

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM-CHENNAI
ACCREDITED BY NAAC WITH 'A++' GRADE

UNDERGRADUATE DEGREE PROGRAMME

BACCALAUREATE IN ANESTHESIA AND OPERATION THEATRE TECHNOLOGY

(4Year UG Degree/ 3YEAR 1YEAR -INTERNSHIP)

CURRICULUM &

SYLLABUS

REGULATION 2026

Competency Based Curriculum

Effective from the Academic Year
2026 -2027

Department of ANESTHESIA AND OPERATION THEATER TECHNOLOGY

School of ALLIED HEALTH SCIENCES

VELS

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DEPARTMENT OF ANESTHESIA AND OPERATION THEATER TECHNOLOGY

VISION OF THE DEPARTMENT
To be a leading department in anesthesia and operation theater technology, recognized for excellence in education, clinical competence, patient safety, and innovation in perioperative care, producing highly skilled professionals who contribute to quality healthcare at national and global levels.

MISSION OF THE DEPARTMENT	
M1	To provide high-quality education and training in anesthesia and operation theater technology that integrates theoretical knowledge with hands-on clinical practice.
M2	To develop competent, ethical, and compassionate anesthesia and OT technologists committed to patient safety and teamwork
M3	To promote evidence-based practice, critical thinking, and the use of modern technology in perioperative care.
M4	To support continuous professional development, research, and lifelong learning in anesthesia and operation theater services.
M5	To collaborate with healthcare institutions to meet the evolving needs of surgical and critical care environments.

PROGRAMME OUTCOMES (PO)	
PO1	Apply foundational knowledge of human anatomy, physiology, and pathology in surgical and anesthetic contexts.
PO2	Perform and assist with preoperative, intraoperative, and postoperative procedures.
PO3	Use and maintain OT and anesthesia-related equipment responsibly.
PO4	Adhere to sterilization, aseptic, and infection control practices.
PO5	Demonstrate communication skills in clinical and academic settings.
PO6	Uphold ethical, legal, and professional standards in patient care.
PO7	Engage in continuous learning and professional development.
PO8	Work efficiently as part of a healthcare team, especially during emergencies.

BOARD OF STUDIES
List of Members
Department of Anesthesia and
Operation Theater Technology

S. No	Name & Designation	Address	Role
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Baccalaureate in Anesthesia & Operation Theater Technology (B. AOTT)

Introduction:

Learning Objectives: At the completion of this course, the student should be -

- Able to help the anesthesiologist in administering anesthesia, assist in various procedures and also help in continuous monitoring of patients during surgery.
- Able to independently handle the latest technology and high end biomedical equipment in Operation Theatre
- Able to assist anesthesiologists in developing and implementing patient anesthesia care plans, including pre-operative, surgical theater, recovery room, and post-operative care procedures.
- Able to do- patient data record keeping catheter insertion, airway management , assisting the administration and monitoring of regional and peripheral nerve blockades, support therapy, adjusting anesthetic levels during surgery, peri-operative monitoring, postoperative procedures, patient education, and administrative tasks.
- Able to manage medical gases and pipeline system
- Able to assist in Intensive care unit
- Able to manage Central sterile supply department and be well versed with sterile techniques for anesthesia and surgical procedures.
- Able to assist during Disaster and emergency situations.

Expectation from the future graduate in the providing patient care.

1. The Course prepares the operating theatre technologist to work as a competent, reliable member of the health care team under the guidance and supervision of doctors in their delivery of patient care, training also focuses on the knowledge and skills of monitoring infection control policy and procedures in the operating theatre.
2. Employment opportunities can be found in hospitals in both private and public sectors as well as in independent trauma centres.
3. OTT graduate is encouraged to pursue further qualification to attain senior position in the professional field, also to keep abreast with the advance and new technology, the professional should opt for continuous professional education credits offered by national and international institutes.

