module (AETCOM)***	-	26	8	34
Sports and extracurricular activities	-	-	-	60
Formative assessment and term examinations	-	-	-	80
Total	-	-	-	1736

*Including Molecular biology

**Early clinical exposure hours to be divided equally in all three subjects

***AETCOM module shall be a longitudinal programme

Table:5 Second professional teaching hours

Subjects	Lecture hours	Small group teaching / tutorials / integrated learning / practical (hours)	Clinical Postings	Self directed learning (hours)	Total (hours)
Pathology	80	138	-	12	230
Pharmacology	80	138	-	12	230
Microbiology	70	110	-	10	190
Community Medicine	20	30	-	10	60
Forensic Medicine and Toxicology	15	30	-	5	50
Clinical Subjects	75**	-	540***		615
Attitude, Ethics & Communication module (AETCOM)***	-	29	-	8	37
Sports and extracurricular activities	-	-	-	28	25
Total	-	-	-	-	1440

At least 3 hours of clinical instruction each week must be allotted to training in clinical and procedural skill laboratories hours maybe distributed weekly or as a block in each posting based on institutional logistics.

**25 hours each for General Medicine, General Surgery and Obstetrics &Gynecology

***The clinical postings in the second professional shall be 15 hours per week (3 hrs per day from Monday to Friday).

Table 6: Third Professional part I teaching hours

Subjects	Lecture hours	Small group teaching / tutorials / integrated learning / practical (hours)	Self directed learning (hours)	Total (hours)
General Medicine	25	35	5	65
General Surgery	25	35	5	65
OBG	25	35	5	65
Pediatrics	20	30	5	55
Orthopedics	15	20	5	40
Forensic Medicine & Toxicology	25	45	5	75
Community Medicine	40	60	5	105
Dermatology	20	5	5	30
Psychiatry	25	10	5	40
Respiratory Medicine	10	8	5	20
Otorhinolaryngology	25	40	5	70
Ophthalmology	30	60	10	100

Radiodiagnosis and Radiotherapy	10	8	2	20
Anesthesiology	8	10	2	20
Clinical Postings *	-	-	-	756
Attitude, Ethics & Communication module (AETCOM)		19	06	25
Total	303	401	66	1551

*The clinical postings in the third professional part 1 shall be 18 hours per week (3hrs per day from Monday to Saturday).

Table 7: Third Professional Part II teaching hours

Subjects	Lecture hours	Small group teaching / tutorials / integrated learning / practical (hours)	Self directed learning (hours)	Total (hours)
General Medicine	70	125	15	210
General Surgery	70	125	15	210
OBG	70	125	15	210
Pediatrics	20	35	10	65
Orthopedics	20	25	5	50
Clinical Postings *				792
Attitude, Ethics & Communication module (AETCOM)	28		16	43
Electives				200
Total	250	435	60	1780

*25% of allotted time of third professional shall be utilized for integrated learning with pre- and para clinical subjects and shall be assessed during the clinical subjects examination. This allotted time will be utilized as integrated teaching by para clinical subjects with clinical subjects (as clinical pathology, clinical pharmacology and Clinical microbiology)

**the clinical postings in the third professional Part II shall be 18 hours per week (3hrs per day from Monday to Saturday)

***hours from clinical postings can also be used for AETCOM modules

Table 8: Clinical postings

Subjects	Period of training in weeks			
	II MBBS	III MBBS part I	III MBBS Part II	Total Weeks
Electives	-	-	8*(4 regular clinical posting)	4
General Medicine [1]	4	4	8+4	20
General Surgery	4	4	8+4	20
OBG [2]	4	4	8+4	20
Pediatrics	2	4	4	10

Community Medicine	4	6	-	10
Orthopedics – Including Trauma[3]	2	4	2	8
Otorhinolaryngology	4	4	-	8
Ophthalmology	4	4	-	8
Respiratory Medicine	2	-	-	2
Psychiatry	2	2	-	4
Radio diagnosis[4]	2	-	-	2
Dermatology, Venereology & Leprosy	2	2	2	6
Dentistry & Anaesthesia	-	2	-	2
Casualty	-	2	-	2
	36	42	48	126

*In four of the eight weeks of electives, regular clinical postings shall be accommodated.

Clinical postings may be adjusted within the time framework.

[1]This posting includes laboratory medicine (para-clinical) & infections diseases (phase III part I).

[2]This includes maternity training and family welfare (including family planning).

[3]This posting includes physical medicine and rehabilitation.

[4]This posting includes radiotherapy, wherever available.

Table 9: Learner – Doctor programme (clinical clerkship)

Year of Curriculum	Focus of learner – doctor programme
Year 1	Introduction to hospital environment. Early clinical exposure. Understanding perspectives of illness
Year 2	History taking, Physical examination. Assessment of change in clinical status, communication and patient education
Year 3	All of the above and choice of investigations, basic procedures and continuity of care
Year 4	All of the above and decision making, management and outcomes

Scheme of Examination

Internal Assessment

It shall be based on dat today assessments, evaluation of assignment, presentation of seminar, clinical a Clinical presentation, problem solving exercises participation inproject for health care in the community, proficiency in carrying out small research project tests etc. Regular periodic examinations should be conducted throughout the course. Although the question of number of examinations left to the institution, there should be a minimum of at least three (3) sessional examinations during the course. One of these tests can be in the form of MCQS.

One of the practical/clinical examination can be in the form of OSPE/OSCE. Average of best two examination marks shouldbe taken into consideration while calculating the marks of the internal assessment..

1. There shall be no less than three internal assessment examinations in each Preclinical / Paraclinical subject and no less than two examinations in each clinical subject in a professional year. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year.
2. In subjects that are taught at more than one phase, proportionate weightage must be given for internal assessment for each Phase. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently.

Components of IA

i) Theory IA can include: theory tests, send ups, seminars, quizzes, interest in subject, scientific attitude etc. Written tests should have short notes and creative writing experiences.

ii) Practical/Clinical IA can include: practical/clinical tests, Objective Structured Clinical Examination (OSCE)/Objective Structured Practical Examination (OSPE), Directly Observed Procedural Skills (DOPS), Mini Clinical Evaluation

iii) Exercise (mini-CEX), records maintenance and attitudinal assessment.

This content is cited from :Medical Council of India. Competency Based Assessment Module for Undergraduate Medical Education Training program, 2019: pp 10-12

Day to day records and log book including certification of required skills should be given importance in internal assessment. Internal assessment should be based on competencies and skills.

The final internal assessment in a broad clinical specialty (e.g., Surgery and allied specialties etc.) shall comprise of marks from all the constituent specialties. The proportion of the marks for each constituent specialty shall be determined by the time of instruction allotted to each.

Learners must secure at least 50% marks of the total marks (combined in theory and practicals / clinicals) ;not less than 40%marks in theory and practical/clinical seperately) assigned for internal assessment in a particular subject in order to be eligible for appearing final University Examinations of that subject declared successful at the final University examination of that subject. The learner should be made aware of the results of Internal Assessment. The college has to build its own mechanism and the calendar of the college

should show the details regarding conduct of Internal assessment. Internal assessment marks will reflect as separate head of passing at the summative examination.

This content is based on the MCI Document. GMR 2019 page 83 11.1.1b5

The results of internal assessment should be displayed on the notice board within a 1-2 weeks of the test. Universities shall guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason.

7. Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject. GMR 2019 page 83 11.1.1b6 &7.

Proper record of the work should be maintained, which will be the basis of internal assessment of all students and should be available for scrutiny.

Weightage for internal assessment shall be 20% of total marks in the subject. A student must secure at least 50% of total marks fixed for internal assessment in a particular subject in order to be eligible to appear in the University Examination of that subject. *(vide Medical Council of India Notification on Graduate Medical Education (Amendment) Regulations 2019, published in the Gazette of India Part III, Section 4, Extraordinary issued on 4th November 2019)*

Suggested pattern of the Internal Assessment shall be based on the directives received from MCI Competency Based Assessment Module for Undergraduate Medical Education Training Program, 2019.

Phase	Minimum Number of tests during the year	Remarks
1st	Human Anatomy 3, Physiology 3, Biochemistry 3, Community Medicine 1	ECE assessment should be included subject-wise There should be at least one short question from AETCOM in each subject One of the 3 tests in preclinical subjects should be prelim or pre-university examination.

2nd	Pathology 3, Pharmacology 3, Microbiology 3, Two tests for- General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Dentistry, Anaesthesiology and Radiodiagnosis), Obstetrics& Gynaecology, Forensic Medicine & Toxicology and Community Medicine End of posting (EOP) examination at each clinical posting including those of allied subjects	• Clinical subjects should also be assessed at end of each posting (EOP) – Theory and Practical • There should be at least one short question from AETCOM in each subject • One of the 3 tests in Paraclinical subjects should be prelim or pre-university examination.
3rd	Forensic Medicine & Toxicology 2, Community Medicine 2 Ophthalmology 2, Otorhinolaryngology 2, Two tests for- General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics &Gynaecology EOP examination at each clinical posting including allied subjects	• Clinical subjects should also be tested at end of each posting (EOP)-Theory and Practical • There should be at least one short question from AETCOM in each subject • One of the tests in Ophthalmology, Otorhinolaryngology /Forensic Medicine &Toxicology/ Community Medicine should be prelim or pre-university examination
4th	Two Tests for- General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis),General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics & Gynaecology EOP examination at each clinical posting including that in allied subjects	• Clinical subjects should also be tested at end of each posting (EOP) -Theory and Practical • There should be at least one short question from AETCOM in each subject • One of the tests in Medicine, Surgery, Pediatrics and Obstetrics & Gynaecology should be prelim or

		preuniversity examination • Assessment of electives to be included in IA

This content is cited from :Medical Council of India. Competency Based Assessment Module for Undergraduate Medical Education Training program, 2019: Annexure I pp 24-25

Internal assessment conduction should involve all the faculty members of the department including Senior Residents. .Competency based Assessment requires focus on learning process and outcomes including psychomotor, communication and affective domains.Involvement of all the teaching faculty and Senior Residents helps in building ownership of teaching –learning methods and assessment as well.

Designing of IA needs adequate planning and blue printing to include all the domains of competency.

The IA of broader specialties should also include marks from all the allied specialties e.g. General Medicine should include marks of Psychiatry, Dermatology,Venereology & Leprosy and Respiratory Medicine including tuberculosis etc. while General Surgery should include Orthopaedics, Dentistry, Anaesthesiology and Radio-diagnosis etc, so that students do not ignore these postings. The proportion of the marks for each allied specialty shall be proportionate to the time of instruction allotted to each postings. When subjects are taught in more than one phase - the assessment mustbe done in each phase and must contribute proportionally to final internal assessment.

Assessment of Foundation Course should be included in formative assessment of first phase. Assessment of Early Clinical Exposure should be included in formative as well as in internal assessment in first phase subject-wise.Assessment of electives should contribute to internal assessment in final phase part-II.

There should be at least one assessment based on direct observation of skills,attitudes and communication at all levels. Communication and attitudinal assessment should also be built in all assessments as far as possible**.** A log book must be used to record these components.

Feedback in IA

Feedback should be provided to students throughout the course so that they are aware of their performance and remedial action can be initiated well in time. The feedbacks need to be structured and the faculty and students must be sensitized to giving and receiving feedback.
The results of IA should be displayed on notice board within 2 weeks of the test and an opportunity provided to the students to discuss the results and get feedback on making their performance better. Universities should guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason(s).

It is also recommended that students should sign with date whenever they are shown IA records in token of having seen and discussed the marks**. Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.**

Record keeping

The peculiarities of CBA, particularly its longitudinal nature and its use as a measure of progression, require a good record keeping. Such records can vary from manual to electronic.In whatever form they are used, the essential features should include regularity, availability to the students and a documentation of discussion of results (present status, feedback and suggestions for improvement) between the student and the teacher(s). Many aspects can be covered in a group feedback while some will require one to one discussion. The formats for use in Indian settings have been published and can be suitably modified for local use.

This content is cited from :Medical Council of India. Competency Based Assessment Module for Undergraduate Medical Education Training program, 2019: pp 10-14

A candidate who has not secured requisite aggregate in the internal assessment may be provisionally permitted to appear for university examination. However, he/she has to successfully complete the remediation measures prescribed by the institution/ university as the case may be, prior to the declaration of his/her results in that particular phase. Failure to meet prescribed 50% marks in Internal assessment after availing remedial measures will lead to annulment of the results of the candidate in that particular subject (s) in the university examination.

This content is based on the MCI Document, **Curriculum Implementation Support Program of the Competency Based Undergraduate Medical Education Curriculum 2019, extract of the Salient features of Graduate Medical Education Regulations 2019, page number** 88-91.

Internal assessment shall be based on day-to-day assessment. It shall relate to different ways in which learners participate in learning process including assignments, preparation for seminar, clinical case presentation, preparation of clinical case for discussion, clinical case study/problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test etc.

1. Regular periodic examinations shall be conducted throughout the course. There shall be no less than three internal assessment examinations in each Preclinical / Paraclinical subject and no less than two examinations in each clinical subject in a professional year. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year.
2. In subjects that are taught at more than one phase, proportionate weightage must be given for internal assessment for each Phase. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently.
3. Day to day records and log book should be given importance in internal assessment.Internal assessment should be based on competencies and skills. Learners must secure at least 50% marks of the total marks (combined in theory and practicals / clinicals) assigned for internal assessment in a particular subject in order to be declared successful at the final University examination of that subject. The learner should be made aware of the results of Internal Assessment. Each college can build itsown mechanism and the calendar of the college should show the details regarding conduct of Internal assessment. Internal assessment marks will reflect as separate head of passing at the summative examination.
4. A candidate who has not secured requisite aggregate in the internal assessment may be provisionally permitted to appear for university examination. However, he/she has to successfully complete the remediation measures prescribed by the institution university as the case may be, prior to the declaration of his/her results in that particular phase. Failure to meet prescribed 50% marks in Internal assessment after

availing remedial measures will lead to annulment of the results of the candidate in that particular subject (s) in the university examination.

UNIVERSITY EXAMINATIONS (As per GMER 2019 clause no 11.2 and its subclauses pages 83-84)

11.2.1 University examinations are to be designed with a view to ascertain whether the candidate has acquired the necessary knowledge, minimal level of skills, ethical and professional values with clear concepts of the fundamentals which are necessary for him/her to function effectively and appropriately as a physician offirst contact. Assessment shall be carried out on an objective basis to the extent possible.

11.2.2 Nature of questions will include different types such as structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part should be indicated separately. MCQs shall be accorded a weightage of not more than 20% of the total theory marks. In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks inaggregate (both papers together) to pass.

11.2.3 Practical/clinical examinations will be conducted in the laboratories or hospitalwards. The objective will be to assess proficiency and skills to conduct experiments, interpret data and form logical conclusion. Clinical cases kept in the examination must be common conditions that the learner may encounter as a physician of first contact in the community. Selection of rare syndromes and disorders as examination cases is to be discouraged. Emphasis should be on candidate's capability to elicit history, demonstrate physical signs, write a case record, analyze the case and develop a management plan.

11.2.4 Viva/oral examination should assess approach to patient management, emergencies, attitudinal, ethical and professional values. Candidate's skill in interpretation of common investigative data, X rays, identification of specimens,ECG, etc. is to be also assessed.

11.2.5 There shall be one main examination in an academic year and a supplementary to be held not later than 90 days after the declaration of the results of the main examination.

11.2.6 A learner shall not be entitled to graduate after 10 years of his/her joining of the first part of the MBBS course.

11.2.7 University Examinations shall be held as under:

(a) First Professional

1. The first Professional examination shall be held at the end of first Professional training (1+12 months), in the subjects of Human Anatomy, Physiology and Biochemistry.
2. A maximum number of four permissible attempts would be available to clear the first Professional University examination, whereby the first Professional course will have to be cleared within 4 years of admission to the said course. Partial attendance at any University examination shall be counted as an availed attempt.

(b) Second Professional

1. The second Professional examination shall be held at the end of second professional training (11 months), in the subjects of Pathology, Microbiology, and Pharmacology.

(c) Third Professional

1. Third Professional Part I shall be held at end of third Professional part 1 of training (12 months) in the subjects of Ophthalmology, Otorhinolaryngology, Community Medicine and Forensic Medicine and Toxicology
2. Third Professional Part II - (Final Professional) examination shall be at the end of training(14 months including 2 months of electives) in the subjects of General Medicine, General Surgery, Obstetrics & Gynaecology and Pediatrics. The discipline of Orthopaedics, Anaesthesiology, Dentistry and Radiodiagnosis will constitute 25% of the total theory marks incorporated as a separate section in paper II of General Surgery.
3. The discipline of Psychiatry and Dermatology, Venereology and Leprosy(DVL), Respiratory Medicine including Tuberculosis will constitute 25% of the total theory marks in General Medicine incorporated as a separate section in paper II of General Medicine

Phase of Course	Written-Theory – Total	Practicals/ Orals/ Clinicals	Pass Criteria
First Professional			Internal Assessment: **50%** separately in theory and practical for eligibility to appear for University Examinations University Examination Mandatory 50% marks in theory and practical (practical = practical/ clinical + viva)
Human Anatomy - 2 papers	200	100	
Physiology - 2 papers	200	100	
Biochemistry - 2 papers	200	100	
Second Professional			
Pharmacology - 2 Papers	200	100	
Pathology - 2 papers	200	100	
Microbiology - 2 papers	200	100	
Third Professional Part – I			
Forensic Medicine & Toxicology - 1 paper	100	100	
Ophthalmology – 1 paper	100	100	
Otorhinolaryngology – 1 paper	100	100	
Community Medicine - 2 papers	200	100	
Third Professional Part – II			
General Medicine - 2 papers	200	200	
General Surgery - 2 papers	200	200	
Pediatrics – 1 paper	100	100	
Obstetrics & Gynaecology - 2 papers	200	200	

Chart depicting the break up of marks for the University Examinations,Minimum marks to be obtained in Internal Assessment and pass criteria table no 10 page 84 of GMR 2019

Note: At least one question in each paper of the clinical specialties should test knowledge - competencies acquired during the professional development programme (AETCOM module); Skills competencies acquired during the Professional Development programme (AETCOM module) must be tested during clinical, practical and viva.

Criteria for passing in a subject:

[As per clause 11.2.8 GMR 2019 page 85]

A candidate shall obtain 50% marks in University conducted examination separately in Theory and Practical (practical includes: practical/ clinical and viva voce) in order to be declared as passed in that subject.

In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass in the said subject.

University Examination - Subjects and Marks

Suggested theory marks distribution based on CISP booklet page no: 91

	Anatomy	**Physiology**	**Biochemistry**
Theory Marks			
Paper I	100	100	100
Paper II	100	100	100
Total Theory Marks University Exam	**200**	**200**	**200**
Practicals + Viva-voce			
Practicals	60	60	60
Viva Voce	40	40	40
Total Practical + Viva University Exam	**100**	**100**	**100**
Internal assessment			
Theory	40	40	40
Practical + Viva-Voce	20	20	20
Total	**60**	**60**	**60**

Question paper pattern as suggested by CBME batches:

For paper I

Type of Questions	**Number of questions**	**Marks for each question**	**Total marks**
MCQS	20	1 (ONE)	20
Essay type questions	2	10	20
Short Essay types questions	6	5	30
Short Answers	10	3	30
Total			100

For paper II

Type of Questions	**Number ofquestions**	**Marks for each question**	**Total marks**
MCQs	20	01	20
Long Essay type questions	2	10	20
Short Essay types questions	6	5	30
Short Answer questions	10	3	30
			100

8. SUBMISSION OF LABORATORY RECORD NOTE BOOK

Each candidate shall submit to the Examiners his/her laboratory notebook duly certified by the Head of the Department as a bonafide record of the work done by the candidate at the time of Practical/Clinical Examination.

The candidate may be permitted by the examiners to refer the practical record book during the Practical Examination in the subject of Biochemistry only. No other material,

handwritten, cyclostyled or printed guides are allowed for reference during the practical examination.

After fulfilling the requisite criteria in Internal Assessment and Attendance, the candidate, must obtain 50% marks in aggregate with a minimum of 50% marks in Theory minimum of 50% marks in Practical / Clinical + viva voce seperately in each of the subjects. In subjects having two theory papers the candidate should secure minimum 40% of marks and 50% together to be declared as pass.

A candidate not securing 50% marks in aggregate in Theory or Practical/Clinical examination in a subject shall be declared to have failed in that subject and is required to appear for both theory and Practical/Clinical again in the subsequent examination in that subject.

10. DECLARATION OF CLASS:

a) A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with distinction.
b) A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 65% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.
c) A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 65% of grand total marks prescribed will be declared to have passed the examination in Second Class.
d) A candidate passing the university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.