Eligibility for admission

Selection Procedure

1. Minimum qualification: He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (50%) in physics, chemistry, biology (PCB) mandatory and mathematics (optional).
2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed in the subjects: Physics, Chemistry, and Biology (mandatory) and Mathematics (optional) up to 12th Standard level.
3. The qualifying examination passed by FN/PIO/CIWGC students should be considered equivalent to eligibility examination by the Association of Indian Universities/Academic Council
4. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.
5. Admission to Bachelor in Anaesthesia & Operation Theatre Technology course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.
    a. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme of CBSE, subject-wise distribution of questions will be as 25% in Physics, 25% in Biology, 25% in Chemistry, 15% in English (Language & Comprehension) and 10% in General Awareness about health related methods.
    b. Successful candidates on the basis of written Test will be called for the interview & shall have to face an interview board. The interview board will include the Head of the Department of Surgery and/or Anesthesia (Chairman of the Board) along with other nominees, whose recommendations shall be final for the selection of the students.
    c. During subsequent counseling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
    d. Candidate who fails to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.
    e. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course will be struck off from the college rolls without giving any notice.

Provision of Lateral Entry:

Lateral entry to second year for allied and healthcare science courses for candidates who have passed diploma program from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the same subject have been studied at diploma level.

Number of intake: lateral entry admission must not be more than 20% of the annual intake.

A candidate with a minimum 2 years full-time diploma in Anaesthesia & Operation Theatre Technology recognized by a Government Body is eligible for lateral entry to the 3rd semester of Baccalaureate in Anaesthesia & Operation Theatre Technology.

Note: Candidates with minimum 2 years full-time diploma in Anaesthesia & Operation Theatre Technology from a recognized Government Body shall have passed „plus-two" [10+2] with Physics, Chemistry and Biology as subjects.

Eligibility of the lateral candidates based on examination conducted by NCAHP.

Foreign nationals and candidates who have qualified from a foreign University/Board should obtain permission from the NCAHP commission prior to the admission for equivalence of the qualification.

Duration of the course

Duration of the course: 4 years or 8 semesters. (2140 hours of Theory & 920 hours of Practical Classes) and 1440 hours (minimum) of internship

Total hours – 4500

Maximum period for completion of the course:

- The maximum period for completion of BAOTT is 6 years.
- If a candidate does not complete within the 6years, he/she should re-register.

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate has to secure minimum or as mandated by the State-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

A candidate having shortage of attendance shall repeat the exam when it is offered next.

Teaching Tools:

The required tools to teach a course on surgical assistance and anaesthesia support may include the following:

a) Lecture Materials:

- Comprehensive lecture notes.
- Presentations and slides.
- Handouts and reading materials.

b) Demonstration Models:

- Anatomical models /simulators for demonstrating surgical techniques.
- Simulators for practicing instrument handling and airway management.

c) Surgical Instruments:

- Real surgical instruments (including laparoscopic, arthroscopic and Robotic instruments) for hands-on practice.
- Simulated instruments for familiarization.

d) Audiovisual Aids:

- Educational videos demonstrating surgical procedures.
- Interactive simulations or virtual reality tools.

e) Anesthesia Equipment:

- Anesthesia machines.
- Monitors for vital signs and anesthesia administration.
- Airway management devices.
- Intravenous equipment.

f) Sterile Technique Supplies:

- Sterile drapes.
- Surgical gowns and gloves.
- Sterile instruments and supplies.

g) Monitoring Equipment:

- Monitors for vital signs, oxygen saturation, and end-tidal carbon dioxide levels, Neuromuscular monitoring, BIS.

h) Simulation Training:

- High-fidelity patient simulators or mannequins for I.V Cannulation, Intubation, BLS & ACLS.

i) Clinical Observations:

- Opportunities to observe actual surgical procedures.
- Assistance in real-world clinical settings.
- Case Studies and Scenarios:

j) Customized case studies and scenarios for problem-solving and decision-making practice.

- Assessment Tools:
    1. Workshop, Quizzes, and written exams.
    2. Practical assessments on instrument handling, sterile technique, and anaesthesia administration.
    3. Simulated emergency scenarios for performance evaluation.

Additionally, it is important to have a well-equipped simulation lab with appropriate infrastructure, access to clinical facilities for practical training, and safety protocols in place to ensure a conducive learning environment. Regular debriefing sessions, reflective discussions, and opportunities for students to ask questions and clarify doubts are also valuable components of the learning process.

The standalone Institutions who wish to conduct these allied health courses in Anaesthesia & Operation Theatre Technology will sign a MOU with the Hospitals/Healthcare facilities for providing practical training to the students of Anaesthesia & Operation Theatre Technology. The Hospitals/Healthcare facilities will impart practical training to the students by posting them in Operation Theatres and ICUs and other patient care areas which are essential for these students. The Number of students admitted in the baccalaureate course by every hospital/ healthcare institution will not exceed by the 10% of the total bed strength of that hospital/healthcare facility with adequate numbers of Operation Theatres and ICU beds.

Teaching faculty and infrastructure

Institute should mandatorily be associated with the state medical colleges whereby they can make use of the available patient load and medical infrastructure as a part of their training curriculum (May be through MOU).

- Standalone institutions must have a MoU with either a medical college or hospital or healthcare facility as per the guidelines (desired number of Operation Theatres/ICU beds/HDU beds) defined in the curriculum to ensure practical exposure to the students.
- MoU to also define the clinical supervision of the students –institutional staff or clinical preceptors can be considered.

For the institutes to be capable of providing high quality training to the students and exposure to all the related specialties, it should have the following:

- Operating Theatres.
- Intensive Care Units. (Surgical and Medical)
- High Dependency Units (HDUs)
- Simulation Labs.
- Central Sterile Supply Department.
- Post-Operative Care Unit (PACU)

The teaching faculty (with annual intake of up to 30 students) for the BAOTT course should have a minimum of Master‟s in the MAOTT or MAOTT with PhD in relevant subject.

- 1 Professor
- 2 Associate Professors
- 4 Asst. Professors.
- 8 Demonstrators/Tutors.

The recommended teachers to student ratio at the UG level should be - 1:30.

Method of teaching and learning-

- Lecture
- Tutorial
- Problem based learning
- Small group teaching and learning
- Continuous interactive learning
- Case-based
- Project based
- Research project- Research was considered by the group to be very important in order to keep pace with other professions and to generate a research background for our own profession.
- Seminars
- Clinical conferences
- E-learning
- Skills laboratory
- Industrial visit

Infrastructure requirements:

- Minimum 4 classrooms with minimum seating capacity of 30 students
- Faculty rooms, Common rooms for students
- Auditorium/Conference room with minimum seating capacity of 150 students.
- Library
- Student canteen/cafeteria
- Office rooms for staff

Assessment and Evaluation

Scheme of Evaluation

The academic performance is assessed on the basis of both Continuous Internal Evaluation (CIE) assessment and End Semester Examination (ESE) in each semester.

ESE weightage will be in the ratio of 30 % for CIE and 70 % for ESE.

Continuous Internal Evaluation (CIE)

- 30% of the total marks is allotted for CIE in each course.
- 50% of CIE shall be based on the average of marks obtained in two notified formative written tests. Absence without prior permission for a formative test shall result in scoring of the test as zero.
- The remaining 50% of CIE will be based on internal assessments in the form of evaluation seminars, journal club presentations, case presentations, completion of assignments etc. which will be specified in the individual course curricula.
- CIE will be conducted for theory and practical for each course wherever applicable.
- A Candidate must secure at least 40% of total marks fixed for CIE in the particular subject in order to be eligible to appear for the End Semester Examination (ESE) for that subject.