   [Please note fraction of marks should not be rounded off for clauses (a), (b) and (c)]

11. MIGRATION

a) Migration from one medical college another is not a right of a student. However, migration of students from one medical college to another medical college in India may be considered by Medical Council of India, only in exceptional cases on extreme compassionate grounds, provided following criteria are fulfilled. Routine migrations on other grounds shall not be allowed.

b) Both the colleges, i.e., one at which the student is studying at present and one to which migration is sought, should have been recognized by the Medical Council of India.
c) The applicant candidate should have passed first professional MBBS examination.
d) The applicant candidate should submit his/her application for migration complete in all respects, to all authorities concerned within a period of one month of passing (declaration of results) the first professional Bachelor of Medicine and Bachelor of Surgery (MBBS) examination.
e) The applicant candidate must submit an affidavit stating that he/she will pursue 18 months of prescribed study before appearing for II professional MBBS examination at the transferee medical college, which should be duly certified by the Registrar of the concerned University in which he/she is seeking transfer. The transfer will be applicable only after receipt of the affidavit.

NOTE I:

i. Migration during clinical course of study shall not be allowed on any ground.
ii. All applications for migration shall be referred to Medical Council of India by college authorities. No Institution/University shall allow migration directly without the approval of the Council.
iii. Council reserves the right, not to entertain any application which is not under the prescribed compassionate grounds and also to take independent decision where applicant has been allowed to migrate without referring the same to the Council.

NOTE II: * Compassionate grounds criteria:

i. Death of a supporting parent or guardian
ii. Illness of the candidate causing disability
iii. Disturbed conditions as declared by Government in the Medical College area.

12. ELIGIBILITY TO JOIN PHASE II OF THE COURSE

Only candidates who pass in all the Phase I (Pre Clinical) subjects shall be eligible to join the Phase II of the course.

Human Anatomy

Goal:

Aims at conveying comprehensive knowledge of the gross and microscopic structure and development of human body to provide anatomical basis for diseases and clinical conditions.

Objectives:

A. Knowledge:

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

a) Understand the normal disposition, functional and cross sectional anatomy of various structures of the body and its clinical relevance.
b) Identify the microscopic structure of various organs and tissue and comprehend their functions in order to understand the alterations in various disease processes.
c) Comprehend functional organizations of central nervous system and interpret various signs and symptoms presented as neurological deficit so that he/she may confidently make a diagnosis.
d) Demonstrate basic concepts of development of organs and tissues, explain the effect of Teratogenic, environmental factors and genetic mutations on critical stages of development.

B. Skills

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

a) Identify and locate all the structures of the body and mark the topography of the Living anatomy.
b) Identify the organs and tissues under the microscope.
c) Understand the principles of Karyotyping and identify the gross congenital anomalies.
d) Understand principles of newer imaging techniques and interpretation of CT scan Sonogram USG etc.
e) Understand clinical basis of some common clinical procedures i.e. intramuscular and intravenous injection, lumbar puncture and kidney biopsy etc.,

C. Integration:

From the integrated teaching of other basic sciences, student shall be able to correlate the structure and functions of the body in order to provide anatomical basis for various disease process.

Detail syllabus of Human Anatomy is given under following headings:

A. General Anatomy

B. Regional Anatomy

	I	-	Upper limb
	II	-	Lower Limb
	III	-	Abdomen& pelvis
	IV	-	Thorax
	V	-	Head Face Neck
	VI	-	Spinal Cord & Brain
C. Micro-Anatomy	I	-	General Histology
	II	-	Systemic Histology
D. Developmental Anatomy	I	-	General Embryology
	II	-	Systemic Embryology

E. Genetics

F. Radiological Anatomy, USG, CT, MRI

G. Surface Anatomy & Living Anatomy

H. University Exam pattern, Theory & Practical

I. Books recommended

SYLLABUS

A - GENERAL ANATOMY

Topic: Anatomical terminology (AN1.1)

- Normal anatomical position
- Planes of the body
- Terms used for relations and comparison
- Terms used for movements of the body

Topic: General features of bones and Joints (AN1.2, AN2.1 to AN2.6)

- Composition of bone and bonemarrow
- Parts, blood and nerve supply of a longbone
- Laws of ossification*
- Special features of asesamoidbone*
- Types of cartilage with its structure and distribution in body
- Joints with subtypes and examples
- Nerve supply of joints and Hilton's law

Topic: General features of Muscle (AN3.1 to AN3.3)

- Classification of muscle tissue according to structure and action
- Parts of skeletal muscle
- Differences between tendons and aponeurosis with examples
- Shunt and spurt muscles*

Topic: General features of skin and fascia (AN4.1 to AN4.5)

- Types of skin and dermatomes in body*
- Structure and function of skin
- Superficial fascia along with fat distribution in body
- Modifications of deep fascia with its functions
- Principles of skinincisions*

Topic: General features of the cardiovascular system (AN5.1 to AN5.8)

- Differences between blood vascular and lymphatic system
- Differences between pulmonary and systemic circulation
- General differences between arteries and veins
- Functional differences between elastic, muscular arteries and arterioles
- Concept of portal system with examples
- Concept of anastomosis and collateral circulation with significance of end-arteries
- Functions of meta-arterioles, precapillarysphincters, arterio-venousanastomosis*
- Definition of thrombosis, infarction and aneurysm*

Topic: General Features of lymphatic system (AN6.1 to AN6.3)

- Components and functions of the lymphatic system*
- Structure of lymph capillaries and mechanism of lymph circulation*
- Concept of lymphoedema and spread of tumorsvialymphatics and venoussystem*

Topic: Introduction to the nervous system(AN7.1toAN7.8)

- General plan of nervous system with components of central, peripheral and autonomic nervous systems.
- Components of nervous tissue and their functions
- Parts of aneuron
- Classification of neurons based on structure and function
- Structure of a typical spinal nerve
- Principles of sensory and motor innervations of muscles*
- Concept of loss of innervations of a muscle with its applied anatomy
- Type of synapses*
- Differences between sympathetic and spinal ganglia.

B-GENERAL HISTOLOGY

Topic:-Epithelium (AN 6.1 to AN.6.2)

- Identification of epithelium under the microscope
- Correlation of structure and function of epithelia
- Ultra structure of epithelium*

Topic: Connective tissue histology (AN66.1 to AN66.2)

- Types of connective tissue with functional correlation
- Ultrastructure of connective tissue*

Topic: Muscle histology (AN67.1 to AN67.3)

- Classification of muscle
- Structure-function correlation of muscle
- Ultrastructure of muscle tissue*

Topic: Nervous tissue histology (AN68.1toAN68.3)

- Descriptionandidentificationofunipolarandmultipolarneurons,ganglia, peripheral nerve.
- Structure-function correlation of neuron
- Ultrastructure of nervous tissue*

Topic: Blood vessels – histology (AN69.1 to AN69.3)

- Identification of elastic and muscular blood vessels, capillaries under the microscope.
- Types and structure-function correlation of blood vessels
- Ultrastructure of blood vessels*

Topic: Glands and Lymphoid tissue (AN70.1 to AN70.2)

- Identification of exocrine glands under the microscope
- Differentiation between serous, mucous and mixedacini
- Identification of lymphoid tissue under the microscope
- Micro anatomy of lymphnode, spleen, thymus, tonsil and correlation of structure with function.

Topic: Bone and Cartilage (AN71.1 to AN71.2)

- Identification of bone under the microscope.
- Types and structure-function correlation of bone.
- Identification of cartilage under the microscope.
- Types and structure function correlation of cartilage.

Topic: Integumentary System (AN72.1)

- Identification of skin and its appendages under the microscope.
- Correlation of structure and function.

C-GENETICS

Topic: Chromosomes (AN73.1 to AN73.3)

- Structure of chromosomes with classification
- Technique of Karyotyping with its applications
- Lyon's hypothesis

Topic: Patterns of Inheritance (AN74.1 to AN74.4)

- Various modes of inheritance with examples
- Pedigree charts for the various types of inheritance
- Examples of diseases of each mode of inheritance
- Multifactorial inheritance with examples
- Genetic basis and clinical features of archondroplasia, cystic, fibrosis, vitamin D resistant rickets, hemophilia, Duchene’s muscular dystrophy and sickle cell anemia*

Topic: Principle of Genetics, Chromosomal Aberrations and Clinical Genetics (AN75.1 to AN75.5)

- Structural and numerical chromosomalaberrations
- Mosaics and chimeras with examples
- Genetic basis and clinical features of PraderWilli syndrome, Edward syndrome and Patausyndrome*
- Genetic basis of variation: polymorphism and mutation
- Principles of genetic counseling

D- GENERAL EMBRYOLOGY

Topic: Introduction to embryology (AN76.1 TO AN76.2)

- Stages of human life
- Terms - phylogeny, ontogeny, trimester, viability

Topic: Gamatogenesis and fertilization (AN77.1 to AN77.6)

- Uterinechanges occurring during the menstrual cycle
- Synchrony between the ovarian and menstrual cycles
- Spermatogenesis and oogenesis
- Stages and consequences of fertilization
- Anatomical principles underlying contraception
- Teratogenic influences; fertility and sterility, surrogate motherhood, social significance of "sex-ratio"*

Topic: Second week of development (AN78.1 to AN78.5)

- Cleavage and formation of blastocyst
- Development of trophoblast
- Process of implantation and common abnormal sites of implantation
- Formation of extra-embryonic mesodermandcoelom, bilaminardiscandprochordal plate.
- Abortion, decidual reaction, pregnancy tests

Topic: 3rd to 8th week of development (AN79.1 to AN79.6)

- Formation and fate of the primitive streak
- Formation and fate of notochord
- Process of neurulation
- Development of somites and intra-embryoniccoelom
- Embryological basis of congenital malformations, nucleus pulposus, sacrococcygealteratomas, neural tubedefects
- Diagnosis of pregnancy in first trimester*

- Role of teratogens, alpha-fetoprotein*

Topic: Fetal membranes (AN80.1 to AN80.7)

- Formation, functions and fate of chorion, amnion, yolksac, allantoisanddecidua.
- Formation and structure of umbilical cord
- Formation of placenta, its physiological functions, foeto-maternal circulation and placental barrier
- Embryological basis of twinning in monozygotic and dizygotictwins
- Role of placental hormones in uterine growth and parturition
- Embryological basis of estimation of fetalage*
- Types of umbilical cord attachments*

Topic: Prenatal Diagnosis (AN81.1 to AN81.3)

- Methods of prenatal diagnosis
- Indications, process and disadvantages of amniocentesis
- Indications, process and disadvantages of chorion villusbiopsy

E- UPPER LIMB

Topic: Features of individual bones (Upper Limb) (AN8.1 to AN8.6)

- Clavicle, scapula, humerus, radius, ulna - side determination, anatomical position and important features
- Joints formed by the given bone
- Peculiarities of clavicle
- Muscle group attachments on above bones
- Identification and naming of bones in articulated hand
- Parts of metacarpals and phalanges
- Peculiarities of pisiform
- Scaphoid fracture and basis of avascularnecrosis*

Topic: Pectoral region (AN9.1 to AN 9.3)

- Pectoralis major, pectoralis minor - attachment, nerve supply and action
- Breast - location, extent, deep relations, structure, age changes, blood supply, lymphatic drainage, microanatomy and applied anatomy
- Development of breast*

Topic: Axilla, Shoulder and Scapular region (AN 10.1 to AN10.13)

- Axilla - boundaries and contents
- Axillary artery and tributaries of vein - origin, extent, course, parts, relations and branches
- Brachial plexus - formation, branches, relations, area of supply of branches, course and relations of terminal branches
- Axillary lymph nodes - anatomical groups and areas of drainage

- Variations in formation of brachialplexus
- Erb'spalsyandKlumpke'sparalysis-anatomicalbasisandclinicalfeatures*
- Enlarged Axillary lymph nodes – anatomical basis*
- Latissmusdorsi and trapezius- location, attachment, nerve supply and actions
- Arterial anastomosis around the scapula*
- Boundaries of triangle of auscultation*
- Deltoid and rotator cuffmuscles
- Serratus anterior - attachment and actions
- Shoulder joint - type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy
- Anatomical basis of injury to Axillary nerve during intramuscular injections

Topic: Arm and Cubital fossa (AN11.1 to AN11.6)

- Muscle groups of upper arm
- Biceps and tricepsbrachii
- Important nerves and vessels in arm - origin, course, relations, branches (or tributaries),termination
- Venepuncture of cubital veins – anatomical basis
- Saturday night paralysis – anatomical basis
- Cubital fossa - boundaries and contents
- Anastomosis around elbow joint*

Topic: Forearm and hand (AN12.1 to AN12.15)

- Ventral forearm - muscle groups with attachments, nerve supply and actions
- Nerves and vessels of forearm - origin, course, relations, branches (or tributaries), termination
- Flexor retinaculum - identification and attachments
- Anatomical basis of carpal tunnel syndrome
- Small muscles of hand
- Movements of thumb and muscles involved
- Blood vessels and nerves in hand - course and branches
- Anatomical basis of clawhand
- Fibrous flexor sheaths, ulnar bursa, radial bursa and digital synovialsheaths
- Infection of fascial spaces of palm*
- Dorsal forearm - muscle groups, attachments, nerve supply and actions
- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of forearm
- Wrist drop – anatomical basis
- Compartments deep to extensorretinaculum
- Extensor expansion – identification and formation

Topic: General Features, joints, radiographs and surface marking (AN13.1 to AN13.8)

- Fascia of upper limb and compartments
- Veins of upperlimb
- Lymphatic drainage of upperlimb
- Dermatomes of upperlimb*
- Elbow joint, proximal and distal radio-ulnar joints, wrist joint and first carpometacarpal joint - type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, blood and nerve supply
- Sternoclavicular joint, acromioclavicular joint, carpometacarpal joints and metacarpophalangeal joints*
- Bones and joints of upper limb seen in anteroposterior and lateral view radiographs of shoulder region, arm, elbow, forearm and hand
- Bony landmarks of upperlimb-jugularnotch, sternalangle, acromialangle, spine of the scapula, vertebral level of the medialend, inferiorangle of the scapula
- Surface projection of cephalic and basilica vein
- Palpation of brachial artery and radialartery
- Testing of muscles: trapezius, pectoralis major, serratus anterior, latissimusdorsi, deltoid, biceps brachii, brachioradialis
- Development of upperlimb*

Thorax

Topic: Thoracic cage (AN21.1 to AN21.11)

- Salientfeaturesofsternum,typicalrib,1stribandtypicalthoracicvertebra
- Features of 2nd, 11th and 12thribs*
- Features of 1st, 11th and 12th thoracicvertebrae*
- Boundaries of thoracic inlet, cavity and outlet
- Extent, attachments, direction of fibres, nerve supply and actions of intercostal muscles
- Course, relations and branches of a typical intercostals nerve
- Origin,courseandbranches/tributariesofanterior,posteriorintercostalvesselsand internal thoracicvessels
- Origin, course, relations and branches of atypical intercostal nerve, superior intercostal artery and subcostal artery*
- Type, articular surfaces and movements of manubriosternal, costovertebral, costotransverse and xiphisternal joints
- Mechanics and types of respiration
- Costochondral and interchondral joints*
- Boundaries and contents of the superior, anterior, middle and posteriormediastinum

Topic: Heart and Pericardium (AN22.1 to AN22.7)

- Pericardium - subdivisions, sinuses, blood supply and nerve supply
- External and internal features of each chamber of the heart
- Origin, course and branches of coronary arteries
- Anatomical basis of ischaemic heart disease
- Formation, course, tributaries and termination of coronary sinus
- Fibrous skeleton of heart
- Position and arterial supply of the conducting system of heart

Topic: Mediastinum (AN23.1 to AN23.7)

- Oesophagus - external appearance, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy
- Thoracic duct - extent, relations, tributaries and applied anatomy
- Origin, course, relations, tributaries and termination of superior venacava, azygos, hemiazygos and accessory hemiazygosveins
- Branches and relations of arch of aorta and descending thoracicaorta
- Location and extent of thoracic sympathetic chain
- Description of splanchnicnerves*
- Right lymphatic duct – extent, relations and applied anatomy

Topic: Lungs and Trachea (AN24.1 to AN24.6, AN25.1 to AN25.6)

- Pleura – extent, recesses with their applied anatomy, blood supply, lymphatic drainage and nerve supply
- Lungs – side determination, external features including root and clinical correlates
- Description of bronchopulmonary segments
- Phrenic nerve - formation and distribution
- Blood supply, lymphatic drainage and nerve supply of lungs
- Extent, length, relations, blood supply, lymphatic drainage and nerve supply of trachea*

Topic: Radiological anatomy of thorax (AN25.7 and AN25.8)

- Identification of structures seen on a plain x-ray chest (PAview)
- Identification of and description in brief of a bariumswallow*

Topic: Surface marking of thorax (AN25.9)

- Demonstrate surface marking of lines of pleural reflection, lung borders and fissures, trachea, heart borders, apexbeat and surface projection of valves of heart

Topic: Histology of thorax (AN25.1)

- Identification, drawing and labelling of a slide of trachea and lung

Topic: Embryology of thorax (AN25.2 to AN25.6)

- Development of pleura, lung and heart
- Fetal circulation and changes occurring at birth
- Embryological basis of: 1) atrial septal defect, 2) ventricular septal defect, 3) Fallot's tetralogy and 4) tracheo-oesophagealfistula
- Developmental basis of common cardiac congenital anomalies, transposition of great vessels, dextrocardia, patent ductusarteriosus and coarctation of aorta
- Development of aortic arch arteries, superior vena cava, inferior vena cava and coronary sinus*

F- ABDOMEN AND PELVIS

Topic: Anterior abdominal wall (AN44.1 to AN44.7)

- Planes(transpyloric,transtubercular,subcostal,lateralvertical),regionsand quadrants of abdomen
- Anterior abdominal wall – fascia, blood vessels and nerves
- Rectus sheath – formation, contents, linea alba and linease milunaris
- Inguinalcanal-extent,boundaries,contentsofinguinalcanal,Hesselbach'striangle
- Anatomical basis of inguinalhernia
- Attachments of muscles of anterior abdominal wall
- Common abdominal incisions*
- Umbilicus - position, dermatome and applied aspects*

Topic: Posterior abdominal wall (AN45.1 to AN45.3)

- Thoracolumbarfascia
- Lumbar plexus – root value, formation and branches
- Other nerve plexuses of posterior abdominal wall*
- Major subgroups of back muscles, nerve supply and action*

Topic: Male external genitalia (AN46.1 to AN46.5)

- Testes-coverings,internalstructure,sidedetermination,bloodsupply,nervesupply and lymphatic drainage
- Descent of testis with its applied anatomy
- Parts of epididymis
- Penis - parts, components, blood supply and lymphatic drainage
- Anatomical basis of varicocoele*
- Anatomical basis of phimosis and circumcision*
- Spermatic cord and its contents

Topic: Abdominal cavity (AN47.1 to AN47.14)

- Greater and lesser sac - boundaries and recesses
- Naming and identification of peritoneal folds and pouches
- Anatomical basis of ascites, peritonitis and sub phrenicabscess*
- Spleen - anatomical position, external features, peritoneal and visceral relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Anatomical basis of splenic notch, accessory spleens and Kehr'ssign*
- Coeliac trunk- origin, course, important relations and branches
- Abdominal part of oesophagus - anatomical position, blood supply, nerve supply, lymphatic drainage and applied aspects
- Stomach - anatomical position, external features, peritoneal and visceral relations, blood supply, nerve supply, lymphatic drainage and applied anatomy
- Anatomical basis of lymphatic spread in carcinoma stomach and different types of vagotomy*
- Mesentery – extent, borders, contents, relations and applied aspects
- Small Intestine - parts, macroscopic difference between jejunum and ileum, nerve supply and lymphatic drainage
- Superior mesenteric artery - origin, course, termination, important relations and branches
- Large intestine - features, extent, peritoneal and otherrelations
- Caecum - anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Vermiformappendix-anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Inferior mesenteric artery - origin, course, important relations and branches
- Duodenum - anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Pancreas - anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Liver and extrahepatic biliary apparatus - anatomical position, external features, important peritoneal relations and visceral relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Clinical importance of Calot's triangle*
- Anatomical basis of site of needle puncture in liver biopsy, referred pain in cholecystitis and obstructivejaundice*
- Portal vein – formation, course, relations, tributaries and sites of porta-systemic anastomosis

- Anatomical basis of haematemesis and caput medusae in portal hypertension
- Kidneys - anatomical position, side determination, coverings, external features, important visceral relations, blood supply, nerve supply, lymphatic drainage and applied anatomy
- Anatomical basis of radiating pain of kidney togroin*
- Ureter – extent, parts, course, relations, constrictions, blood supply, nerve supply, lymphatic drainage and applied aspects
- Suprarenal gland - anatomical position, coverings, external features, important visceral and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects
- Thoraco-abdominal diaphragm – attachments, major and minor openings, nerve supply and actions
- Thoraco-abdominal diaphragm - abnormal openings and diaphragmatichernia*
- Abdominal aorta - origin, course, important relations and branches
- Inferior vena cava - formation, course, relations and tributaries

Topic: Pelvic wall and viscera (AN48.1 to AN48.8)