End semester examination (ESE)

- There shall be a University Examination at the end of each semester.
- To be eligible to appear for University examination a candidate should fulfill all the following conditions
    - Undergone satisfactorily the approved program of study in the course/courses for the prescribed duration
    - 75% attendance separately in theory and in practical/hospital postings, in each course
    - Shall have the minimum attendance requirement in all courses of that semester for the first appearance
    - Secure at least 50% of total marks fixed for CIE in a particular course; and
    - Fulfill any other requirement that may be prescribed by the University from time to time.
- The End semester examination will consist of Theory examination for all courses and in addition, Practical examination for specified courses.
- Theory examination
    - Written tests with question types, pattern, duration and weightage as specified in the Course-wise curricula
    - Setting of question papers and evaluation of answer scripts as per University regulations
- Practical examination

Broad outline would be in the form of Spotters, Demonstration of equipment handling, Case based discussions.

Criteria for pass:

A Candidate must score 50%separately in theory and practical wherever applicable to be declared as pass. In case of fail, subsequently a candidate has to appear for both theory and practical examination of the university in that particular course.

Attendance and appearance for Exam:

Candidates not possessing required attendance in a particular course as prescribed by University will not be allowed to take up examinations and has to appear for supplementary examination whenever board conducts exam for the particular course very next time.

Carry over benefit:

A candidate shall appear for all the subjects of that particular semester in the University examinations but failed in that semester can avail this benefit, provided:

- A candidate who fails in not more than 2 subjects in I semester is allowed to move to II semester. The candidate with back log subjects shall take both I semester backlog subjects as well as II semester subjects. The candidate with a backlog of not more than 2 subjects in II semester is allowed to go to the III semester till he/she clears all I semester subjects.
- The candidate with a backlog of not more than 2 subjects in III semester is allowed to go to the IV semester till he/she clears all II semester subjects.
- The candidate with a backlog of not more than 2 subjects in IV semester is allowed to go to the V semester till he/she clears all III semester subjects.
- The candidate with a backlog of not more than 2 subjects in V semester is allowed to go to the VI semester till he/she clears all IV semester subjects.
- Results of candidates will be declared at the end of VI semester only when the all backlog subjects are cleared by the candidates.

Maximum attempt: No more than three attempts shall be allowed for the candidate to pass the any subjects. If he/she fails to clear the any subjects within three attempts will be considered as withdrawal of the course.

Re-totaling:

Re-totaling of marks is permitted only for theory papers. The University/board, on application within the stipulated time and remittance of a prescribed fee, shall permit a re-totaling of marks for the course/s applied. The marks obtained after re-totaling shall be the final marks awarded.

Supplementary Examinations:

Supplementary examination shall be conducted by the university for the benefit of unsuccessful candidates. Lower semester examinations shall be conducted by the University along with current semester examinations for the benefit of unsuccessful candidates.

- A Candidate detained for lack of attendance will be barred from appearing in any one or all course/s for the supplementary examination.

A candidate permitted to appear for the supplementary examination can improve his internal assessment marks before he takes the supplementary examination by subjecting himself to internal assessment

CREDIT DISTRIBUTION

B.Sc., ANESTHESIA AND OPERATION THEATER TECHNOLOGY

Minimum credits to be earned:

90

(3 Year for Degree / 1 Year Internship)

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	3 Yrs. Total Credits
DSC	17	13	10	14	15	15	84
DSE	7	7	6	2	2	2	26
RP	-	-	-	-	-	-	
Total Credits	24	20	16	16	17	17	110

ABBREVIATIONS:

DSC	Disciplinary Specific Core
DSE	Disciplinary Specific Elective
RP	Research Methodology, Internship, Mini Project, & Research Project

CURRICULUM STRUCTURE

FIRST SEMESTER

Course Code	Course Title	Teaching Hour				Theory			Practical			Grand Total (Marks)
		L hrs.)	P/D	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOT T-001	Basics of Healthcare Delivery System in India	80	…..	….	4	40	10	50	…..	…..	…..	50
BAOT T-002	Medical Terminology & Record Keeping	50	…..	….	3	40	10	50	…..	…..	…..	50
BAOT T-003	Anatomy	100	40	….	6	80	20	100	40	10	…..	150
BAOT T-004	Physiology	100	40	….	6	80	20	100	40	10	…..	150
BAOT T-005	Healthcare Quality & Patient Safety	40	60	….	5	40	10	50	30	20	50	100
Total		**370**	**140**	**….**	**24**	**…..**	**….**	**350**	**…..**	**…..**	**50**	**500**