- Muscles of pelvic diaphragm
- Position, features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and clinical aspects of important male and female pelvic viscera
- Origin, course, important relations and branches of internal iliacartery
- Branches of sacralplexus
- Anatomical basis of suprapubiccystostomy, urinary obstruction in benign prostatic hypertrophy, retroverted uterus, prolapse uterus, internal and external haemorrhoids,analfistula,vasectomy,tubalpregnancyandtuballigation*
- Neurological basis of automatic bladder*
- Lobes involved in benign prostatic hypertrophy and prostatecancer*
- Structures palpable during vaginal and rectalexamination*

Topic: Perineum (AN49.1 to AN49.5)

- Boundaries and contents of superficial and deep perineal pouch
- Perineal body - identification and description
- Perineal membrane in male and female
- Ischiorectal fossa - boundaries, contents and applied anatomy
- Anatomicalbasisofperinealtear,episiotomy,perianalabscessandanalfissure*

Topic: Vertebral column (AN50.1 to AN50.4)

- Curvatures of the vertebral column
- Type, articular ends, ligaments and movements of intervertebral joints, sacroiliac joints and pubicsymphysis
- Site, direction of the needle and structures pierced during lumbarpuncture

- Anatomical basis of scoliosis, lordosis, prolapseddisc, spondylolisthesis and spina bifida*

Topic: Sectional Anatomy of Abdomen and Pelvis (AN51.1, AN51.2)

- Cross-sections at T8, T10 and L1 (transpyloric plane)levels
- Midsagittal section of male and female pelvis

Topic: Histology and embryology (AN52.1 to AN52.8)

- Microstructure of oesophagus, cardiooesophageal junction*, fundus of stomach, pylorus of stomach
- Microstructure of duodenum, jejunum, ileum
- Microstructure of colon, appendix
- Microstructure of liver, gallbladder, pancreas
- Microstructure of kidney, ureter, suprarenalgland
- Microstructure of testis, epididymis, vas deferens, penis, prostategland
- Microstructure of ovary, uterus, uterinetube, cervix*, placenta, umbilicalcord, corpusluteum*
- Development of anterior abdominal wall*
- Development and congenital anomalies of diaphragm
- Development and congenital anomalies of foregut
- Development and congenital anomalies of midgut
- Development and congenital anomalies of hindgut
- Development of urinary system
- Development of male reproductive system
- Development of female reproductive system

Topic: Osteology (AN53.1 to AN53.4)

- Lumbar vertebrae - anatomical position, salient features, articulations and attachments of muscle groups
- Sacrum and coccyx - anatomical position, salient features, articulations and attachments of muscle groups
- Bonypelvis-anatomical position, boundaries of pelvicinlet, pelviccavity and pelvic outlet,
- True and false pelvis with sex differences
- Clinical importance - sacralization of lumbar vertebra, lumbarization of 1st sacral vertebra, types of bonypelvis*

Topic: Radiological anatomy (AN 54.1 to AN54.3)

- Features of plain X- ray abdomen
- Contrast X- ray - barium swallow, barium meal, bariumenema
- Cholecystography
- Intravenouspyelography

- Hysterosalpingography
- ERCP*
- CT -abdomen*
- MRI-abdomen and pelvis*
- Abdominal arteriography*

Topic: Surface marking (AN 55.1 and AN55.2)

- Regions and planes of abdomen
- Superficial inguinal ring
- Deep inguinal ring
- McBurney's point
- Renalangle
- Murphy's point
- Surface projections of - stomach, liver, fundus of gall bladder, spleen, duodenum, pancreas, ileocaecal junction, kidneys and root of mesentery, abdominal aorta and inferior venacava

G- Lower Limb

Topic: Features of individual bones (lower limb) (AN 14.1 – 14.4)

- Hip bone, femur, patella, tibia, fibula - side determination, anatomical position and important feature
- Joints formed by the given bone
- Muscle group attachments on above bones
- Importance of ossification of lower end of femur and upper end of tibia
- Identification and naming of bones in articulated foot with individual muscle attachments*

Topic: Front & Medial Side of Thigh (AN15.1 to AN15.6)

- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of anteriorthigh
- Major muscles with their attachment, nerve supply and actions
- Femoral triangle - boundaries and contents
- Anatomical basis of psoas abscess & femoralhernia*
- Adductor canal – boundaries and contents

Topic: Gluteal region & Back of thigh (AN16.1 to AN16.6)

- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of gluteal region
- Major muscles with their attachment, nerve supply and actions
- Anatomicalbasisofsciaticnerveinjuryduringglutealintramuscularinjections
- Anatomical basis of Trendelenburgsign
- Hamstring group of muscles with their attachment, nerve supply and actions

- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels on the back of thigh
- Popliteal fossa - boundaries, roof, floor, contents and relations

Topic: Hip joint (AN17.1 to AN17.3)

- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply, bursae around the hip joint
- Anatomical basis of complications of fracture neck of femur*
- Dislocation of hip joint and surgical hipreplacement*

Topic: Knee joint, Antero-lateral compartment of leg & Dorsum of foot (AN18.1 to AN18.7)

- Major muscles of anterolateral compartment of leg with their attachment, nerve supply and actions
- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of anterolateral compartment of leg
- Anatomical basis of foot drop
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply, bursae around the knee joint
- Anatomical basis of locking and unlocking of the knee joint
- Anatomical basis of knee joint injuries*
- Anatomical basis of osteoarthritis*

Topic: Back of leg & Sole (AN19.1 to AN19.7)

- Major muscles of back of leg with the irattachment, nerve supply and actions
- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of leg
- Concept of "peripheral heart"
- Sole - layers, muscles, vessels and nerves
- Anatomical basis of rupture of calcanealtendon*
- Factors maintaining arches of the foot and their importance
- Anatomical basis of flat foot and clubfoot*
- Anatomical basis of metatarsalgia and plantarfasciitis*

Topic: General features, joints, radiographs & surface marking (AN 20.1 – 20.10)

- Tibi of ibular and ankle joints - type, articular surfaces, capsule, synovial membrane,
  ligaments,relations,movementsandmusclesinvolved,bloodandnervesupply
- Subtalar and transverse tarsal joints*
- Fascia lata, venous drainage, lymphatic drainage, retinacula and dermatomes of

lower limb
- Anatomical basis of enlarged inguinal lymphnodes*
- Anatomical basis of varicose veins and deep veinthrombosis
- Bones and joints of lower limb seen in anteroposterior and lateral view radiographs of various regions of lower limb
- Important bony landmarks of lower limb - vertebral level of highest point on iliac crest, anterior and posterior superior iliac spines, iliac tuberosity, pubic tubercle, ischial tuberosity, adductor tubercle, tibial tuberosity, head of fibula, medial and lateral malleoli, condyles of femur and tibia, sustentaculumtali, tuberosity of fifth metatarsal and tuberosity of the navicular
- Palpation of arterial pulses in a simulated environment - femoral, popliteal, anterior tibial, posterior tibial and dorsalispedis
- Surface marking - mid inguinal point, saphenous opening, great and small saphenous veins, femoral nerve, sciatic, tibial, common peroneal and deep peroneal nerve
- Basic concept of development of lower limb*

H-HEAD AND NECK

Topic: Skull osteology (AN26.1 to AN26.7)
- Anatomical position of skull
- Identification and naming of individual skull bones
- Features of normafrontalis, verticalis, occipitalis, lateralis and basalis
- Cranial cavity - subdivisions, foramina and structures passing through them
- Morphological features of mandible
- Features of typical and atypical cervical vertebrae (atlas andaxis)
- Concept of membranousossification*
- Features of the 7th cervicalvertebra*

Topic: Scalp (AN27.1 and AN27.2)
- Scalp - layers, blood supply, nerve supply and surgical importance
- Emissary veins and their role in spread of infection from extracranial route to intracranial venoussinuses

Topic: Face and parotid region (AN28.1 to AN28.10)
- Muscles of facial expression and their nervesupply
- Sensory innervation offace
- Origin / formation, course, branches / tributaries of facial vessels
- Branches of facial nerve with distribution
- Cervicallymphnodes and lymphatic drainage of head, face and neck
- Superficial muscles of face, their nerve supply and actions

- Anatomical basis of facial nervepalsy
- Surgical importance of deep facial vein
- Parotid gland - parts, borders, surfaces, contents, relations, nerve supply, course of its duct and surgical importance
- Anatomical basis of Frey's syndrome*

Topic: Posterior triangle of neck (AN29.1 to AN29.4)

- Sternocleidomastoid - attachments, nerve supply, relations and actions
- Anatomical basis of Erb's and Klumpke'spalsy
- Anatomical basis of wryneck*
- Attachments of inferior belly of omohyoid, scalenus anterior, scalenusmedius and levatorscapulae*

Topic: Cranial cavity (AN30.1 to AN30.5)

- Cranial fossae and related structures
- Major foramina with structures passing through them
- Identification and description of dural folds and dural venous sinuses
- Clinical importance of dural venous sinuses
- Effect of pituitary tumours on visual pathway*

Topic: Orbit (AN31.1 to AN31.5)

- Extraocular muscles – demonstration and description
- Nerves and vessels in the orbit - demonstration and description
- Anatomical basis of Horner's syndrome*
- Components of lacrimal apparatus
- Anatomical basis of oculomotor, trochlear and abducent nerve palsies along with strabismus

Topic: Anterior triangle of neck (AN32.1 and AN32.2)

- Boundaries and subdivisions of anterior triangle
- Boundaries and contents of muscular, carotid, digastric and submental triangles

Topic: Temporal and infratemporal region (AN33.1 to AN33.5)

- Temporal and infratemporal fossae - extent, boundaries and contents
- Muscles of mastication-attachments, direction of fibres, nervesupply and actions
- Temporomandibular joint - articulating surface, type and movements
- Clinical significance of pterygoid venousplexus
- Features of dislocation of temporomandibularjoint*

Topic: Submandibular region (AN34.1 and AN34.2)

- Submandibular salivary gland - morphology, relations and nerve supply including submandibularganglion
- Anatomical basis of formation of submandibularstones*

Topic: Deep structures in the neck (AN35.1 to AN35.10)

- Deep cervical fascia - parts, extent, attachments and modifications
- Thyroid gland - location, parts, borders, surfaces, relations and blood supply
- Sub clavian artery - origin, parts, course and branches
- Internal jugular and brachio cephalic veins -formation, course, relations, tributaries and termination
- Cervical lymph nodes - extent, drainage and applied anatomy
- Cervical sympathetic chain - extent, formation, relation and branches
- IX, X, XI and XII cranial nerves - course and branches in the neck
- Anatomical basic of clinical features of thyroid swellings*
- Anatomical basis of clinical features of compression of sub clavian artery and lower trunk of brachial plexus by cervicalrib*
- Fascial spaces of neck*

Topic: Mouth, pharynx and palate (AN36.1 to AN36.5)

- Palatine tonsil - morphology, relations, blood supply and applied anatomy
- Composition of softpalate
- Waldeyer's lymphatic ring - components and functions
- Pyriform fossa - boundaries and clinical significance*
- Anatomical basis of tonsillitis, tonsillectomy, adenoids and peri-tonsillarabscess*
- Clinical significance of Killian'sdehiscence*

Topic: Cavity of nose (AN37.1 to AN37.3)

- Nasalseptumandlateralwallofnose–features,bloodsupplyandnervesupply
- Paranasal sinuses - location and functional anatomy
- Anatomical basis of sinusitis and maxillary sinustumours*

Topic: Larynx (AN38.1 to AN38.3)

- Larynx-morphology, structure of the walls, nerve supply, blood supply and actions of intrinsic and extrinsic muscles
- Anatomical aspects of laryngitis*
- Anatomical basis of recurrent laryngeal nerve injury*

Topic: Tongue (AN39.1 and AN39.2)

- Tongue - morphology, nerve supply, embryological basis of nerve supply, blood supply, lymphatic drainage and actions of extrinsic and intrinsic muscles
- Anatomical basis of hypoglossal nervepalsy*

Topic: Organs of hearing and equilibrium (AN40.1 to AN40.5)

- External ear - parts, blood supply and nervesupply
- Middle ear and auditory tube - boundaries, contents, relations and functional

anatomy
- Features of internalear*
- Anatomical basis of otitis externa and otitismedia*
- Anatomical basis of myringotomy*

Topic: Eyeball (AN41.1 to AN41.3)
- Eyeball - parts and layers
- Anatomical aspects of cataract, glaucoma and central retinal arteryocclusion*
- Intraocular muscles - position, nerve supply and actions*

Topic: Back region (AN42.1 to AN42.3)
- Contents of the vertebralcanal
- Suboccipital triangle - boundaries and contents
- Semispinaliscapitis and splenius capitis - position, direction of fibres, relations, nerve supply and actions*

Topic: Head and neck joints, histology, development, radiography and surface marking (AN43.1 to AN43.9)

- Atlantooccipital joint and atlantoaxial joint - movements with muscles producing them
- Microanatomy of pituitary gland, thyroidgland, parathyroidgland, tongue, salivary glands, tonsil, epiglottis, cornea and retina
- Microanatomy of olfactory epithelium, eyelid, lip, sclera-corneal junction, optic nerve, cochlea, organ of Corti and pinealgland*
- Development and developmental basis of congenital anomalies of face, palate, tongue, branchial apparatus, pituitary gland, thyroid gland and eye
- Testing of muscles of facial expression, extraocular muscles and muscles of mastication,
- Palpation of arteries - carotid, facial and superficial temporal arteries
- Location of - hyoid bone, thyroid cartilage and cricoid cartilage with their vertebral levels
- Surface marking - thyroid gland, parotid gland and duct, pterion, common carotid artery, internal jugular vein, subclavian vein, external jugular vein, facial artery in the face and accessory nerve
- Identify the anatomical structures in 1) Plain X-ray skull – AP and lateral view; 2) PlainX-raycervical spine-AP and lateral view;3)PlainX-ray of paranasal sinuses
- Carotid and vertebral angiograms- anatomical route and anatomical structures*

I NEUROANATOMY

Topic: Meninges and CSF (AN56.1 and AN56.2)

- Meninges - layers with their extent and modifications
- Circulation of CSF with its applied anatomy

Topic: Spinal cord (AN57.1 to AN57.5)

- Spinal cord-external features, extentin child and adult with its clinical implications
- Transverse section of spinal cord at mid-cervical and mid-thoracic level
- Ascending and descending tracts at mid thoracic level of spinal cord
- Anatomical basis of syringomyelia*

Topic: Medulla oblongata (AN58.1 to AN58.4)

- Medulla oblongata – external features
- Transverse section of medulla oblongata at the level of 1) pyramidal decussation; 2) sensory decussation; 3) inferior olivary nucleus
- Cranial nerve nuclei in medulla oblongata with their functional components
- Anatomical basis and effects of medial and lateral medullary syndrome*

Topic: Pons (AN59.1 to AN59.3)

- Pons – external features
- Transverse section of pons at the upper and lower level
- Cranial nerve nuclei in pons with their functional components

Topic: Cerebellum (AN60.1 to AN60.3)

- Cerebellum - external and internal features
- Connections of cerebellar cortex and intracerebellar nuclei
- Anatomical basis of cerebellardysfunction*

Topic: Midbrain (AN61.1 to AN61.3)

- Midbrain - external and internal features
- Internal features of midbrain at the level of superior and inferiorcolliculus
- Anatomical basis and effects of Benedikt's and Weber's syndrome*

Topic: Cranial nerve nuclei and cerebral hemispheres (AN62.1 to AN62.6)

- Cranial nerve nuclei with their functional components
- Cerebral hemispheres – poles, surfaces, sulci, gyri and functional areas
- White matter of cerebrum
- Basal ganglia and limbic lobe - parts and major connections
- Dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus - boundaries, parts, gross relations, major nuclei and connections
- Circle of Willis - formation, branches and major areas of distribution

Topic: Ventricular system (AN63.1 and AN63.2)

- Lateral, 3rd and 4th and ventricles - parts, boundaries and features
- Anatomical basis of congenital hydrocephalus*

Topic: Histology and Embryology (AN64.1 to AN64.3)

- Micro anatomical features of spinal cord, cerebellum and cerebrum
- Development of neural tube, spinal cord, medulla oblongata, pons, midbrain, cerebral hemispheres and cerebellum
- Various types of open neural tube defects with their embryologicalbasis*

J- ETHICS IN ANATOMY –AN82.1

- Demonstrate respect and follow the correct procedure when handling cadavers
- other biologic tissue

Note:-1.AN1.*1. First two alphabets represents the subject (see list) number following alphabet reflects topic number, following period a running number.*
***2**. *Number given are for illustrative purposes only and should not be compared with the same in curriculum documents.*

Summary time allotted, teaching and learning methods and student assessment

TIME ALLOTTED

Curricular component	Time allotted in hours
Lectures	220
Small group teaching / tutorials / integrated learning /practical	415
Self-directed learning	40
Early clinical exposure (basic science correlation and clinical skills)	30 (18 +12)
Formative assessment and term examinations	30
Total	**739**

AETCOM module 1.1 and 1.5	8+4 hours

- The number of hours can be modified to suit the specific requirement to address the topics.
- Less than one third of the total time allotted is used for didactic teaching.

- Greater emphasis is laid on hands-on training, symposia, seminars, small group discussions, problem-oriented and problem-based discussions and self- directed learning.
- Students shall be encouraged to take active part in and share the responsibility for their learning.

Suggested Guidelines for the teaching and learning methods

LECTURE

The salient features of teaching and learning methods used-

- All lectures shall have well defined Specific learning objectives which are linked to the relevant competencies. Learning objectives shall be observable and assesible. Bloom's taxonomy shall be used as a reference in choosing verbs for defining the learning objectives.
- The focus shall be on the must-know component of the topic.
- As anatomy is largely visually based subject appropriate pictures and videos shall be utilized.
- The anatomical basis of clinical conditions pertaining to the topic shall be addressed.
- Interactivity shall be built into the lectures by asking open ended questions, quizzes, incomplete handouts, creation of models, solving problems or a flipped classroom approach, to name a few methods..

1) EARLY CLINICAL EXPOSURE (ECE): Needs to be entered in log book

2) SELF-DIRECTED LEARNING: Forty hour time for self-directed learning is allotted for Anatomy

3] AETCOM MODULES TO BE COVERED UNDER ANATOMY:

1.1 What does it mean to be a Docter ?

1.5 Cadever as our first teacher

A log book for each student shall be maintained to record the reflections of ECE and AETCOM module components and skill certifications along with other components of Assessment like, learner participation in learning process including assignments, preparation for seminar, problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test.