SECOND SEMESTER

Course Code	Course Title	Teaching Hour				Theory			Practical			Grand Total (Marks)
		L (hrs.)	P/D	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOTT-006	Medical Law & Ethics, Principles of Management	60	…..	…..	4	40	10	50	…..	….	…..	50
BAOTT-007	Basics of Biomedical Sciences in Surgery & Anesthesia	40	60	…..	3	40	10	50	…..	….	…..	50
BAOTT-008	Biochemistry & Hematology	40 + 30	0 + 30	…..	3	40 + 40	10 + 10	100	30	20	50	150
BAOTT-009	Pathology & Microbiology	50 + 50	…….	…..	4	40 + 40	10 + 10	100	…..	….	…..	150
BAOTT-0010	Basic Concept in Pharmacology	40	…….	…..	2	40	10	50	…..	….	…..	100
BAOTT-0011	Basic Computer & Information Sciences, communication & Soft Skills	40	60	0	4	40	10	50	30	20	50	100
Total		**350**	**150**	**…..**	**20**	**…..**	**….**	**400**	**…..**	**….**	**100**	**500**

THIRD SEMESTER

Course Code	Course Title	Teaching Hours				Theory			Practical			Grand Total (Marks)
		L (hrs.)	P/D	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOT T-012	Basic Techniques of Anesthesia	100	…..	50	5	80	20	100	40	10	50	150
BAOT T-013	Basics of Surgical Procedures	100	…..	50	5	80	20	100	40	10	50	150
BAOT T-014	CSSD & Manifold area	50	…..	100	4	40	10	50	…..	…..	…..	50
BAOT T-015	Industrial Orientation & Industrial Visit	50	…..	0	2	40	10	50	…..	…..	…..	50
Total		**300**	**…..**	**200**	**16**	**…..**	**….**	**300**	**…..**	**…..**	**100**	
Grand Total		**510**			**……**							**400**
(Hours)					**……**							

FOURTH SEMESTER

Course Code	Course Title	Teaching Hour				Theory			Practical			Grand Total (Marks)
		L (hrs.)	P / D	C L P	CR	SEE	IA	T	SEE	IA	T	
BAOTT-016	Advanced Anesthesia Techniques	100	…..	50	5	80	20	100	40	10	50	150
BAOTT-017	Advanced Surgical Procedures	100	…..	50	5	80	20	100	40	10	50	150
BAOTT-018	Basic Intensive CARE	50	…..	100	4	40	10	50	30	20	50	100
BAOTT-019	Clinical Medicine & Management	50	…..	0	2	40	10	50	…..	…..	…..	50
Total		**300**	**…..**	**200**	**16**	**…..**	**….**	**300**	**…..**	**…..**	**150**	
Grand Total		**500**			**……**							**450**
(Hours)					**……**							

FIFTH SEMESTER

Course Code	Course Title	Teaching Hour				Theory			Practical			Grand Total (Marks)
		L (hrs.)	P/D	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOTT-020	Specialized Anesthesia	100	…..	50	5	80	20	100	40	10	50	150
BAOTT-021	Specialized Surgery	100	…..	50	5	80	20	100	40	10	50	150
BAOTT-022	Recent Advances in Anesthesia & Surgical Field	50	…..	50	5	80	20	100	…..	…..	…..	100
BAOTT-023	Disaster Management & Environmental Science	100	…..	0	2	40	10	50	…..	…..	…..	50
Total		**400**	**…..**	**150**	**17**	**…..**	**….**	**350**	**…..**	**…..**	**100**	**450**
Grand Total (Hours)		**510**			**……**							