4] INTEGRATION [Kindly refer section II for general guide lines on integration]
Suggested areas for integration

Physiology

Number	Compentency	Teachining & Learning Methods	Assessment Methods
PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss Nerve Growth Factor & other growth factors/cytokines	Lecturere,Small group discussion	Written /Viva-Voce
PY3.7	Describe the different types of muscle fibres and their structure	Lecturere, Small group discussion	Written /Viva-Voce
PY3.13,	Describe, muscular dystrophy: myopathies	Lecturere , Small group discussion	Written/Viva voce
PY4.1	Describe the structure and functions of digestive system	Lecturere, Small group discussion	Written/Viva voce
PY5.1 .	Describe the functional Anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system	Lecturere, Small group discussion	Written/Viva voce
PY5.6	Describe abnormal ECG, arrythmias, heart block and myocardial Infarction	Lecturere, Small group discussion	Written/Viva voce
PY9.1	Describe and discuss sex determination; sex differentiation and their abnormities and outline psychiatry and practical implication of sex determination.	Lecturere, Small group discussion	Written/Viva voce
PY10.1	Describe and discuss the organization of nervous system	Lecturere, Small group discussion	Written/Viva voce
PY10.2	Describe and discuss the functions and properties of synapse, reflex,receptors	Lecturere, Small group discussion	Written/Viva voce
PY10.3	Describe and discuss somatic sensations & sensory tracts	Lecturere, Small group discussion	Written/Viva voce
PY10.4	Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular pparatus	Lecturere, Small group discussion	Written/Viva voce
PY10.5	Describe and discuss structure and functions of reticular activating	Lecturere, Small group discussion	Written/Viva voce

	system, autonomic nervous system (ANS)		
PY10.6	Describe and discuss Spinal cord, its functions, lesion & sensory sturbances	Lecturere, Small group discussion	Written/Viva voce
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus,hypothalamus, cerebellum and limbic system and their bnormalities	Lecturere, Small group discussion	Written/Viva voce
PY10.11	Demonstrate the correct clinical examination of the nervous system: Higher functions, Sensory system, motor system, reflexes, Cranial Nerves in a normal volunteer or simulated	Lecturere, Small group discussion	Written/Viva voce

Biochemitry

Number	Compentency	Teachining & Learning Methods	Assessment Methods
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands .	Lecturere, Small group discussion	Written/Viva voce
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	Lecturere, Small group discussion	Written/Viva voce
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands	Lecturere, Small group discussion	Written/Viva voce

Pathology

Number	Compentency	Teachining & Learning Methods	Assessment Methods
PA28.10	Describe the etiology, pathogenesis, pathology, laboratory findings, distinguishing features progression and complications of acute and chronic pyelonephritis and reflux nephropathy	Lecturere, Small group discussion	Written/Viva voce
PA31.1	Classify and describe the types, etiology, pathogenesis, pathology and	Lecturere, Small group discussion	Written/Viva voce

	hormonal dependency of benign breast disease		
PA32.	1 Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	Lecturere, Small group discussion	Written/Viva voce
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	Lecturere, Small group discussion	Written/Viva voce
PA33.1	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	Lecturere, Small group discussion	Written/Viva voce

Anesthesiolgy

Number	Compentency	Teachining & Learning Methods	Assessment Methods
AS4.2	Describe the Anatomy of the airway and its implications for general anesthesia	Lecturere, Small group discussion	Written/Viva voce
AS5.2	Describe the correlative Anatomy of the brachial plexus, subarachnoid and epidural spaces	Lecturere, Small group discussion	Written/Viva voce
AS5.3	Observe and describe the principles and steps/ techniques involved in peripheral nerve blocks	Lecturere, Small group discussion	Written/Viva voce
AS8.1	Describe the anatomical correlates and physiologic principles of pain	Lecturere, Small group discussion	Written/Viva voce

ENT

Number	Compentency	Teachining & Learning Methods	Assessment Methods
EN1.1	Describe the Human Anatomy & physiology of ear, nose, throat, head.neck	Lecturere, Small group discussion	Written/Viva voce

General Medicine

Number	Compentency	Teachining & Learning Methods	Assessment Methods
IM3.1	Define discuss describe and distinguish community acquired pneumonia, nosocomial pneumonia and aspiration pneumonia	Lecturere, Small group discussion	Written/Viva voce

IM13.9	Demonstrate in a mannequin the correct technique for performing breast exam, rectal examination and cervical examination and pap smear	Bedside clinic	Skill assessment / Short case
IM17.1	Define and classify headache and describe the presenting features, precipitating factors, aggravating and relieving factors of various kinds of headache	Lecturere, Small group discussion	Written/Viva voce
IM18.1	Describe the functional and the vascular anatomy of the brain	Lecturere, Small group discussion	Written/Viva voce
IM19.1	Describe the functional anatomy of the locomotor system of the brain	Lecturere, Small group discussion	Written/Viva voce

General surgery

Number	Compentency	Teachining & Learning Methods	Assessment Methods
SU19.1	Describe the etiology and classification of cleft lip and palate	Lecturere, Small group discussion	Written/Viva voce ,OSCE
SU19.2	Describe the Principles of reconstruction of cleft lip and palate	Lecturere, Small group discussion	Written/Viva voce ,OSCE
SU22.1	Describe the Applied anatomy, and physiology of thyroid K Human Anatomy	Lecturere, Small group discussion	Written/Viva voce OSCE
SU22.5	Describe the applied anatomy of parathyroid.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU23.1	Describe the applied anatomy of adrenal glands	Lecturere, Small group discussion	Written/Viva voce OSCE
SU24.1	Describe the clinical features, principles of investigation, prognosis and management of pancreatitis.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU25.1	Describe applied anatomy appropriate investigations for breast disease	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.2	Describe the clinical features, investigations and principles of management of congenital anomalies of Genitourinary system	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.5	Describe the applied anatomy and physiology of esophagus	Lecturere, Small group discussion	Written/Viva voce OSCE

	Human Anatomy		
SU28.7	Describe the applied anatomy and physiology of stomach.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.10	Describe the applied anatomy of liver. Describe the Clinical features, Investigations and principles of management of Liver abscess, hydatid disease, Injuries and Tumors of the liver.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.11	Describe the applied anatomy of Spleen. Describe the clinical features, Investigations and principles of management of splenic injuries. Describe the Post-splenectomy sepsis-prophylaxis.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.12	Describe the applied anatomy of biliary system. Describe the clinical features, investigations and principles of management of diseases of biliary system.	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.13	Describe the applied anatomy of small and large intestines	Lecturere, Small group discussion	Written/Viva voce OSCE
SU28.16	Describe applied anatomy including congenital anomalies of the rectum and anal canal	Lecturere, Small group discussion	Written/Viva voce OSCE

Orthopaedics

Number	Compentency	Teachining & Learning Methods	Assessment Methods
OR2.1	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fracture of clavicle	Lecturere, Small group discussion	Written/Viva voce ,OSCE
OR2.2	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fractures of proximal humerus	Lecturere, Small group discussion	Written/Viva voce ,OSCE
OR2.3	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of supra condylar fracture of	Lecturere, Small group discussion	Written/Viva voce OSCE

	humerus		
OR2.10	Describe and discuss the etiopathogenesis, mechanism of injury, clinical features, investigations and principles of anagement of fractures of proximal femur	Lecturere, Small group discussion	Written/Viva voce ,OSCE
OR2.13	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of: (a)Fracture both bones leg (b) Calcaneus (c) Small bones of foot	Lecturere, Small group discussion	Written/Viva voce ,OSCE
OR2.15	Plan and interpret the investigations to diagnose complications of fractures like malunion, non-union, infection, compartmental syndrome	Lecturere, Small group discussion	Written/Viva voce OSCE

Distribution of number of hours for Theory & Practical Classes

I.

A. Theory Classes:

1. General Anatomy - 10 hours
2. Upper limb - 20 hours
3. Lower limb - 25 hours
4. Head and Neck - 25 hours
5. Brain - 15 hours
6. Thorax - 15 hours
7. Abdomen and Pelvis - 30 hours
8. Histology - 40 hours
9. Embryology - 40 hours

Total hours of Theory Classes - 220 hours

B. Tutorial Classes: 80 hours

II. Practical Classes:

Class	Hours
Dissection Classes	420 hours
Histology	80hours

Osteology	80hours

INTERNAL ASSESSMENT

1. Day to day assessment should be given 10% weight age. The marks will be given on the basis of the:
2. Part completion test
3. Tutorial test
4. Card test-which will include 50% oral and 50% MCQ's
5. Seminar presentation and participation.

All the records should be maintained well and should be submitted in time.

PRACTICALS

Total I A assessment marks for practical is 20.

5 marks are allotted for the records (Gross + Histology) and 2 best practical examination should be taken into consideration. Attained marks should be reduced to 15, added to the marks awarded for records.

Internal Assessment Marks should be notified to the students well in advance and their signature to be taken before submitting to the university.

UNIVERSITY EXAMINATION

DISTRIBUTION OF MARKS

THEORY

For Paper-I Above diaphragm 100 Marks

Type of Questions	Number of questions	Marks for each question	Total marks
MCQS	**20**	**1 (ONE)**	**20**
Essay type questions	2	10	20
Short Essay types questions	6	5	30
Short answer questions	10	3	30
Total			100

For paper II Below diaphragm 100 Marks

Type of Questions	Number of questions	Marks for each question	Total marks
MCQS	**20**	**1 (ONE)**	**20**
Long Essay type questions	2	10	20
Short Essay types questions	6	5	30
Short Answer questions	10	3	30
Total			100

Internal Assessment

Total Marks: **60 (Theory: 40 and Practical: 20)**

Scheme for calculation of internal assessment marks:

	ANATOMY
Internal Assessment (Theory)	40
Internal assessment (Practical)	20

Theory Maximum Marks (200)	**Practical Maximum Marks(60)** **Vive –VoceMarks(40)**

Theory (maximum marks)	**Marks**	**Practicals**	**Marks**
Theory written paper	30	Practical exam (10 marks) and viva- voce (5 marks)	15
Formative assessment		Formative assessment	
MCQs/Topic ending test/seminars/assignments/ Case based learning tests	10	Early clinical exposure + Skill Certification+ Practical record	5
Total	**40**		**20**

Paper –I	100 marks	Gross Anatomy i. Spotters(5X2) ii. Specimen discussion 1(Above diaphragm) iii. Specimen discussion 1(Below diaphragm)	10marks 10marks 10marks **30marks**
Paper –II	100 marks	**Histology** i. Spotters(10X1) ii. Slide discussion 1(General Histology) iii. Slide discussion 2 (systemic Histology)	 10marks 10marks 10marks **30marks**
Total	**200**	**Vive –Voce** i .Osteology ii. Surface marking iii Radiology iii. Embryology	 10marks 10marks 10marks 10marks **40marks**
		Total	**100**

Distribution of Blue Print Marks for Theory papers

Paper –I

Topic	Marks
MCQ	20
General Anatomy/ AETCOM	10
General Histolgy	05
General Embryology	05
Upperlimb	15
Head & Neck	20
Neuroanatomy	10
Thorax	15
Total	**100**

Paper –II

Topic	Marks
MCQ	20
Systemic Histolgy	10
Systemic Embryology	10
Abdomen and pelvis	25
Lower limb	20
Genetics	10
ECE	05
Total	**100**

Theory

Paper -I	100Marks
Paper –II	100Marks
Internal .Assessment	40Marks
Toatl	**240Marks**

Practical

Histolgy	30marks
Dsscation	30Marks
Viva –Voice	40Marks
IntenalAssement	20Marks
Toatl	**120Marks**

Viva voce: 40 marks

The viva-voce examination shall carry 40 marks and all examiners will conduct the examination. Viva should focus on application and interpretation. (viva marks to be added to practical and not theory)

Anatomy Books Recommended

1. Gray's Anatomy
2. Essentials of Human Anatomy A.K.Datta Vol. 1 to 3
3. Cunningham's manual of Practical Anatomy Vol. 1 to 3
4. Human Histology by Inderbir Singh
5. Atlas of Human Histology-DIFORE
6. Surgical Anatomy- M C Gregor
7. Human Embryology- Inderbir Singh
8. Developing Human – Keith Moore
9. Surface Anatomy and Radiology- Halim
10. General Anatomy- B.D.Chourasia
11. Text Book of Neuroanatomy- Inderbir Singh
12. Human Osteology by Inderbir Singh
13. Human Genetics – S D Gangane
14. Gray's anatomy for students – Drake
15. Clinically Oriented Anatomy – Keith.L.Moore
16. Human Anatomy By B D Chaurasia's
17. Text Book of Anatomy By Visharamsingh
18. Text Book of Histology & Pracatical Guide By G P Gunasegaran
19. Practical Anatomy Workbook By Krishna Garg & Medha Joshi

HUMAN PHYSIOLOGY

Goal:

The goal of teaching Physiology to undergraduate students is to make them understand the Physiological Principles and Homeostatic mechanisms of Normal Human body so that he/she can understand the disease pattern better.

Objectives:

1. Learn normal functioning of all organs, systems and their interactions for well co-ordinated body function.
2. To assess relative contribution of each organ system to the maintenance of the milieu interior.
3. Elucidate the Physiological aspects of normal growth and development.
4. Describe the Physiological response and adaptations to environmental stress.
5. List Physiological Principles underlying pathogenesis and treatment of disease.
6. To apply Physiologic knowledge in Research activities.
7. To implicate the importance of research culture.

Knowledge:

At the end of the course the student will be able to.

1. Describe the normal functioning of all the organ systems, regulatory mechanisms and interactions of various organs for well co-ordinated total body function.
2. Understand the basic Principles, mechanisms and homeostatic control of all the functions of human body as a whole.
3. Lay emphasis on Physiological basis in diagnosis and Management of diseases.
4. Correlate knowledge of Physiology in area indicated by National Health Programme.

Skills:

At the end of the course, the student shall be able to acquire the skills

1. To conduct the experiments for study of Physiological functions.
2. To interpret experimental and Investigative data.
3. To distinguish between normal and abnormal data derived as a result of Tests which he /she performed and observed in the Laboratory.
4. Conduct and interpret clinical examination in normal healthy subject

Integration:

At the end of the Integrated Teaching, the student shall acquire an integrated knowledge of organ structure and function and the regulatory mechanisms including Biophysics.

There will be one lecture class on Research- About - Introduction, research methods and research projects & their importance, every quarterly along with main course content.
This is to develop Research culture in the UG students from 1st Phase itself.

COURSE CONTENT

This content is cited from "Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate, 2018. Vol. 1; pages 92-104.

TOTAL TEACHING HOURS FOR THEORY AND METHODS

Theory	**160 Hours**
Non-lecture teaching (small group teaching/tutorials/integrated learning/practical)	310 hours
Self directed learning	25 hours
Total	**495 hours**
Early clinical exposure	30 hours
Grand Total	**525 Hours**

AETCOM 1.2 and 1.3	8+7 hours

SYLLABUS:

1. General Physiology [8hrs]

Number of competencies: (09)

Number of procedures that require certification: (NIL)

No.	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	No. required to certify P	Vertical Integration (VI)	Horizontal Integration (HI)
PY1.1	Describe the structure and functions of a mammalian cell	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.2	Describe and discuss the principles of homeostasis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

PY1.3	Describe intercellular communication	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.4	Describe apoptosis-programmed cell death	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology	
PY1.5	Describe and discuss transport mechanisms across cell membranes	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.6	Describe the fluid compartments of the body, its ionic composition &measurements	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY1.7	Describe the concept of pH & Buffer systems in the body	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY1.8	Describe and discuss the molecular basis of resting membrane potential and action potential in excitable tissue	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.9	Demonstrate the ability to describe and discuss the methods used to demonstrate the functions of the cells and its products, its communications and their applications in Clinical care and research.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

Topic: Haematology - [16hrs]

1. **Number of competencies: (13)**
2. **Number of procedures that require certification: (NIL)**

No.	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration (VI)	Horizontal Integration (HI)
PY2.1	Describe the composition and functions of blood components	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY2.2	Discuss the origin, forms, variations and functions of plasma proteins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Biochemistry
PY2.3	Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Biochemistry
PY2.4	Describe RBC formation (erythropoiesis & its regulation) and its functions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY2.5	Describe different types of anaemias& Jaundice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	Biochemistry
PY2.6	Describe WBC formation (granulopoiesis) and its regulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY2.7	Describe the formation of platelets, functions and variations.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY2.8	Describe the physiological basis of hemostasis and, anticoagulants. Describe	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

	bleeding & clotting disorders (Hemophilia, purpura)								
PY2.9	Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	K	KH	Y	Lecture, Small group discussion , ECE- Visit to blood bank	Written/ Viva voce		Pathology	
PY2.10	Define and classify different types of immunity. Describe the development of immunity and its regulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY2.11 Practical	Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT	S	SH	Y	DOAP sessions	Practical/ OSPE/ Viva voce		Pathology	
PY2.12 Practical	Describe test for ESR, Osmotic fragility, Hematocrit. Note the findings and interpret the test results etc	K	KH	Y	Demonstration	Written /Viva voce		Pathology	
PY2.13 Practical	Describe steps for reticulocyte and platelet count	K	KH	**Y**	Demonstration sessions	Written /Viva voce		Pathology	

3. Topic: Nerve and Muscle Physiology [10hrs]

Number of competencies: (18)

Number of procedures that require certification: (NIL)

PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss Nerve Growth Factor & other growth factors/cytokines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Human Anatomy
PY3.2	Describe the types, functions & properties of nerve fibers	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY3.3	Describe the degeneration and regeneration in peripheral nerves	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY3.4	Describe the structure of neuro-muscular junction and transmission of impulses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anaesthesiology	
PY3.5	Discuss the action of neuro-muscular blocking agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anaesthesiology Pharmacology	
PY3.6	Describe the pathophysiology of Myasthenia gravis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PY3.7	Describe the different types of muscle fibres and their structure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Human Anatomy
PY3.8	Describe action potential and its properties in different muscle types (skeletal & smooth)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY3.9	Describe the molecular basis of muscle contraction in skeletal and in smooth muscles	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

PY3.10	Describe the mode of muscle contraction (isometric and isotonic)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY3.11	Explain energy source and muscle metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Biochemistry
PY3.12	Explain the gradation of muscular activity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY3.13	Describe muscular dystrophy: myopathies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Human Anatomy
PY3.14	Perform Ergography	S	SH	Y	DOAP sessions	Practical/ OSPE/ Viva voce			
PY3.15	Demonstrate effect of mild, moderate and severe exercise and record changes in cardiorespiratory parameters	S	SH	Y	DOAP sessions	Practical/ OSPE/ Viva voce			
PY3.16	Demonstrate Harvard Step test and describe the impact on induced physiologic parameters in a simulated environment	S	SH	Y	DOAP sessions	Practical/ OSPE/Viva voce			
PY3.17	Describe Strength-duration curve	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY3.18	Observe with Computer assisted learning (i) amphibian nerve - muscle experiments (ii) amphibian cardiac experiments	S	KH	Y	Demonstration, Computer assisted learning methods	Practical / Viva voce			

4. Topic: Gastro-intestinal Physiology: [10 hrs]

Number of competencies:(10)

Number of procedures that require certification: (NIL)

PY4.1	Describe the structure and functions of digestive system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY4.2	Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.3	Describe GIT movements, regulation and functions. Describe defecation reflex. Explain role of dietary fibre.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.4	Describe the physiology of digestion and absorption of nutrients	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.5	Describe the source of GIT hormones, their regulation and functions	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.6	Describe the Gut-Brain Axis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.7	Describe & discuss the structure and functions of liver and gall bladder	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.8	Describe & discuss gastric function tests,	K	KH	Y	Lecture, Small group discussion,	Written/Viva voce			Biochemistry

	pancreatic exocrine function tests & liver function tests				Demonstration Esophageal Manometry & endoscopy				
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastro-oesophagealreflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Biochemistry
PY4.10	Demonstrate the correct clinical examination of the abdomen in a normal volunteer or simulated environment	S	SH	Y	DOAP session	Skill assessment/ Viva voce/OSCE			

5. Topic: Cardiovascular Physiology(CVS) [25hrs]

Number of competencies: (16)

Number of procedures that require certification: (03)

PY5.1	Describe the functional anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.2	Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.3	Discuss the events occurring during the cardiac cycle	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

PY5.4	Describe generation, conduction of cardiac impulse	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.5	Describe the physiology of electrocardiogram (E.C.G), its applications and the cardiacaxis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY5.6	Describe abnormal ECG, arrythmias, heart block and myocardial Infarction	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Human Anatomy
PY5.7	Describe and discuss haemodynamics of circulatory system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.8	Describe and discuss local and systemic cardiovascular regulatory mechanisms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.9	Describe the factors affecting heart rate, regulation of cardiac output & blood pressure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.10	Describe & discuss regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, foetal, pulmonary and splanchnic circulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY5.11	Describe the patho-physiology of shock, syncope and heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY5.12	Record blood pressure & pulse at rest and in different grades of exercise and postures in a volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce	1 each x 3		

PY5.13	Record and interpret normal ECG in a volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce		General Medicine	
PY5.14	Observe cardiovascular autonomic function tests in a volunteer or simulated environment	S	SH	N	DOAP sessions	Skill assessment/ Viva voce			
PY5.15	Demonstrate the correct clinical examination of the cardiovascular system in a normal volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce			
PY5.16	Record Arterial pulse tracing using finger plethysmography in a volunteer or simulated environment	S	SH	N	DOAP sessions, Computer assisted learning methods	Practical/OSPE/ Viva voce		General Medicine	

6. Topic: Respiratory Physiology: [12hrs]

Number of competencies:(10)

Number of procedures that require certification: (01)

PY6.1	Describe the functional anatomy of respiratory tract	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.2	Describe the mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.3	Describe and discuss the transport of respiratory gases: Oxygen and Carbondioxide	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

PY6.4	Describe and discuss the physiology of high altitude and deep sea diving	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.5	Describe and discuss the principles of artificial respiration, oxygen therapy, acclimatization and decompression sickness.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.6	Describe and discuss the pathophysiology of dyspnoea, hypoxia, cyanosis asphyxia; drowning, periodic breathing	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.7	Describe and discuss lung function tests & their clinical significance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY6.8	Demonstrate the correct technique to perform & interpret Spirometry	S	SH	Y	DOAP sessions	Skill assessment/ Viva voce		Respiratory Medicine	
PY6.9	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce/OSCE	1		
PY6.10	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical /OSPE/ Viva voce			

7. Topic: Renal Physiology [10hrs]

Number of competencies : (09)

Number of procedures that require certification: (NIL)

PY7.1	Describe structure and function of kidney	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.2	Describe the structure and functions of juxta glomerular apparatus and role of renin-angiotensin system	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.3	Describe the mechanism of urine formation involving processes of filtration, tubular reabsorption & secretion; concentration and diluting mechanism	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.4	Describe & discuss the significance & implication of Renal clearance	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.5	Describe the renal regulation of fluid and electrolytes & acid-base balance	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.6	Describe the innervations of urinary bladder, physiology of micturition and its abnormalities	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY7.7	Describe artificial kidney, dialysis and renal transplantation	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	
PY7.8	Describe & discuss Renal Function Tests	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Biochemistry

PY7.9	Describe cystometry and discuss the normal cystometrogram	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			

7. Topic: Endocrine Physiology: [16hrs]

Number of competencies: (06)

Number of procedures that require certification: (NIL)

PY8.1	Describe the physiology of bone and calcium metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY8.2	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas and hypothalamus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY8.3	Describe the physiology of Thymus & Pineal Gland	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY8.4	Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Biochemistry
PY8.5	Describe the metabolic and endocrine consequences of obesity & metabolic syndrome, Stress response. Outline the	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

	psychiatry component pertaining to metabolic syndrome.								
PY8.6	Describe & differentiate the mechanism of action of steroid, protein and amine hormones	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

8. **Topic: Reproductive Physiology [10 hrs]**

Number of competencies:(12)

Number of procedures that require certification: (NIL)

PY9.2	Describe and discuss puberty: onset, progression, stages; early and delayed puberty and outline adolescent clinical and psychological association.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY9.3	Describe male reproductive system: functions of testis and control of spermatogenesis & factors modifying it and outline its association with psychiatric illness	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY9.4	Describe female reproductive system: (a) functions of ovary and its control; (b) menstrual cycle - hormonal, uterine and ovarian changes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY9.5	Describe and discuss the physiological effects of sex hormones	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

PY9.6	Enumerate the contraceptive methods for male and female. Discuss their advantages & disadvantages	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics &Gynaecology, Community Medicine	
PY9.7	Describe and discuss the effects of removal of gonads on physiological functions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY9.8	Describe and discuss the physiology of pregnancy, parturition & lactation and outline the psychology and psychiatry-disorders associated with it.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics &Gynaecology	
PY9.9	Interpret a normal semen analysis report including (a) sperm count, (b) sperm morphology and (c) sperm motility, as per WHO guidelines and discuss the results	K	KH	Y	Lecture, Small group discussion	OSPE/Viva voce			
PY9.10	Discuss the physiological basis of various pregnancy tests	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics &Gynaecology	
PY9.11	Discuss the hormonal changes and their effects during perimenopause and menopause	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics &Gynaecology	
PY9.12	Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics &Gynaecology	

10. Topic: Neurophysiology : [35hrs]

Number of competencies:(20)

Number of procedures that require certification: (09)

PY10.1	Describe and discuss the organization of nervous system	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.2	Describe and discuss the functions and properties of synapse, reflex, receptors	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.3	Describe and discuss somatic sensations & sensory tracts	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.4	Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.5	Describe and discuss structure and functions of reticular activating system, autonomic nervous system (ANS)	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.6	Describe and discuss Spinal cord, its functions, lesion & sensory disturbances	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			Human Anatomy
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Psychiatry	Human Anatomy

PY10.8	Describe and discuss behavioural and EEG characteristics during sleep and mechanism responsible for its production	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Psychiatry	
PY10.9	Describe and discuss the physiological basis of memory, learning and speech	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Psychiatry	
PY10.10	Describe and discuss chemical transmission in the nervous system. (Outline the psychiatry element).	K	KH	Y	Lecture, Small group discussion	Written /Viva voce			
PY10.11	Demonstrate the correct clinical examination of the nervous system: Higher functions, sensory system, motor system, reflexes, cranial nerves in a normal volunteer or simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce/OSCE	1each (total 5)		Human Anatomy
PY10.12	Identify normal EEG forms	S	S	Y	Small group teaching	OSPE/ Viva voce		Psychiatry	
PY10.13	Describe and discuss perception of smell and taste sensation	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	
PY10.14	Describe and discuss patho-physiology of altered smell and taste sensation	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	

PY10.15	Describe and discuss functional anatomy of ear and auditory pathways & physiology of hearing	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	
PY10.16	Describe and discuss pathophysiology of deafness. Describe hearing tests	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	
PY10.17	Describe and discuss functional anatomy of eye, physiology of image formation, physiology of vision including colourvision, refractive errors, colour blindness,physiology of pupil and light reflex	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Ophthalmology	
PY10.18	Describe and discuss the physiological basis of lesion in visual pathway	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Ophthalmology	
PY10.19	Describe and discuss auditory & visual evoke potentials	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		Ophthalmology	
PY10.20	Demonstrate (i) Testing of visual acuity, colour and field of vision and (ii) hearing (iii) Testing for smell and (iv) taste sensation in volunteer/ simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce	1each (total4)	ENT, Ophthalmology	

Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.
Column D: K – Knows, KH - Knows How, SH - Shows how, P- performsindependently,
Column F: DOAP session – Demonstrate, Observe, Assess, Perform.
Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

11. Topic: Integrated Physiology: [8hrs]

Number of competencies: (14)

Number of procedures that require certification: (NIL)

PY11.1	Describe and discuss mechanism of temperature regulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.2	Describe and discuss adaptation to altered temperature (heat and cold)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.3	Describe and discuss mechanism of fever, cold injuries and heat stroke	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.4	Describe and discuss cardio-respiratory and metabolic adjustments during exercise; physical training effects	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.5	Describe and discuss physiological consequences of sedentary lifestyle	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.6	Describe physiology of Infancy	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PY11.7	Describe and discuss physiology of aging; free radicals and antioxidants	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
PY11.8	Discuss & compare cardio-respiratory changes in exercise (isometric and isotonic) with	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

	that in the resting stateand under different environmental conditions (heat andcold)								
PY11.9	Interpret growth charts	K	KH	N	Small group teaching	Practical/ OSPE/ Viva voce		Pediatrics	
PY11.10	Interpret anthropometric assessment of infants	K	KH	N	Small group teaching	Practical /OSPE/ Viva voce		Pediatrics	
PY11.11	Discuss the concept, criteria for diagnosis of Brain death and its implications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PY11.12	Discuss the physiological effects of meditation	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
PY11.13	Obtain history and perform general examination in the volunteer / simulated environment	S	SH	Y	DOAP sessions	Skill assessme nt/ Viva voce			
PY11.14	Demonstrate Basic Life Support in a simulated environment	S	SH	Y	DOAP sessions	OSCE		General Medicine, Anaesthesi ology	

Suggested Teaching Learning methods, Assessment methods along with Horizontal & Vertical Integration of topics is been depicted in the above table in each system with respective competency.

PRACTICAL

The following list of practical is minimum and essential. Additional exercises can be included as and required. All the practical's have been categorized as 'Procedures to be performed' and 'Demonstrations'. The procedures are to be performed by the students during practical classes to acquire skills. These would be included in the practical during University examination. Those categorized as 'Demonstrations' are to be shown to students during practical classes. Questions based on these would be given in the form of data, charts, graphs, problems and case histories for interpretation by students during university examination.

Procedures to be performed by the students:

I. Hematology: Major Experiments

1. RBC count
2. Total WBC Count
3. Differential WBC Count.
4. Absolute Eosinophil Count.

Hematology: Minor Experiments

1. Estimation of Hemoglobin Content of blood.
2. Bleeding Time
3. Clotting Time.
4. Blood Grouping.
5. Determination of blood indices: MCV, MCH, MCHC and Colour Index.

II. Procedures to be performed on human subjects.

1. Mosso's Ergography.
2. Recording of Blood Pressure, pulse rate at rest and effect of posture
3. Effect of mild and moderate exercise on blood pressure, pulse rate and respiratory rate
4. Demonstrate Harvard step test and describe the impact on induced physiologic parameters.
5. Record and interpret Lead II ECG. Given a normal ECG, determine cardiac axis.
6. Spirometry - Lung volumes and capacities, MVV and Dyspnoeic Index, Timed vital capacity.
7. Peak Expiratory Flow Rate
8. Demonstrate Basic Life Support in a simulated environment
9. Visual field by Perimetry

III. Clinical Examination.

1. Components of History taking and General Physical examination
2. Clinical Examination of Radial Pulse.
3. Clinical Examination of Cardiovascular system.
4. Clinical Examination of Respiratory system.
5. Clinical Examination of Higher functions.
6. Clinical Examination of Sensory System.
7. Clinical Examination of Motor system including examination of Reflexes.
8. Clinical Examination of Cranial Nerves.

IV. Demonstrations:

I. Hematology:

1. Erythrocyte sedimentation rate
2. Haematocrit
3. Reticulocyte count
4. Platelet count
5. Osmotic fragility

II. Record Arterial pulse tracing using finger plethysmography

III. Stethography

IV. Tests of cardiovascular autonomic functions

V. Interpretation of charts, graphs, case histories, Calculations & Demonstrations:

1. Hematology: Hematocrit, (PCV), ESR and Blood Indices.
2. Cardiovascular system : ECG Recording in lead II and calculation of Heart rate, PR Interval and Identification of J Point, Identification and Interpretation of graph : JVP
3. Cardiovascular fitness test by 2km walk test or bicycle Ergometer or Harvard step test.
4. Nervous system: Autonomic Function Tests.
5. Respiratory system: Determination of lung volumes and capacities & other lung function tests by computerized Spirometry, Flow – Volume loop.
6. Special Senses :
7. Audiometry , Purkinje - Sanson's images, ophthalmoscopy, Retinoscopy,
8. Examination of fundus.
9. CNS: Electroencephalogram.
10. N.M.Physiology: Electromyography.
11. Renal Physiology : Identification and Functioning of Artificial Kidney
12. GIT : Identification and uses of Ryle's Tube

VI. Computer assisted learning:

(i) Amphibian nerve - muscle experiments and interpretation of graphs

List of graphs on nerve-muscle experiments:

1. Simple muscle twitch
2. Effect of various strengths of stimuli on Simple muscle twitch
3. Effect of changes in temperature on Simple muscle twitch
4. Effect of two successive stimuli on muscle contraction
5. Effect of multiple successive stimuli (treppe, clonus, tetanus)
6. Study of fatigue in skeletal muscle

7. Velocity of nerve conduction
8. Effect of load on muscle
9. Measurement of isometric contractions using nerve muscle preparation

(ii) Amphibian cardiac experiments and interpretation of graphs

List of graphs on cardiac experiments:

1. Normal cardiogram
2. Effect of temperature on frog heart
3. Effect of Stannius ligatures
4. Properties of cardiac muscle – all or none law, staircase effect, refractory period in a beating heart (extrasystole and compensatory pause), refractory period in a quiescent heart
5. Effect of vagus on frog's heart
6. Action of drugs on vagus (nicotine and atropine)
7. Perfusion of isolated heart and effect of ions (NaCl, KCl, CaCl2)
8. Perfusion of isolated heart and effect of drugs (adrenaline, acetyl choline, atropine)

EARLY CLINICAL EXPOSURE:

a) Basic sciences correlation - 18 hours - 3-hours session per month for 6 months which will take place with charts, graphics, videos, reports, field visits etc. in classrooms /labs.

b) Clinical Skills - 12 hours- 3-hours session per month for 4 months per Department. Students accompanied by preclinical faculty in small groups equipped with observation guides are introduced to specified cases being demonstrated by Clinicians.

Suggested cases for hospital visit are:

- Anemia, Jaundice, Visit to blood bank,
- Pneumonia, Bronchitis, pleural effusion
- Acid peptic disease –endoscopy unit
- Dialysis unit for Renalfailure, Hemiplegia

SELF-DIRECTED LEARNING: **Twenty-five hours of dedicated time for self directed learning is provided for physiology**

Suggested Topics For Self Directed Learning:

- **Blood**: Functions of blood, Bleeding disorders. Blood groups, Clinical importance of ESR, PCV, Blood Indices, Hazards of mismatched blood groups .
- **GIT:** Salivary secretion, Gastric Movements, GI Hormones. Respiratory Physiology: Hypoxia, Bohr's effect, Artificial respiration in man**.**
- **CVS:** cardiac output. Heart sounds, Arterial pulse J.V.P. ECG, Coronary blood flow, Shock.
- **Renal Physiology**: Clearance tests, Cystometrogram, Abnormal Urinary bladder, Body temperature regulation.
- **M. N. Physiology**: N. M. Junction and Transmission, N-M junction blockers, Types of contraction, Genesis of fatigue.
- **Endocrine System:** Effects of abnormal secretions of GH, thyroid hormone, PTH and adrenocortical hormones. with Charts.
- **Reproductive System**: Role of estrogen and Progesterone on Ovulation. Spermatogenesis
- **CNS:** Receptors, Synapse, Reflex, Pyramidal and Extra pyramidal systems, Effects of sections of spinal cord at various levels with case histories, Effects of lesion in cerebellum / Basal ganglia / Sensory cortex with case histories.
- **Special Sense:** Visual acuity pathway, Lesions of visual tracts. Theories of color vision, Hearing aids. Physiology of olfaction and gustation.

AETCOM Modules to be covered under Physiology:

1.2 What does it mean to be a patient?

1.3 The doctor-patient relationship

A log book for each student shall be maintained to record the reflections of ECE and AETCOM module components and skill certifications along with other components of Assessment like, learner participation in learning process including assignments, preparation for seminar, problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test.

The above content is cited from Medical Council of India. Competency Based Assessment Module for Undergraduate Medical Education Training program, 2019: pp 13-20.

Suggested topics for Small group Teaching / Tutorial

1. Gen. Physiology: Transport across cell membrane.
2. Blood: Body Fluid, Erythropoiesis, Morphology and functions of WBCs.
3. GIT: Composition, Functions and Regulation of Secretion of Saliva, gastric juice and pancreatic juice. Motility of gut.
4. Respiratory Physiology:Intrapleaural, Intrapulmonary and Transpulmonary pressure changes during respiration, Transport of Oxygen and CO2 in blood., Regulation of respiration, Hypoxia
5. CVS: Properties of cardiac muscle, Cardiac output, Cardiac Cycle, Regulation of arterial BP and HR.
6. Renal Physiology: Concentration and dilution of Urine. Micturition reflex
7. M. N. Physiology: E-C coupling.
8. Endocrine Physiology: Actions and regulation of secretion of GH, Thyroid hormones, Parathormone, Insulin,Glucocorticoids, Aldosterone
9. Reproductive Physiology: Spermatogenesis, Menstrual cycle their applied aspect
10. Special sense: Visual pathway and lesions, Auditory pathway and hearing tests, taste and smell pathways with applied aspect
11. Central Nervous system: Sensory tracts, Motor tracts

SKILL CERTIFICATION: The list of certifiable skills is given below.

List and number of sessions for skill certification:

Competency No.	Topics	Number of Sessions
PY 5.12	1. Record blood pressure 2. pulse at rest and indifferent grades of exercise and 3. postures in a volunteer or simulated environment	1 each x 3
PY6.9	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment	1
PY6.10	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment	1
PY 10.11	Demonstrate the correct clinical examination of the nervous system: (i) sensory system, (ii) motor system, (iii) reflexes, (iv) Cranial nerves in a normal volunteer or simulated environment (v)Higher functions,	1 each Total 5
PY10.20	Demonstrate (i) Testing of visual acuity, colour and field of vision (ii) hearing (iii) Testing for smell and (iv) taste sensation in volunteer /simulated environment	1 each Total 4

SUGGESTED AREAS FOR INTEGRATION: As per the Medical Council of India "Competency based Undergraduate Curriculum for the Indian Medical Graduate" 2018; pp 104 -117

Scheme of Examination

Internal Assessment

Total Marks: **60 (Theory: 40 and Practical: 20)**

Scheme for calculation of Internal Assessment marks:

Theory (maximum marks)	**Marks**	**Practicals**	**Marks**
Theory written paper	30	Practical exam (10 marks) and viva- voce (5 marks)	15
Formative assessment		Formative assessment	
MCQs/Topic ending test/seminars/assignments/ Case based learning tests	10	Early clinical exposure + Skill Certification+ Practical record	5
Total	**40**		**20**

Prior to submission to the University, the marks for each of the three internal examination practical assessments must be calculated out of 30 marks, regardless of the maximum marks. Only the final marks out of 40 needs to be submitted to the University, separately for theory and practical for each internal assessment.

1. Internal assessment should be based on competencies and skills.
2. Regular periodic examinations shall be conducted throughout the course.
3. Average of any two best marks obtained in the examinations will be taken into consideration for calculating internal assessment. 20% weightage will be given to day to day assessment (Performance in Periodic tests, MCQ, Internal assessment should be based on competencies and skills, Participation in Seminars and Research Projects etc). The three Sessional examinations will have MCQ (20% of total marks) in theory.
4. Day to day records and log book (including required skill certifications) will be given importance in internal assessment. Internal assessment will be based on competencies and skills.
5. At least 50% marks of the total marks combined in theory and practical's/clinical assigned for internal assessment is to be obtained in a particular subject to be eligible to appear for University Examinations.

Practical: 20 Marks

There will be three terminal practical examinations. Average of best two will be reduced to 16 and marks obtained for Practical Records and performance in periodic practical tests will be reduced to 04. The three terminal examinations will be having OSPE in either practical I or II Formative exams. The Internal Assessment Marks both in theory and Practical's obtained by the candidate will be sent to the University at least fifteen days prior to the commencement of Summative Theory Examinations.
The Internal Assessment marks will be displayed on the notice board. The students will be shown their answer scripts. Their signatures will be taken against the marks obtained. The answer scripts will be stored in the respective department for 5yrs.

Internal assessment marks will not be added to University examination marks But will reflect as a separate head of passing at the summative examination.

Distribution of Marks for University Examination

Theory Examination

1. Designing of question paper will take into consideration at all levels of knowledge domain e.g. Bloom's taxonomy of cognitive domain with appropriate verbs for the questions at each level to assess higher levels of learning.
2. Structuring of question paper will be using combination of various types of questions e.g. structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part will be indicated separately.
3. Long essay question will have a structured clinical /Practical question, problem to the students and require them to apply knowledge and integrate it with disciplines. The proper marking distribution will be provided.
4. MCQs will not be more than 20% weightage of total marks. One short essay (5 marks) will be preferably a case vignette.
5. ECE assessment will be included topic wise as a short note. Short question from AETCOM will also be included in theory papers in Formative as well as Summative examinations.

There are two Theory papers with hundred marks each. Total duration of Each Paper will be 03hrs.

TABLE SHOWING SCHEME FOR EXAMINATION MARKS

Theory (maximum marks)		Practical (maximum marks)	
Paper I	**100**	**Practical exam**	**60**
Paper II	**100**	**Viva Voce**	**40**
Total	**200**	**Total**	**100**

The Pattern of Question Paper I: 100 marks

I.	MCQ	01x20	=	20 Marks
II.	Long Essays	02x10	=	20 Marks
III.	Short Essays	06x05	=	30 Marks
IV.	Short Answers	10x03	=	30 Marks

The Pattern of Question Paper II: 100 marks

I.	MCQ	01x20	=	20 Marks
II.	Long Essays	02x10	=	20 Marks
III.	Short Essays	06x05	=	30 Marks
IV.	Short Answers	10x03	=	30 Marks

B. Practical: This part will include assessment in psychomotor and affective domain. Assessment of clinical and procedural skills will be based on direct observation by the examiners

Practical marks: 60 Marks

There shall be four practical sessions, each carrying 10 marks. The distribution of content and marks for the practical would be:

Practical I: (10 marks)

Clinical examination-I (CNS – sensory / motor/ reflexes / cranial nerve): 10marks

Practical II: (10 marks)

Clinical examination-II (CVS / RS/ GIT): 10marks

Practical III: (20 marks)

Human experiment: 15 marks

- Mosso'sergography
- Effect of posture / exercise on BP and Pulse rate
- Estimate fitness using the Harvard step test
- Record and interpret Lead II ECG
- Spirometry and PEFR
- Perimetry
- Demonstrate BLS

a) **Chart: Amphibian charts (nerve muscle / cardiac): 5 marks**

Practical IV: (20 marks)

b) **Hematology: Major- (10 Marks) RBC count / WBC count / making a peripheral smear + DLC on the provided slide. Minor-(05 Marks) BT,CT + blood group / Hb + blood group: 15 marks**

c) **Clinical problems/Chart/Graphs: - 05 marks**

d) **Viva - Voce Examination: - 40 marks.**

e) **Practical Internal Assessment Marks: - 20 marks.**

The viva - voce examination shall carry 40 marks and all four examiners will conduct the examination. Viva will focus on application and interpretation of the subject.
(Viva marks to be added to practicals and not in theory)

Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.

Blue print marks distribution for theory paper I and II

Paper 1 (Max 100 marks)

Topics	Marks Allotted
Multiple choice questions	**20**
General physiology	**05**
Hematology	**10**
Cardiovascular system	**25**
Respiratory system	**20**
Gastrointestinal	**10**
Renal	**15**
AETCOM	**05**

Paper II (Max 100 marks)

Topics	Marks Allotted
Multiple choice questions	**20**
Nerve muscle physiology	**10**
Endocrine system	**20**
Reproductive system	**10**
Central nervous system	**25**
Special sense	**10**
Integrated physiology	**05**

* The topics assigned to the different papers are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

Recommended Text Books and Reference Books

Deciding which textbook to buy is not an easy task. Choice of a textbook depends on the individual and his or her aptitude. It is desirable, and would certainly be helpful if each student has one textbook out of the recommended list of textbooks.

The list of books under the section Reference books are categorized under three levels of difficulty-level-1 being the easiest. The books under level 1 are meant for providing an overall, simple but comprehensive account of physiology. Books at level 2 can be considered as alternative textbooks and some of them are excellent books for further reading. Level 3 books are really meant for purpose of reference during advanced study in any special area of Physiology.