SIXTH SEMESTER

Course Code	Course Title	Teaching Hour				Theory			Practical			Grand Total (Marks)
		L (hrs.)	P/D	CLP	CR	SEE	IA	T	SEE	IA	T	
BAOT T-024	Specialized Anesthesia - 2	100	….	50	5	80	20	100	40	10	50	150
BAOT T-025	Specialized Surgery-2	100	….	50	5	80	20	100	40	10	50	150
BAOT T-026	Specialized Anesthesia & Surgical-3	100	….	50	5	80	20	100	40	10	50	150
BAOT T-027	Research Methodology & Biostatics“	50	….	0	2	40	10	50	…..	…..	…..	50
Total		**350**	**…..**	**150**	**17**	**…..**	**….**	**350**	**…..**	**…..**	**150**	**500**
Grand Total (Hours)		**500**			…….							

Course Code	Course Title	Time Period
BAOTT-028	B.AOTT Internship (Anesthesia, Surgery, Specialties)	One Year

SEMESTER 1

BAOTT-001: Introduction to Healthcare Delivery System in India. (80 Hours)

Learning Objectives

Understanding the key features of the Indian healthcare delivery system, comparing it to other countries, evaluating community participation in healthcare, understanding the role of the private sector in healthcare, familiarizing oneself with the National Health Mission and National Health Policy, identifying issues and challenges, and exploring the background, objectives, and operations of national health programmes are the learning objectives of this course. The course also covers the AYUSH medical system, India's past, present, and future health scenarios, demography, vital statistics, epidemiological concepts, disease transmission, and disease monitoring in infectious and non-communicable diseases.

Introduction to National Healthcare Delivery System

The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

Unit 1: Introduction to healthcare delivery system -15 Hours

a) Healthcare delivery system in India at primary, secondary and tertiary care
b) Community participation in healthcare delivery system
c) Health system in developed countries.
d) Private Sector
e) National Health Mission
f) National Health Policy
g) Issues in Health Care Delivery System in India

Unit 2: National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme. -10 Hours

Unit 3: Introduction to AYUSH system of medicine. -15 Hours

a) Introduction to Ayurveda.
b) Yoga and Naturopathy
c) Unani
d) Siddha
e) Homeopathy
f) Need for integration of various system of medicine

Unit 4: Health scenario of India- past, present, and future. -15 Hours

Demography & Vital Statistics-

a) Demography – its concept
b) Vital events of life & its impact on demography
c) Significance and recording of vital statistics
d) Census & its impact on health policy

Unit 5: Epidemiology -25 Hours

a) Principles of Epidemiology
b) Natural History of disease
c) Methods of Epidemiological studies
d) Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Course Outcome

The course outcomes include describing the primary, secondary, and tertiary healthcare delivery systems in India, evaluating community participation, comparing and contrasting healthcare systems in developed countries, analyzing the role of the private sector in healthcare provision, understanding the objectives, action plans, and achievements of national health programmes, analyzing the National Health Policy and its implications for healthcare delivery, identifying and annotating national health policies, and identifying and annotating national health policies.

Recommended Books

1. **Park's Textbook of Preventive and Social Medicine** — *K. Park*
2. **Community Medicine with Recent Advances** — *K. K. Sood*
3. **National Health Programs of India** — *Jugal Kishore*
4. **Textbook of Community Medicine (Preventive and Social Medicine)** — *Vivek Jain*

BAOTT-002: Medical Terminology and Record keeping (including anatomical terms) (50 Hours)

Medical terminologies and record keeping

Course Objectives

1. To develop understanding of the structure and origin of medical terms (roots, prefixes, suffixes).
2. To enable students to construct and analyze basic medical terminology accurately.
3. To familiarize students with medical abbreviations, symbols, and plural forms used in healthcare.
4. To introduce system-wise diagnostic, surgical, and procedural terminology.
5. To train students in interpreting medical records and performing basic electronic health record (EHR) data entry.