Text Books (Latest Edition)

1. Comprehensive text book of medical physiology. G K Pal. – single volume
2. A.K.JAIN (RL), Understanding Medical Physiology; text book for medical students, Jaypee brothers, New Delhi.
3. GUYTON (Arthur C), Text of Medical Physiology. Prism Publishers, Bangalore.
4. GANONG (William F), Review of Medical Physiology, Appleton and Lange
5. Text book of Medical Physiology. Indu Khurana
6. Principles of Medical Physiology. SabyasachiSircar
7. Text book of Medical Physiology. D Venkatesh, H HSudhakar
8. MAHAPATHRA. Essentials of Medical physiology, Current books international, Calcutta.

Reference Books

Level -1

Leonard R. Johnson. Essential Medical Physiology, 2nd ed.
MORAN Campbell E.J. Clinical Physiology, ELBS UK,

Level -2

1. BERNE (Robert M) and levy (Mathew), Physiology, Mosby Publication.
2. SCHMIDT (RF) and THEWS (G), Human Physiology, Spinger V Erlog, London.
3. TORTORA (Gerald J), Principles of Anatomy and Physiology Harper Collins Ref. College Publication.

Level -3

1. MOUNTCASTLE (Veernow B), Medical Physiology.
2. PATTON (Harry d), Text book of Physiology.
3. RAINER AND NINDHAERST - Text of Physiology - Springer verlog, London.

Text Books on Practical Physiology (Latest Edition)

1. C. L. Ghai., A textbook of Practical Physiology.
2. A.K.Jain - Manual of Practical Physiology.
3. McLeod, Clinical Examination.
4. Hutchinson & Hunter, Clinical Methods.

HUMAN BIOCHEMISTRY

GOAL

The broad goal is to teach Biochemistry to undergraduate students to make them understand the scientific basis of the life processes at the molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

OBJECTIVES

A. KNOWLEDGE

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

1. Describe the molecular and functional organization of a cell and its subcellular components;
2. Delineate structure, function and inter-relationships of biomolecules and consequence of deviation from normal;
3. Summarize the fundamental aspects of enzymology and clinical application wherein regulation of enzymatic activity is altered;
4. Describe digestion and assimilation of nutrients and consequences of malnutrition;
5. Integrate the various aspects of metabolism and their regulatory pathways;
6. Explain the biochemical basis of inherited disorders with their associated sequelae;
7. Describe mechanisms involved in maintenance of body fluid and pH homeostasis;
8. Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine;
9. Summarize the molecular concepts of body defence and their application in medicine;
10. Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis;
11. Familiarize with the principles of various conventional and specialized laboratory investigations and instrumentation analysis and interpretation of a given data;
12. Suggest laboratory investigations to support theoretical concepts and clinical diagnosis.

B. SKILLS:

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

1. Make use of conventional techniques/instruments to perform biochemical analysis relevant to clinical screening and diagnosis;
2. Analyze and interpret investigative data;
3. Demonstrate the skills of solving scientific and clinical problems and decision making;

C. INTEGRATION

The knowledge acquired in Biochemistry should help the students to integrate molecular events with structure and function of the human body in health and disease.

COURSE CONTENT AND TEACHING HOURS

A. TEACHING HOURS

TOTAL: 250 HOURS

Theory: 160 hours (80 Lectures+40 Small group teaching+40 Case based learning)
Practical: 70 hours
Self-Directed learning (SDL): 20 hours
Early clinical exposure (ECE): 30 hours (12 hrs clinical skills +18 hrs Basic science Correlation)

Sl No.	Teaching learning method	No. of Hours
1	Large group teaching	80 hours
2	Small group teaching (SGT) (Small group discussions-SGD/Tutorials/Seminars/Case based learning sessions/Integrated teaching sessions/Practical)	150 hours
3	Self-directed learning (SDL)	20 hours
	TOTAL	**250 hours**
4	Early clinical Exposure	30 hours

(vide Medical Council of India Notification on Graduate Medical Education (Amendment) Regulations 2019, published in the Gazette of India Part III, Section 4, Extraordinary issued on 4th November 2019, Page 69)

SYLLABUS

Topic: Basic Biochemistry (1 Hour)
Number of competencies: (01)
Number of procedures that require certification: (NIL)

No.	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core Y/N	Suggested Teaching Learning method	Suggested Assessment method	No. required to certify P	Vertical integration	Horizontal Integration
BI1.1	Describe the molecular and functional organization of a cell and its sub-cellular components.	K	KH	Y	Lecture, Small group discussion	Written assessment/ Viva voce			Physiology

Topic: Enzyme (9 Hours)
Number of competencies: (07)
Number of procedures that require certification: (NIL)

BI2.1	Explain fundamental concepts of enzyme, isoenzyme, alloenzyme, coenzyme & co-factors. Enumerate the main classes of IUBMB nomenclature.	K	KH	Y	Lecture, case discussion	Written assessment/ Viva voce			
BI2.2	Observe the estimation of SGOT & SGPT	K	K	Y	Demonstration	Viva voce			
BI2.3	Describe and explain the basic principles of enzyme activity	K	KH	Y	Lecture, case discussion	Written/ Viva voce			
BI2.4	Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	
BI2.5	Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	

BI2.6	Discuss use of enzymes in laboratory investigations (Enzyme-based assays)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.7	Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions.	K	KH	Y	Lecture, Small group discussion, DOAP sessions	Written/ Viva voce		Pathology, General Medicine	

Topic: Chemistry and Metabolism of Carbohydrates (17 Hours)

Number of competencies: (10)

Number of procedures that require certification: (NIL)

BI3.1	Discuss and differentiate monosaccharides, di-saccharides and polysaccharides giving examples of main carbohydrates as energy fuel, structural element and storage in the human body	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.2	Describe the processes involved in digestion and assimilation of carbohydrates and storage.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.3	Describe and discuss the digestion and assimilation of carbohydrates from food.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.4	Define and differentiate the pathways of carbohydrate metabolism, (glycolysis, gluconeogenesis, glycogen metabolism, HMP shunt).	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI3.5	Describe and discuss the regulation, functions and	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	

	integration of carbohydrate along with associated diseases/disorders.								
BI3.6	Describe and discuss the concept of TCA cycle as a amphibolic pathway and its regulation.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.7	Describe the common poisons that inhibit crucial enzymes of carbohydrate metabolism (eg; fluoride, arsenate)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Physiology
BI3.8	Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	
BI3.9	Discuss the mechanism and significance of blood glucose regulation in health and disease.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI3.10	Interpret the results of blood glucose levels and other laboratory investigations related to disorders of carbohydrate metabolism.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	

Topic: Chemistry and Metabolism of Lipids (15 Hours)

Number of competencies: (07)

Number of procedures that require certification: (NIL)

BI4.1	Describe and discuss main classes of lipids (Essential/non-essential fatty acids, cholesterol and hormonal steroids, triglycerides, major phospholipids and sphingolipids) relevant to human system and their major functions.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	

BI4.2	Describe the processes involved in digestion and absorption of dietary lipids and also the key features of their metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.3	Explain the regulation of lipoprotein metabolism & associated disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.4	Describe the structure and functions of lipoproteins, their functions, interrelations & relations with atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.5	Interpret laboratory results of analytes associated with metabolism of lipids	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.6	Describe the therapeutic uses of prostaglandins and inhibitors of eicosanoid synthesis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.7	Interpret laboratory results of analytes associated with metabolism of lipids.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Topic: Chemistry and Metabolism of Proteins (19 Hours)

Number of competencies: (05)

Number of procedures that require certification: (NIL)

BI5.1	Describe and discuss structural organization of proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI5.2	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology

BI5.3	Describe the digestion and absorption of dietary proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI5.4	Describe common disorders associated with protein metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI5.5	Interpret laboratory results of analytes associated with metabolism of proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Topic: Metabolism and homeostasis (24 Hours)

Number of competencies: (15)

Number of procedures that require certification: (NIL)

BI6.1	Discuss the metabolic processes that take place in specific organs in the body in the fed and fasting states.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.2	Describe and discuss the metabolic processes in which nucleotides are involved.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI6.3	Describe the common disorders associated with nucleotide metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Physiology
BI6.4	Discuss the laboratory results of analytes associated with gout & Lesch Nyhan syndrome.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.5	Describe the biochemical role of vitamins in the body and explain the manifestations of their deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.6	Describe the biochemical processes involved in generation of energy in cells.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI6.7	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology

	fluids and the derangements associated with these.								
BI6.8	Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.9	Describe the functions of various minerals in the body, their metabolism and homeostasis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.10	Enumerate and describe the disorders associated with mineral metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy

Topic: Molecular biology (14 Hours)

Number of competencies: (07)

Number of procedures that require certification: (NIL)

BI7.1	Describe the structure and functions of DNA and RNA and outline the cell cycle.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.2	Describe the processes involved in replication & repair of DNA and the transcription & translation mechanisms.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.3	Describe gene mutations and basic mechanism of regulation of gene expression.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI7.4	Describe applications of molecular technologies like recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	
BI7.5	Describe the role of xenobiotics in disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.6	Describe the anti-oxidant defence systems in the body.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.7	Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	

Topic: Nutrition (7 Hours)

Number of competencies: (05)

Number of procedures that require certification: (NIL)

BI8.1	Discuss the importance of various dietary components and explain importance of dietary fibre.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.2	Describe the types and causes of protein energy malnutrition and its effects.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.3	Provide dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, coronary artery disease and in pregnancy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI8.4	Describe the causes (including dietary habits), effects and health risks associated with being overweight/ obesity.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables.(macro-molecules & its importance)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	

Topic: Extracellular Matrix (4 Hours)

Number of competencies: (03)

Number of procedures that require certification: (NIL)

BI9.1	List the functions and components of the extracellular matrix (ECM).	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI9.2	Discuss the involvement of ECM components in health and disease.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI9.3	Describe protein targeting & sorting along with its associated disorders.	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			

Topic: Oncogenesis and immunity (05 Hours)

Number of competencies: (05)

Number of procedures that require certification: (NIL)

BI10.1	Describe the cancer initiation, promotion oncogenes & oncogene activation. Also focus on p53 & apoptosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		OBG, General Surgery, Pathology	
BI10.2	Describe various biochemical tumor markers and the biochemical basis of cancer therapy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		OBG, General Surgery, Pathology	
BI10.3	Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.4	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	Physiology
BI10.5	Describe antigens and concepts involved in vaccine development.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Pediatrics, microbiology	

Topic: Biochemical Laboratory Tests (70 Hours)

Number of competencies: (24)

Number of procedures that require certification: (05)

BI11.1	Describe commonly used laboratory apparatus and equipments, good safe laboratory practice and waste disposal.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

BI11.2	Describe the preparation of buffers and estimation of pH.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.3	Describe the chemical components of normal urine.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.4	Perform urine analysis to estimate and determine normal and abnormal constituents	S	P	Y	DOAP session	Skill assessment	1	General Medicine	Physiology
BI11.5	Describe screening of urine for inborn errors & describe the use of paper chromatography	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.6	Describe the principles of colorimetry	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.7	Demonstrate the estimation of serum creatinine and creatinine clearance	S	P	Y	Practical	Skills assessment	1		
BI11.8	Demonstrate estimation of serum proteins, albumin and A:G ratio	S	P	Y	Practical	Skills assessment	1		
BI11.9	Demonstrate the estimation of serum total cholesterol and HDL- cholesterol	S	P	Y	Practical	Skills assessment			
BI11.10	Demonstrate the estimation of triglycerides	S	P	Y	Practical	Skills assessment			
BI11.11	Demonstrate estimation of calcium and phosphorous	S	P	Y	Practical	Skills assessment			
BI11.12	Demonstrate the estimation of serum bilirubin	S	P	Y	Practical	Skills assessment			
BI11.13	Demonstrate the estimation of SGOT/ SGPT	S	P	Y	Practical	Skills assessment			
BI11.14	Demonstrate the estimation of alkaline phosphatase	S	P	Y	Practical	Skills assessment			
BI11.15	Describe & discuss the composition of CSF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

BI11.16	Observe use of commonly used equipments/techniques in biochemistry laboratory including: •pH pHmeter •Paper chromatography of amino acid •Protein electrophoresis •TLC, PAGE •Electrolyte analysis by ISE •ABG analyzer •ELISA •Immunodiffusion •Autoanalyser •Quality control •DNA isolation from blood/ tissue	S	KH	Y	Demonstration	Skill assessment			
BI11.17	Explain the basis and rationale of biochemical tests done in the following conditions: diabetes mellitus, dyslipidemia, myocardial infarction, renal failure, gout, proteinuria, nephrotic syndrome, edema, jaundice, liver diseases, pancreatitis, disorders of acid-base balance,- thyroid disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI11.18	Discuss the principles of spectrophotometry.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.19	Outline the basic principles involved in the functioning of instruments commonly used in a biochemistry	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

	laboratory and their applications.								
BI11.20	Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states.	S	SH	Y	DOAP sessions	Skill assessment	1		
BI11.21	Demonstrate estimation of glucose, creatinine, urea and total protein in serum.	S	SH	Y	DOAP sessions	Skill assessment	1		
BI11.22	Calculate albumin: globulin (AG) ratio and creatinine clearance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.23	Calculate energy content of different food Items, identify food items with high and low glycemic index and explain the importance of these in the diet	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.24	Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.
Column D: K – Knows, KH - Knows How, SH - Shows how, P- performsindependently,
Column F: DOAP session – Demonstrate, Observe, Assess, Perform.
Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

Integration

Physiology									
PY3.11	Explain energy source and muscle metabolism	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.2	Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.4	Describe the physiology of digestion and absorption of nutrients	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.7	Describe & discuss the structure and functions of liver and gall bladder	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.8	Describe & discuss gastric function tests, pancreatic exocrine function tests & liver function tests	K	KH	Y	Lecture, Small group discussion, Demonstration Esophageal Manometry & endoscopy	Written/Viva voce			Biochemistry
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Biochemistry
PY7.8	Describe & discuss Renal Function Tests	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY8.4	Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

Pathology

PA12.2	Describe the pathogenesis of disorders caused by protein calorie malnutrition and starvation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Pediatrics	
PA14.1	Describe iron metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PA15.1	Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.1	Define and classify hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.2	Describe the pathogenesis and clinical features and hematologic indices of hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.3	Describe the pathogenesis, features, hematologic indices and peripheral blood picture of sickle cell anemia and thalassemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.4	Describe the etiology, pathogenesis, hematologic indices and peripheral blood picture of Acquired hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA25.1	Describe bilirubin metabolism, enumerate the etiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	

Dermatology, Venereology & Leprosy

DR17.1	Enumerate and identify the cutaneous findings in Vitamin A deficiency	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Skill assessment Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.2	Enumerate and describe the various skin changes in Vitamin B complex deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine Pediatrics, Biochemistry	
DR17.3	Enumerate and describe the various changes in Vitamin C deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.4	Enumerate and describe the various changes in Zinc deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	

Ophthalmology

OP7.1	Describe the surgical anatomy and the metabolism of the lens	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Human Anatomy	

General Medicine

IM2.3	Discuss and describe the lipid cycle and the role of dyslipidemia in the pathogenesis of atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
IM2.12	Choose and interpret a lipid profile and identify the desirable lipid profile in the clinical context	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Biochemistry	
IM2.18	Discuss and describe the indications, formulations, doses, side effects and monitoring for drugs used in the management of dyslipidemia	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology Biochemistry	
IM11.12	Perform and interpret a capillary blood glucose test	S	P	Y	Bed side clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	

IM11.13	Perform and interpret a urinary ketone estimation with a dipstick	S	P	Y	Bed side clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM13.1	Describe the clinical epidemiology and inherited & modifiable risk factors for common malignancies in India	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology, Biochemistry	
IM23.1	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.2	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.3	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.4	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM24.22	Describe and discuss the aetiopathogenesis, clinical presentation, complications, assessment and management of nutritional disorders in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	

Pediatrics

PE9.1	Describe the age related nutritional needs of infants, children and adolescents including micronutrients and vitamins	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Community Medicine, Biochemistry	
PE9.3	Explains the Calorific value of common Indian foods	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE10.1	Define Describe the etio-pathogenesis , Classify including WHO classification , clinical features, complication and management of Severe Acute Malnourishment (SAM) and Moderate Acute Malnutrition (MAM)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.2	Outline the clinical approach to a child with SAM and MAM	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.3	Assessment of a patient with SAM and MAM, diagnosis, classification and planning management including hospital and community based intervention, rehabilitation and prevention	S	SH	Y	Bed side clinics, Skill Lab	Skill station		Physiology, Biochemistry	
PE11.1	Describe the common etiology, clinical features and management of Obesity in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry, Pathology	
PE12.1	Discuss the (RDA) , dietary sources of Vitamin A and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.2	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin A	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	

PE12.3	Identify the clinical features of dietary deficiency / excess of Vitamin A	S	SH	Y	Bed side clinics, Small group discussion	Document in log book		Biochemistry	
PE12.4	Diagnose patients with Vitamin A deficiency, Classify and plan management	S	SH	N	Bed side clinics, Skill Station	Document in log book		Biochemistry	
PE12.5	Discuss the Vitamin A prophylaxis program and their recommendations	K	K	Y	Lecture, Small group Discussion	Written/ Viva voce		Biochemistry	
PE12.6	Discuss the RDA, dietary sources of Vitamin D and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.7	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin D (Rickets and Hypervitaminosis D)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.8	Identify the clinical features of dietary deficiency of Vitamin D	S	SH	Y	Bedside clinics, Skills lab	Document in log book		Biochemistry, Physiology, Pathology	
PE12.9	Assess patients with Vitamin D deficiency, Diagnose, Classify and plan management	S	SH	Y	Bed side clinics	Document in log book		Biochemistry, Physiology, Pathology	
PE12.11	Discuss the RDA, dietary sources of Vitamin E and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.12	Describe the causes, clinical features, diagnosis and management of deficiency of Vitamin E	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.13	Discuss the RDA , dietary sources of Vitamin K and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.14	Describe the causes, clinical features, diagnosis ,	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	

	management and prevention of Deficiency of Vitamin K								
PE12.15	Discuss the RDA , dietary sources of Vitamin B and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.16	Describe the causes, clinical features, diagnosis and management of Deficiency of B complex Vitamins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.17	Identify the clinical features of Vitamin B complex deficiency	S	SH	Y	Bedside clinics, Skills lab	Document in log book		Biochemistry	
PE12.18	Diagnose patients with Vitamin B complex deficiency and plan management	S	SH	Y	Bed side clinics, Skill lab	Document in log book		Biochemistry	
PE12.19	Discuss the RDA, dietary sources of Vitamin C and their role in Health and disease	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.20	Describe the causes, clinical features, diagnosis and management of Deficiency of Vitamin C (scurvy)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.21	Identify the clinical features Vitamin C deficiency	S	SH	N	Bed side clinics, Skill lab	Document in log book		Biochemistry	

General Surgery

SU1.1	Describe basic concepts of homeostasis, enumerate the metabolic changes in injury and their mediators.	K	KH	Y	Lecture, Bed side clinic and Small group discussion.	Written/ Viva voce.		Physiology, Biochemistry	
SU1.2	Describe the factors that affect the metabolic response to injury.	K	KH	Y	Lecture, Bed side clinic and Small group discussion.	Written/ Viva voce.		Biochemistry	
SU9.1	Choose appropriate biochemical, microbiological, pathological, imaging	K	KH	Y	Lecture, Small group discussion.	Written/ Viva voce		Biochemistry, Microbiology, Pathology	

	investigations and interpret the investigative data in a surgical patient.								
SU12.3	Discuss the nutritional requirements of surgical patients, the methods of providing nutritional support and their complications.	K	KH	Y	Lecture, Small group discussion, Bedside clinic discussion	Written/ Viva voce		Biochemistry	

Source: Medical Council of India, Competency Based Undergraduate Curriculum for the Indian Medical Graduate, 2008. Vol.1; pg 119 - 135

Case based learning Sessions with lab data interpretation: 20 X 2 =40 hrs

Sl. No	Topic	Suggested Cases for discussion	No. of sessions (2 hrs each)	Domain/ Level	Assessment Tool
1	Diagnostic enzymology BI2.7, BI11	Myocardial infarction Acute pancreatitis	1	K/KH	Case/chart/ discussion/OSPE
2	Carbohydrate metabolism BI3.8, BI3.10, BI11.17	Diabetes Mellitus GTT charts/GST Galactosemia Von Gierke disease	2	K/KH	Case/chart/ discussion/ OSPE
3	Lipid metabolism BI3.10, BI4.7, BI11.17	Dyslipidemia Ketoacidosis Famili Hypercholesterolemia	1	K/KH	Case/chart/ discussion/ OSPE
4	Protein metabolism Inborn errors of metabolism BI5.5, BI11.17	PKU Alkaptonuria Homocystinuria MSUD Albinism	2	K/KH	Case/chart/ / discussion/ OSPE
5	Plasma proteins BI5.5, BI11.16, BI11.17	Multiple myeloma	1	K/KH	Case/chart/ discussion/ OSPE
6	Nucleotide metabolism BI6.4, BI11.17	Gout	1	K/KH	Case/chart/ discussion/ OSPE
7	Liver Function tests and Hemoglobinopathies BI6.2, BI6.14, BI11.17	Hemolytic Jaundice Hepatic jaundice Obstructive jaundice Neonatal jaundice Alcoholic cirrhosis Non alcoholic Steatohepatitis Sickle cell anaemia Thalassemia	2	K/KH	Case/chart/ discussion/ OSPE
8	Renal function tests BI6.14, BI11.17	Normal renal function Renal failure Nephrotic syndrome Acute glomerulonephritis	2	K/KH	Case/chart/ discussion/ OSPE
9	Thyroid function tests BI6.14, BI11.17	Hypothyroidism Hyperthyroidism	1	K/KH	Case/chart/ discussion/ OSPE
10	Vitamin deficiency disorders BI6.5	Vitamin A deficiency Rickets/Osteomalacia Scurvy BeriBeri Pellagra Megaloblastic anemia	3	K/KH	Case/chart/ / discussion/ OSPE

11 Minerals BI6.10	Iron deficiency anaemia Tetany Wilson's disease Goitre Fluorosis	1	K/KH	Case/chart/ / discussion/ OSPE
12 Nutritional disorders BI8.2	Kwashiorkor Marasmus Metabolic syndrome	1	K/KH	Case/chart/ discussion/ OSPE
13 Cancer BI10.2	Prostate carcinoma Breast carcinoma	1	K/KH	Case/chart/ discussion/ OSPE
14 Disturbances in acid-base balance BI6.8, BI11.17	Metabolic acidosis Metabolic alkalosis Respiratory acidosis Respiratory alkalosis	1	K/KH	

IV. EARLY CLINCAL EXPOSURE (ECE):

Needs to be entered in Log book

CLINICAL SKILLS - 12 hours

Suggested cases for hospital visit:

- Anemia
- Jaundice
- Renal failure
- Diabetes Mellitus

BASIC SCIENCE CORRELATION - 18 hours

Suggested topics:

- Biochemical basis of myocardial infarction (dyslipidemia, atherosclerosis, diagnostic tests)
- Biochemical basis of acute complications of diabetes mellitus
- Biochemical alterations in diarrhea (acid base and electrolyte and ORS management
- Biochemical basis of Metabolic syndrome
- Critical alerts in Biochemistry lab test results.
- Evidence based laboratory medicine

V. SELF DIRECTED LEARNING (SDL):

Suggested topics for log book entry in the form of concept mapping:

- RBC membrane composition and Biochemical basis of Hereditary spherocytosis
- Respiratory distress syndrome
- Advanced glycation end products and complications of Diabetes Mellitus
- Hormonal basis of osteoporosis
- Cardiovascular risk assessment scores
- Biochemical basis of Alzheimer disease

AETCOM MODULES TO BE COVERED UNDER BIOCHEMISTRY

AETCOM modules number (as per MCI document)	Topic
1.4	**The foundations of communication – 1**

A log book for each student shall be maintained to record the reflections of ECE and AETCOM module components and skill certifications along with other components of Assessment like, learner participation in learning process including assignments, preparation for seminar, problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test.

SCHEME OF EXAMINATION

INTERNAL ASSESSMENT

Scheme for calculation of internal assessment marks:

Theory (maximum marks)	Marks	Practicals	Marks
Theory written paper	30	Practical exam (10 marks) and viva- voce (5 marks)	15
Formative assessment		Formative assessment	
MCQs/monthly test/seminars/assignments/ Case based learning tests	10	Early clinical exposure + Skill Certification+ Practical record	5
Total	**40**		**20**

Please note:

1. Prior to submission to the University, the marks for each of the three internal examination theory assessments must be calculated out of 30 marks, regardless of the maximum marks.
2. Only the final marks out of 40 needs to be submitted to the University, separately for theory and practical for each internal assessment.
3. Internal assessment should be based on competencies and skills.
4. Regular periodic examinations shall be conducted throughout the course. There shall

be three internal assessment examinations in each preclinical subject.

5. An average of the marks scored in the three internal assessment examinations will be considered as the final internal assessment marks.
6. At least 50% marks of the total marks combined in theory and practicals/clinical assigned for internal assessment is to be obtained in a particular subject to be eligible to appear for university examinations. A candidate who has not secured requisite aggregate in the internal assessment may be permitted to appear for another internal examination as a remedial measure. If he/she successfully completes the remediation measures prescribed by the Institution / University as the case may be, only then he/she is eligible to appear for University Examination.
7. Students must secure at least 50% marks of the total marks (combined in theory and practical) assigned for internal assessment to be declared successful at the final university examination of that subject.
8. The third internal examination is the preliminary examination to be conducted on the lines of the university examination.
9. The students should be made aware of the results of internal assessment.
10. Internal assessment marks will reflect as a separate head of passing at the university examination.
11. The internal examination marks for the 1^{st}, 2^{nd} and 3^{rd} internal examinations shall be submitted to the University on or before 15^{th} December, 15^{th} March and 15^{th} July respectively.
12. Level of participation in early clinical exposure must be assessed and contribute to the practical component as shown in the table above.
13. A suggested format for assessing participation in ECE is shown.
14. The scheme for calculation of the internal examination marks is given the table above.
15. A clear record of all components that add to the internal assessment marks needs to be maintained by the institution and retained by them for at least 5 years after completion of the examination. Institutions may be asked to provide these details by the University as and when required.
16. The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.
17. A suggested format for providing feedback is shown.
18. Formative assessments also enable the early identification of students who are struggling t o achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

(vide Medical Council of India Notification on Graduate Medical Education (Amendment) Regulations 2019, published in the Gazette of India Part III, Section 4, Extraordinary issued on 4^{th} November 2019. Page 82-83)

UNIVERSITY EXAMINATIONS

Table Showing Scheme for Calculation of University Examination Marks

Theory (maximum marks)		**Practical (maximum marks)**	
Paper 1	100	Practical exam (Practical Exercise) (1 to 4)	60
Paper 2	100	Viva-Voce	40
Total	**200**	**Total**	**100**

1. University examinations are to be designed with a view to ascertain whether the candidate has acquired the necessary knowledge, minimal level of skills, ethical and professional values with clear concepts of the fundamentals which are necessary for him/her to function effectively and appropriately as a physician of first contact.
2. Assessment shall be carried out on an objective basis to the extent possible.
3. Nature of questions will include different types such as structured essays, modified essays (case based), short essays and short answers questions.
4. In subjects that have two papers, the student must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
5. The objective will be to assess proficiency and skills.
6. Viva/oral examination should assess the student's ability to explain key concepts with functional and clinical correlations. Viva should focus on application and interpretation.
7. The marks obtained in the viva examination will be added to the practical marks.
8. The student must secure a minimum of 50% of marks in aggregate in the viva and practical examination (both combined) to pass.
9. Students must secure at least 50% marks of the totally marks (combined in theory & practical) assigned for Internal assessment to be declared successful at the final university examination of that subject.

(vide Medical Council of India Notification on Graduate Medical Education (Amendment) Regulations 2019, published in the Gazette of India Part III, Section 4, Extraordinary issued on 4th November 2019. Page 84)

A. THEORY: 200 Marks

There shall be two theory papers of 100 marks each and duration of each paper shall be 3 hours. The pattern of questions in each paper shall be as mentioned below.

Type of Question	Number of Questions	Maximum Marks for each question	Total
Multiple choice question (MCQ) Minimum FOUR MCQs should be CASE based	20	01	20
Structured Long essay questions (SLEQ) Minimum one case vignette based question (CVBQ)	2	10	20
Short ESSAY questions (SEQ) Minimum two case vignette based questions (CVBQ)	06	05	30
Short answer questions (SAQ) minimum one question on AETCOM module 1.4 in Paper I	10	03	30
		Total Marks	**100**

B. PRACTICAL:

Practical exercises – 60 marks

1. Exercise 1: OSPE - 15 Marks
2. Exercise 2: Qualitative analysis of Normal or Pathological constituents of Urine - 15 Marks
3. Exercise 3: Quantitative estimation and interpretation - 15 Marks
4. Exercise 4: Case studies - 15 Marks
   One Major Case - 10 Marks
   One Minor Case - 05 Marks

Exercise 1: OSPE (15 Marks)
No. of Stations: 1 (performance station) and 2 (interpretation stations)
Time duration: Max 5 min

Exercise 2: Qualitative analysis of Normal or Pathological constituents of Urine (15 Marks):
Selection, principle and performance of tests: 5 marks
Interpretation and Discussion: 10 marks
Note: Alphabetically arranged test procedures shall be given.

Exercise 3: Quantitative estimation and interpretation (15 Marks)
Principle: 5 Marks
Procedure, Calculation and Results: 5 Marks
Interpretation and Discussion: 5 Marks
Note: Procedure sheets shall be given.

Exercise 4: Case studies (15 marks)
Total No. of case report: 2
Suggested Major Case studies: Organ function tests/Diabetes mellitus/Acid base disorders/ Myocardial infarction/ Dyslipidemia/PEM
Note: Questions for Quantitative experiments may preferably be case based scenarios.

C. Viva voce: 40 marks

The viva-voce examination shall carry 40 marks and all examiners will conduct the examination. Viva should focus on application and interpretation. (viva marks to be added to practical and not theory)

(vide Medical Council of India Notification on Graduate Medical Education (Amendment) Regulations 2019, published in the Gazette of India Part III, Section 4, Extraordinary issued on 4th November 2019)

Distribution of topics for Paper 1 and Paper 2 for University examination and Topic wise weightage

Sl. No	Paper 1 Topics	Weightage Up to (in marks)
1	Cell, cellular organelles and membrane transport	5
2	Extra cellular matrix	3
3	Enzymes	13
4	Carbohydrate Chemistry	5
5	Carbohydrate Metabolism	13
6	Lipid Chemistry	5
7	Lipid Metabolism	13
8	Metabolism and homeostasis	8
9	Biological Oxidation	5
10	Vitamins	13
11	Minerals	13
12	Nutrition	10
13	Acid Base Balance	13
14	Water and Electrolyte Balance	6

Sl. No	Paper 2 Topics	Weightage Up to (in marks)
1	Protein Chemistry	6
2	Plasma proteins	5
3	Immunology	5
4	Protein and amino acid Metabolism	13
5	Nucleic acid Chemistry	6
6	Metabolism of Purine and Pyrimidines	10
7	Molecular Biology	13
8	Molecular Biology Techniques	13
9	Biochemistry of Cancer	10
10	Heme Metabolism	13
11	Organ function tests	13
12	Free radicals and Antioxidants	6
13	Xenobiotics and Detoxification	3
14	Clinical Chemistry	5

Note:

- Weightage of marks assigned to topics may add to more than 100
- Structured Long essay question should be from the topics with weightage of MORE THAN 10 marks. However, a part of structured long essay may be from other topics adhering to the weightage of marks allotted for that topic.
- The topics to different paper are generally evaluated under those sections. However, a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

BLUE PRINT FOR QUESTION PAPER
(to be filled by the question paper setter)

Total marks under each type of question from each topic needs to be entered by QP Setter.

BIOCHEMISTRY PAPER 1

A	B	C	D	E	G	H	I	
Sl No	**Topic**	**Total marks as per guideline**	**SLEQ 10 marks (including one CVBQ of 10 marks)**	**SEQ 5 marks each (including two CVBQ of 5 marks)**	**SAQ 3 marks each**	**Total marks from each topic (total of columns from D to G)**	**Higher order thinking skills questions (including CVBQs)**	
							Question number	Marks
1	Cell, cellular organelles and membrane transport	5						

2	Extra cellular matrix	3						
3	Enzymes	13						
4	Carbohydrate Chemistry	5						
5	Carbohydrate Metabolism	13						
6	Lipid Chemistry	5						
7	Lipid Metabolism	13						
8	Metabolism and homeostasis	8						
9	Biological Oxidation	5						
10	Vitamins	13						
11	Minerals	13						
12	Nutrition	10						
13	Acid Base Balance	13						
14	Water and Electrolyte Balance	6						
MCQs		**20X 1= 20**					**Grand Total =100**	

SLEQ- Structured Long Essay Question; SEQ- Short Essay Question; SAQ- Short Answer Question ; MCQ- Multiple Choice Questions CVBQ- Case Vignette Based Question Marks allocated to questions that assess higher order thinking skills (%) =

BIOCHEMISTRY PAPER 2

A	B	C	D	E	G	H	I	
Sl No	**Topic**	**Total max as per guideline**	**SLEQ 10 marks (including one CVBQ of 10 marks)**	**SEQ 5 marks each (including two CVBQ of 5 marks)**	**SAQ 3 marks each**	**Total marks from each topic (total of columns from D to G)**	**Higher order thinking skills questions (including CVBQs)**	
							Question number	Marks
1	Protein Chemistry	6						
2	Plasma proteins	5						

3	Immunology	5						
4	Protein and amino acid Metabolism	13						
5	Nucleic acid Chemistry	6						
6	Nucleotide Metabolism	10						
7	Molecular Biology	13						
8	Molecular Biology Techniques	13						
9	Biochemistry of Cancer	10						
10	Heme Metabolism	13						
11	Organ function tests	13						
12	Free radicals and Antioxidants	6						
13	Xenobiotics and Detoxification	3						
14	Clinical Chemistry	5						
MCQs		**20X 1= 20**					**Grand Total =100**	

SLEQ- Structured Long Essay Question; SEQ- Short Essay Question; SAQ- Short Answer Question; MCQ- Multiple Choice Questions CVBQ- Case Vignette Based Question. Marks allocated to questions that assess higher order thinking skills (%) =

Note:

1. Question paper may be framed using "Blue Print" table as guideline
2. A minimum of 35% marks in each paper shall be allocated to questions that assess the higher order thinking skills of the student. This includes Case Vignette based questions.
3. Column I has been provided for calculating percentage marks allotted for questions assessing higher order thinking skills.

RECOMMENDED BOOKS FOR THEORY (LATEST EDITION)

1. Textbook of Biochemistry by D.M.Vasudevan & Sreekumari. S - 9th Edition.
2. Textbook of Biochemistry by Rafi MD - 3th Edition.
3. Medical Biochemistry by Dinesh Puri - 3th Edition.
4. Textbook of Biochemistry by Debajyoti Das - 13th Edition.
5. Textbook of Biochemistry by U.Satyanarayan & U. Chakrapani - 7th Edition.
6. Textbook of Biochemistry Pankaja Naik - 4th Edition.
7. Harpers' Illustrated Biochemistry - 31st Edition

RECOMMENDED BOOKS FOR PRACTICALS (LATEST EDITION)

1. Manual of Practical Biochemistry by Rafi MD - 2nd Edition.
2. Manipal manual of Clinical Biochemistry by Shivanand Nayak. - 4th Edition.
3. Laboratory Manual in Biochemistry by T.N.Pattabhiraman - 4th Edition.
4. A Case Oriented Approach Towards Biochemistry by Namrata Chhabra - 1st Edition

COMMUNITY MEDICINE

PHASE – I (TERM 1 & 2)

INTRODUCTION TO COMMUNITY MEDICINE

Introduction to Humanities and Community Medicine, which includes Evolution of Medicine, Demography, Medical Sociology, Behavioral Sciences inclusive of Communication Skills and brief introduction to Research methodology and Biostatistics.

GOAL: To prepare undergraduate medical students as a competent Community & Primary Care Physician

OBJECTIVES:

Knowledge: The student shall be able to:

1. Explain the principles of sociology including demographic population dynamics;
2. Identify social factors related to health, disease and disability in the context of urban and rural societies;
3. The impact of urbanization on health and disease;
4. Observe and interpret the dynamics of community behavior;
5. Describe the elements of normal psychology and social psychology;
6. Observe the principles of practice of medicine in hospital and community setting.
7. Understand the basics of Research in medical field

Skills: At the end of the course, the student shall be able to make use of:

1. Principles of practice of medicine in hospital and community settings and familiarization with elementary nursing practices.
2. Art of communication with patients including history taking and medico social work.
3. To formulate a research plan to undertake projects funded by STS ICMR, BLDE University etc.

Teaching of community medicine shall be both theoretical as well as practical. The practical aspects of the training programme shall include visits to the health establishments and to the community where health intervention programmes are in operation so as to make students understand the role of social, cultural, economic and environmental factors on the

health of population in urban & rural communities & also to orient the student about health care facilities available and the services provided by them in the underserved population.

In order to inculcate in the minds of the students the basic concept of community medicine to be introduced in this phase of training, it is suggested that the detailed curriculum drawn shall include at least 52 hours which includes lectures, demonstrations, seminars etc. together with community visits.

COURSE CONTENTS:

- **CONCEPT OF HEALTH AND DISEASE**

Must know

1. Evolution of Public Health.
2. Definition of health, holistic concept of health, appreciation of health as a relative concept, determinants of health.
3. Characteristics of agent, host and environmental factors in health and disease and the multifactorial etiology of disease.
4. Understanding Natural history of disease and application, interventions at various levels of prevention with appropriate examples.
5. Indices used in measurement of health.
6. Health profile in India.

Desirable to know

1. ICD Classification of diseases.

Nice to know

1. Complementary Alternative Medicine.

- **RELATIONSHIP OF SOCIAL AND BEHAVIOURAL TO HEALTH AND DISEASE**

Must Know

1. Conduct of a clinico-social evaluation in relation to social, economic and cultural aspects, educational and residential background; attitude to health, disease and to health services; the individuals, family and community.

2. Assessment of barriers to good health, recovery from sickness and to lead a socially and economically productive life.
3. Development of good doctor – patient and community relationship.

Desirable to know

1. Hospital Sociology.

Nice to know: Social Research.

- **NUTRITION**

Must know

1. Common sources of various nutrients and special nutritional requirement according to age, sex, activity, physiological condition.
2. Nutritional assessment of individual, families and the community by:
    a) selecting and using appropriate methods such as : anthropometry, clinical,
    b) dietary, laboratory techniques.
3. Plan and recommend a suitable diet for the individuals and families bearing in mind the local availability of foods, economic status, etc.
4. Common nutritional disorders: protein energy malnutrition, vitamin A deficiency, anemia, iodine deficiency disease, fluorosis, food toxin diseases and their control and management.
5. Food adulteration, Prevention of Food Adulteration Act, Food hygiene.
6. National Programmes in Nutrition.

Desirable to know

1. Nutritional surveillance, education and rehabilitation.

Nice to know

1. Preservation of foods.
2. Genetically modified crops.

This content is cited from "Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate, 2018. Vol. II; pages 41-59"

THEORY (20hrs)

- **Concept of Health & Disease (CM 1.1 to 1.8)**
  - Define and describe the concept of Public Health
  - Define health; describe the concept of holistic health including concept of spiritual health and the relativeness & determinants of health
  - Describe the characteristics of agent, host and environmental factors in health and disease and the multi factorial etiology of disease
  - Describe and discuss the natural history of disease
  - Describe the application of interventions at various levels of prevention
  - Describe and discuss the concepts, the principles of Health promotion and Education, IEC and Behavioral change communication (BCC)
  - Enumerate and describe health indicator
  - Describe the Demographic profile of India and discuss its impact on health

- **Relationship of social and behavioural to health and disease (CM 2.1 to 2.5)**
  - Describe the steps and perform clinic-socio-cultural and demographic assessment of the individual, family and community
  - Describe the socio-cultural factors, family (types), its role in health and disease & demonstrate in a simulated environment the correct assessment of socio-economic status
  - Describe and demonstrate in a simulated environment the assessment of barriers to good health and health seeking behavior
  - Describe social psychology, community behaviour and community relationship and their impact on health and disease
  - Describe poverty and social security measures and its relationship to health and disease
- **Principles of health promotion and education (CM 4.1 to 4.2)**
  - Describe various methods of health education with their advantages and limitations
  - Describe the methods of organizing health promotion and education and counseling activities at individual family and community settings

- **Nutrition (CM 5.1, 5.3, 5.5, 5.6, 5.8)**
  - Describe the common sources of various nutrients and special nutritional requirements according to age, sex, activity, physiological conditions
  - Define and describe common nutrition related health disorders (including macro-PEM, Micro-iron, Zn, iodine, Vit. A), their control and management
  - Enumerate and discuss the National Nutrition Policy, important national nutritional Programs including the Integrated Child Development Services Scheme (ICDS) etc

PRACTICAL (27hrs)

- **Research Methodology (CM 6.1)**
  - Brief Introduction of Research & Biostatistics and STS ICMR projects

- **Environment & Health (CM 3.1, 3.2)**
  - Describe the health hazards of air, water, noise, radiation and pollution
  - Describe concepts of safe and wholesome water, sanitary sources of water, water purification processes, water quality standards, concepts of water conservation and rainwater harvesting.
- **Field visits**
  - Rural Health Training Center, Ukkali
  - Urban Health Training Center, Chandabawadi

SDL - SELF DIRECTED LEARNING (5hrs)

- **Global warming & Population explosion**

- **1ST INTERNAL EXAM (at the end of Phase 1, Term 2)**
  - **THEORY (5M X 10 = 50 Marks)**

This content is cited from "Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate, 2018. Vol. II; pages 41-59"

ANNEXURE – I

FOUNDATION COURSE

This content is cited from "Medical council of India Foundation course for the Undergraduate Medical Education Program, 2019.

Goal: The goal of the Foundation Course is to prepare a learner to study Medicine effectively. It will be of one-month duration after admission**.**

Purpose

The purpose of the Foundation Course includes:

a) Orienting the students to all aspects of the medical college environment.
b) Equipping them with certain basic, but important, skills required for patient care and enhancing their communication, language, computer and learning skills.
c) Providing opportunity for peer and faculty interactions and an overall sensitization to the various learning methodologies.
d) This content is copied from GMER 2019 (Graduate Medical Education Regulations)

9.1.1 **Objectives:** The objectives shall be:

(i) Orient the learner to:

a. The medical profession and the physician's role in society
b. The MBBS programme
c. Alternate health systems in the country and history of medicine
d. Medical ethics, attitudes and professionalism
e. Health care system and its delivery
f. National health priorities and policies
g. Universal precautions and vaccinations
h. Patient safety and biohazard safety
i. Principles of primary care (general and community-based care)
j. The academic ambience

(ii) Enable the learner to acquire enhanced skills in:

a. Language
b. Interpersonal relationships
c. Communication
d. Learning including self-directed learning
e. Time management
f. Stress management
g. Use of information technology

(iii) Train the learner to provide:

a. First-aid
b. Basic life support

9.1.2 In addition to the above, learners may be enrolled in one of the following programmes which will be run concurrently:

(i) Local language programme
(ii) English language programme
(iii) Computer skills

These may be done in the last hours of the day for the duration of the Foundation Course.

9.1.3 These sessions must be as interactive as possible.

3. Major Components

The major components of the Foundation Course include:

- **Orientation Program:** This includes orienting students to all the components mentioned in GMER 9.1 and should be completed as one block in the first week.
- **Skills Module (Basic):** This involves skill sessions such as Basic Life Support, First Aid, Universal precautions and biomedical waste and safety management that students need to be trained prior to entering the patient care areas.
- **Field visit to Community and Primary health centre:** These visits provide orientation to the care delivery through community and primary health centres, and include interaction with health care workers, patients and their families.
- **Professional development including Ethics:** This is an introduction to the concept of Professionalism and Ethics. This component will provide students with understanding that clinical competence, communication skills and sound ethical principles are the foundation of professionalism. It will also provide understanding of the consequences of unethical and unprofessional behaviour, value of honesty, integrity and respect in all interactions. Professional attributes such as accountability, altruism, pursuit of excellence, empathy, compassion and humanism will be addressed. It should inculcate respect and sensitivity for gender, background, culture, regional and language diversities. It should also include respect towards the differently abled persons. It introduces the students to the basic concept of compassionate care and functioning as a part of a health care team. It sensitises students to “learning” as a behaviour and to the appropriate methods of learning. Orientation to Professionalism and Ethics will continue as the AETCOM module after the first month of the MBBS course and throughout the first year, with reinforcement of the various components introduced.
- **Sports and Extracurricular activities:** These have been included, in order to demonstrate the importance of work-life balance in a demanding profession, and provide an opportunity for students to have compulsory physical activity and to

showcase their talents. The Foundation Course should have compulsory 4 hours per week for sports and 2 hours per week for extracurricular activities, adding up to 22 hours.

- **Enhancement of Language / Computer skills / Learning Skills:** These are sessions to provide opportunity for the students from diverse background and language competence to undergo training for speaking and writing English, fluency in local language and basic computer skills. The students should be sensitized to various learning methodologies such as small group discussions, skills lab, simulations, documentation and concept of Self-Directed learning.

1. **Foundation Course Modules**

1. Orientation Module	**Total hours: 30**
1A. Orientation Module: Introduction to institution / campus / facilities	
1B. Orientation Module: Role of doctors in the society	
1C. Orientation Module: History of Medicine and alternate systems	
1D. Orientation Module: IMG roles / overview MBBS curriculum various career pathways	
1E. Orientation Module : Principles of family practice	
2. Skills Module:	**Total hours: 35**
2A.Skills Module: First Aid	
2B.Skills Module: BLS	
2C.Skills Module: Universal precautions	
2D.Skills Module: Waste management	
2E.Skills Module: Immunization	
2F.Skills Module: Documentation	
3. Community orientation module	**Total hours: 8**
3A. Community Orientation Module: National Health goals and policies/ health Care systems/ community health	
3B. Community Orientation Module: Interactions with patients and families, Communities.	
4. Professional Development and Ethics Module (P&E)	**Total hours: 40**
4A. (P&E): Concept of Professionalism and Ethics	
4B. (P&E): White coat Ceremony	
4C. (P&E): Professional behaviour and altruistic behaviour	
4D. (P&E): Working in a health care team	
4E. (P&E): Disability competencies	
4F. (P&E): Cultural competence	
4G. (P&E): Stress management	
4H. (P&E): Time management	
4I. (P&E): Interpersonal relationship	
4J. (P&E): Learning	
5. Enhancement of Language and Computer Skills Module	**Total hours:40**
5A. Enhancement of Language and Computer Skills Module:	

Communication
5B. Enhancement of Language and Computer Skills Module: Local Language training
5C. Enhancement of Language and Computer Skills Module: English Language training
5D. Enhancement of Language and Computer Skills Module: Computer Skills training

6. Sports and extracurricular activities: Total hours: 22

Sports should be for a mandatory 4 hours per week and extra-curricular activities 2 hours per week, subject to a total of 22 hours.

Assessment Methods

Formative and Internal Assessment for Foundation Course

Foundation Course is compulsory and an attendance of 75% will be mandatory.

Feedback, comments and/or grades about the student's performance by the faculty mentor can be documented particularly for the skills training.

The performance of the students in the Foundation Course will **NOT** contribute towards internal assessment marks.

Student's feedback about the Foundation Course shall be documented in a structured format. This will help in gathering student's perceptions about various aspects of Foundation Course and help in program evaluation and refinement.

Assessment: Formative: May be assessed by active discussion in the small group session or by Reflective writing in log book. General feedback about the usefulness of the session for future planning.

The above matter is copied from Medical Council of India. Curriculum implementation support program, Foundation Course for the Undergraduate Medical Education Program, 2019.

ANNEXURE – II

Attitude, Ethics and Communication (AETCOM) Competencies

This content is copied from Medical Council of India, AETCOM Module for Undergraduate Medical Education Program, 2019: pp 3-27

New teaching learning approaches includes a structured longitudinal program on attitude, ethics and communication (AETCOM).

The domains of attitude and communications with emphasis on ethics shall be taught directly and explicitly throughout the undergraduate curriculum. The two major aspects of teaching professionalism include explicit teaching of cognitive base and stage opportunities for experiential learning and reflection throughout the curriculum.

AETCOM module facilitates faculty in implementing a longitudinal program that will help students acquire necessary competence in the attitudinal, ethical and communication domains. It also offers approaches to teaching learning methods.

Teaching Learning Methods recommended

Guidelines for Case Discussion

A hybrid problem-oriented approach shall be the most effective ways for students to explore the various facets of "real life issues". In addition to problem solving skills, case discussions promote collaborative learning, team work, reflection and self-directed learning.

1. Two or more learning sessions are recommended for each session with sufficient time for self-directed learning and other learning activities between each session.
2. A case is introduced into a small group and the facilitator facilitates a small group discussion where,

a) initial reactions of the group to the case is obtained
b) the underlying ethical, legal and societal principles of the case are elicited
c) learning objectives for the case are developed
d) learning tasks are assigned for members of the learning groups
e) learning resources are identified

- The suggested location for such a session is a small group discussion area which requires a small table with seating for 8 - 10 students
- Suggested duration for such a session is 1 hour
- A board with chalk or marker is also required

3. Learning occurs in between sessions by the learners through following:

- Self-directed learning by study of identified learning resources
- Self-directed learning through study of online learning resources
- Identification of legal, ethical and social precedents for the given settings

- Obtaining opinion from seniors in the profession on their impressions on the setting

4. Reinforcement of the fundamental concepts underlying the case shall be done through a large group learning session (lecture or equivalent) in between the small group sessions.

5. In the second session, the small group discussion is focused on closure of the case (or the part of the case) for which learning objectives were identified for in the first session. The facilitators may guide the discussion based on the ethical, legal, societal and communication aspects of the case. The approach will be to allow students to reflect, make a choice and defend their choice, based on their values and learning.

Student narrative

The student narrative is a learning method that focuses on the following skills:

a) Elicit, observe and record data.
b) Reflect on the data at a higher level of thinking and derive opinions and conclusions.
c) Communicate the observations and conclusions in a written and verbal form and expand on and defend the conclusions with colleagues and teachers.
d) Form new experiences and conclusions based on this discussion.

Learning modules for Professional year I

There are in total Five Number of modules suggested by Medical Council of India, AETCOM Module for Undergraduate Medical Education Program, 2019 with Total number of 34 hours duration

Module 1.1: What does it mean to be a doctor?

Background

It is important for new entrants to get a holistic view of their profession, its ups and downs, its responsibilities and its privileges. It is important to start this discussion early in their careers when their minds are still fresh with the thrill of joining medical school. Such a discussion will help them remember the big picture through the program and remind them why they have chosen to be doctors.

Competencies addressed

The Student should be able to:	Level
1. Enumerate and describe professional qualities and roles of a physician	KH
2. Describe and discuss the commitment to lifelong learning as an important part of physician growth.	KH
3. Describe and discuss the role of a physician in health care system.	KH
4. Identify and discuss physician's role and responsibility to society and the community that she/he serves	KH

Learning Experience

Year of study: Professional year 1

Hours: 8 (6 hours + 2 hours self-directed learning)

i. Exploratory session- 1 hour
ii. Facilitated panel discussion – 2 hours
iii. Self-directed learning - 2 hours
iv. Introductory visit to the hospital – 2 hours
v. Discussion and closure of case - 1 hour

Module 1.2: What does it mean to be a patient?

Background

Doctors deal with human suffering throughout their professional careers. A balanced approach to the patient care experience requires an understanding of patients, illnesses, their concepts of suffering, coping mechanisms, the role of the doctor, an exploration of empathy vs equanimity and the difference between healing and curing. An introduction to this fundamental but complex field is important in the first Professional year. An introductory experience will allow students to keep the patient experience in perspective during their learning.

Competencies addressed

The student should be able to:	Level
1.Enumerate and describe professional qualities and roles of a physician	KH
2. Demonstrate empathy in patient encounters	SH

Learning Experience

Year of study: Professional year 1

Hours: 8 (6 hours + 2 hours self-directed learning)

i. Exploratory session - 2 hours
ii. Hospital visit - 2 hours
iii. Self-directed learning - 2 hours
iv. Discussion and closure of case - 2 hours

Module 1.3: The doctor-patient relationship

Background

The doctor-patient relationship is the cornerstone to effective patient care. This session builds on the previous two sessions which address doctors and patients and attempts to explore the fundamental basis of the doctor-patient contract, its rules, boundaries and duties. It provides an introduction to the nature of relationship, importance of communication, honesty, transparency, shared responsibility, equality and vulnerability. This introductory session, though complex, will provide an overview for the student to provide them with a perspective on the doctor-patient relationship throughout their years of study.

Competencies addressed

The student should be able to:	Level
1.Enumerate and describe professional qualities and roles of a physician	KH
2. Demonstrate empathy in patient encounters	SH

Learning Experience

Year of study: Professional year 1

Hours: 7 hours (5 hours + 2 hours of self-directed learning)

i. Large group session- 1 hour
ii. Self-directed learning - 2 hours
iii. Interactive discussions – 2 hours
iv. Discussion and closure – 2 hours

Module 1.4: The foundations of communication - 1

Background

Communication is a fundamental prerequisite in the medical profession and bedside clinical skills is crucial in ensuring professional success for doctors. This module provides students with an introduction to doctor-patient communication. The Kalamazoo consensus statement[1] provides a working model of teaching communication skills and may be used to impart communication skills. The five 'A's elements of behaviour change model may also be used. Effective listening, verbal and nonverbal communication and creating respect in patient encounters would be the skills that would be introduced.

Competency addressed

The student should be able to:	Level
Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non- judgmental and empathetic manner	SH

Learning Experience

Year of study: Professional Year 1
Hours: 7 hours (5 hours + 2 hours self-directed learning)

- **i.** Large group session- 2 hours
- **ii.** Self-directed learning - 2 hours
- **iii.** Small group discussions – 2 hours
- **iv.** Discussion and closure – 1 hour

Module 1.5: The cadaver as our first teacher

Background
Medical students enter college and their first and lasting encounter is with the cadaver. Respect for cadaver as a teacher translates later into respect for human beings as teachers and a lifelong respect for learning. Throughout the world the emphasis on "humanizing" the cadaver with respect as first patient or first teacher has gained momentum.

Competency addressed

The student should be able to:	Level
Demonstrate respect and follows the correct procedure when handling cadavers and other biologic tissues.	SH

Learning Experience

Year of study: Beginning and end of Professional year 1

Hours: 4 (2+2) hours

i. Opening session- 2 hours
ii. Closing session - 2 hours

Assessment of skills related to Attitude, Ethics and Communication AETCOM

The assessment in AETCOM nodule has been designed with this purpose. The teachers should use this opportunity to observe the performance and provide feedback based on their observations. In case a student has demonstrated a performance, which is considered below expectation, corrective action including counseling should be initiated.

I. **Assessment** for **Module 1.1: What does it mean to be a doctor?**
Formative: not required 2. **Summative:** not required

II. **Assessment for Module 1.2: What does it mean to be a patient?**
Formative: The student may be assessed based on their active participation and presentation (written and oral). **Summative:** SAQ

III. **Assessment for Module 1.3: The doctor-patient relationship**
Formative: The student may be assessed based on their active participation in the sessions. A written critique of the situations discussed in item may be used for formative assessment.
Summative: Short questions for example a) rights of patients, b) responsibilities of patients, c) duties of doctors, and d) boundaries of the doctor-patient relationship

IV. **Assessment for Module 1.4: The foundations of communication - 1**
Formative: The student may be assessed based on their active participation in the sessions. A written critique of the situations discussed in item 3 may be used for formative assessment.
Summative: may be deferred for later phases.

V. **Assessment for Module 1.5: The cadaver as our first teacher**
Formative: The student may be assessed based on their active participation in the sessions. The respect and the manner in which students handle biologic tissues throughout the phase may be part of the overall formative assessment of the student.
Summative: may not be required.

The above content is copied from Medical Council of India. AETCOM Module for Undergraduate Medical Education Program, 2019: pp19, 21, 23, 26, 28.

ANNEXURE-III

Early Clinical Exposure

This content is cited from Medical Council of India. Early Clinical Exposure Module for Undergraduate Medical Education Program, 2019; Pages 7-12.

Early clinical exposure creates an opportunity for students to correlate learning in Phase I subjects with their clinical application. This will improve student's motivation to learn and also improves better retention of the subject. It also provides authentic human context and early introduction to the clinical environment.

Students will be able to learn the basic and clinical sciences by means of integrating learning activities, like early clinical contact, clinical skills, communication skills or task-based learning sessions.

Objectives of Early Clinical Exposure:

The objectives of Early Clinical Exposure of the first-year medical learners are to enable the learner to:

a) Recognize the relevance of basic sciences in diagnosis, patient care and treatment.
b) Provide a context that will enhance basic science learning.
c) Relate to experience of patients as a motivation to learn.
d) Recognize attitude, ethics and professionalism as integral to the doctor-patient relationship.
e) Understand the socio-cultural context of diseases through the study of humanities.

Elements of ECE:

The three elements of ECE are:

1. Provision of clinical correlation to basic sciences learning.
2. Provision of authentic human contact in a social or clinical context that enhances learning in the early/pre-clinical years of undergraduate education.
3. Introduction to humanities in medicine

The key principles underlying early clinical exposure are providing a clinical context and ensuring patient centricity. The clinical context shall include case scenario, videos, actual patient, simulated patient etc. The presence of actual patients in every session of ECE, though not essential, is preferred.

Planning of activities & its distribution:

It shall be planned by all teaching faculty for learning sessions in basic sciences around a clinical scenario so that students understand its relevance.

The time allotted for ECE in first year (as per GMER, 2019) is 90 hours which shall be equally divided among the three preclinical subjects. So the time available for each subject is 30 hours. It is further divided as follows:

1. **Basic sciences correlation** (18 hours): One three hour session per month for 6 months shall be allotted. The clinical context will be introduced using actual patient contact or by use of paper based cases, charts (e.g. use of spirogram, electromyogram with its clinical correlation), graphics (e.g. using photos of gigantism/hypothyroidism/ Cushing's syndrome in endocrinology), videos (e.g. videos depicting normal & abnormal respiratory movements, embryology, endoscopy, laryngoscopy etc.), reports (e.g. blood/urine reports indicating biochemical markers), field visits etc. in community/ hospital laboratories.

2. **Clinical skills (experience and human context)** (12 hours): Three hour session per month for 4 months per department will be allotted. Cases will be demonstrated by preclinical faculty or clinicians, in out-patient departments/ wards/ demonstration rooms, as feasible, in small groups.

   Each 3-hour session of clinical experience shall follow the guidelines below:

- Introduction to the module & instruction by preclinical faculty: 30 minutes
- Clinical experience (in groups at different places like wards/OPDs/classrooms with guided observation/checklist): 1 hour 30 minutes
- Summary & conclusions (with learning points): 30 minutes
- Reflection (with guidance & monitoring) on what was learnt: 30 minutes

It will be finalized with a detailed observation guide for students and instruct them, before the actual interaction, regarding what he/she is supposed to observe during the ECE session. In observation guide will have list of clinical features the student has to focus in the particular context.

Preclinical and clinical faculty shall coordinate and involve in the activities related to hospital visits. Clinical faculty will be involved in the planning of ECE sessions. Faculty will be trained to develop, implement and assess ECE which is relevant to their subjects and phases including setting question papers, use of case based questions, assessing clinical context in earlier years and applications of the ECE.

ANNEXURE-IV

Humanities Module

Study of medical humanities plays a pivotal role in preparing students to practice in the community. It develops the students' capacity to listen, interpret and communicate with patients. Appreciating the subjective aspects of a person's health and illness will enable them to offer individualized care. It will also provide a channel to the students to express themselves through creative mediums of literature, music and arts.

Literature and Medicine

Background

Medicine is an integral part of literature – classic, popular and science fiction. A whole genre of medical fiction exists which reflects the community's view of the medicine, its system and health care workers. Literature also portrays human suffering and gives learners perspectives quite different from that obtained from teachers. Many doctors are prolific writers and have written about personal suffering as well as the impact of medicine. The module allows the learner to explore medicine and human suffering from a literary perspective.

Competency addressed

The learner must explore, discuss and reflect on human illness suffering and medicine, as portrayed in literature (classic/contemporary).

Learning Session

Year of Study: 1

Hours: 8 hours

i. Exploratory session: 2 hours
ii. Self-directed Learning: 4 hours
iii. Research / Task / Report
iv. Discussion and closure: 2 hours

Description:

1. An exploratory session is created where, either in small groups or in an interactive large group, students are allowed to speak about the portrayal of suffering illness and health care workers and the system as portrayed in classic and contemporary literature. Evoke questions about regional literature in particular. Explore differences in portrayal of doctors in classic vs. contemporary literature. Evoke a discussion about doctors' accounts of their own suffering.
2. Students, individually or in groups, are asked to choose and read and report on a book that has affected their view of the illness, suffering or the medical profession

Discussion and closure: A closure session where students share their reflection based on their tasks and learning's and their implications.

Formative & Internal Assessment: For Early Clinical Exposure

Formative assessment will have a major role in the teaching of Early Clinical Exposure. The assessment shall focus on students' activities during ECE. Students will participate in various activities such as case based scenarios, live patient's interactions, simulated patients, videos etc. A record of these activities shall be maintained and assessed periodically.

Elements from ECE should be included as appropriate in formative and summative assessments of the respective subjects.

A. **Internal Assessment:**
   Early Clinical Exposure will be part of internal assessment for the respective subject. During assessment, questions will test clinical correlation in basic sciences.

B. **University Examinations:**
   University examinations shall include elements from ECE to test the ability of the student to apply basic science knowledge in clinical context.
   The Modified Essay Questions (Problem based long answer questions), Clinical vignette based Short Answers Questions (SAQ), objective type questions (e.g. Multiple Choice Questions - MCQs) and OSPE can include parts of ECE.

Assessment for Humanities Module - Submitted narrative and reflections

Note: Humanities will be merged with AETCOM module and therefore no additional time is allotted.

The above content is cited from Medical Council of India. Early Clinical Exposure Module for Undergraduate Medical Education Program, 2019: pp 11-12, 39