Learning Objectives

This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student‟s field of study. Spelling is critical and will be counted when grading tests.[25]Topics to be covered under the subject are as follows:

Unit 1: Derivation of medical terms.
Define word roots, prefixes, and suffixes. -10 Hours

Unit 2: Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
Basic medical terms. -10 Hours

Unit 3: Conventions for combined morphemes and the formation of plurals.
Interpret basic medical abbreviations/symbols. -10 Hours

Unit 4: Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system. -10 Hours

Unit 5: Interpret medical orders/reports.
Data entry and management on electronic health record system. -10 Hours

Course Outcome

By the end of the course, the student will be able to:

1. Define and identify word roots, prefixes, suffixes, and combining forms in medical terms.
2. Form and spell medical terms correctly using appropriate word components.
3. Interpret common medical abbreviations, symbols, and plural forms used in clinical settings.
4. Apply system-specific terminology related to integumentary, musculoskeletal, respiratory, cardiovascular, nervous, and endocrine systems.
5. Accurately interpret medical orders/reports and perform basic documentation in electronic health record systems.

BAOTT-003: Anatomy (100 Hours)

Course Objectives

1. To introduce basic anatomical terminology and fundamental concepts of human anatomy.
2. To develop knowledge of osteology, including bones of the upper limb, lower limb, and vertebral column.
3. To provide understanding of the anatomy of the heart, lungs, thorax, excretory, digestive, and nervous systems.
4. To explain the structure, origin, insertion, and actions of major muscles of the thorax and upper limb.
5. To develop skills in surface anatomy and basic radiological interpretation.

Learning Objectives

The course aims to teach basic anatomical terminology, identify bones and features of the limbs, thorax, lungs, and heart, comprehend the muscular system, investigate excretory, digestive, and nervous systems, comprehend the gastrointestinal tract, and comprehend the structure and function of the central nervous system. Students will also learn surface anatomy and radiological interpretation abilities. Understanding the relationship between the muscular system and specific actions, describing the excretory and digestive systems, explaining the structure and function of the central nervous system, and applying surface anatomy and radiology interpretation techniques are among the course outcomes.

Basic anatomy

Unit 1: Introduction to Anatomy: Basic Anatomical terminology

Osteology- -20 Hours

- Upper limb – clavicle, scapula, humerus, radius, ulna,
- Lower limb - femur, hipbone, sacrum, tibia, fibula &Vertebral column

Unit 2:

A. Heart – Surface anatomy of heart, chambers of the heart, valves of the heart, and major blood vessels of heart, pericardium, and coronary arteries -20 Hours

B. Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum &thoracic vertebrae

C. Lungs – Trachea, bronchial tree.

Unit 3: Excretory system – Kidneys, ureters, bladder. - 20 Hours
Skeleton-muscular system – Muscles of thorax, muscles of upper limb (arm & fore arm) Flexor and extensor group of muscles (origin, insertion, action)

Unit 4: Digestive System: -20 Hours
Structure and function of the digestive system
Oral cavity and digestive enzymes
Anatomy and function of the gastrointestinal tract
Absorption and digestion of nutrients

Common digestive disorders

Unit 5: Nervous System: -20 Hours

Structure and function of neurons

Organization of the central nervous system (brain and spinal cord)

Peripheral nervous system and its divisions

Cranial nerves and spinal nerves

Basic principles of neurophysiology

Practical in Anatomy (40 Hours)

Mannequins to be provided for Teaching Osteology – Bones identification (right and left side) and prominent features and muscle attachment of the bone, clavicle, scapula, radius, ulna, humerus, femur, hip bone, sacrum, tibia, fibula. Surface Anatomy, Organ Anatomy (Heart, Lungs, Stomach, Liver, Spleen, Kidney, Urinary tract, Testis, Female reproductive organs), Radiology, and X-ray Chest PA view.

Course outcome

By the end of the course, the student will be able to:

1. Use correct anatomical terminology to describe body structures and positions.
2. Identify and describe bones of the upper limb, lower limb, vertebral column, and thoracic cage.
3. Explain the structure and function of the heart, lungs, excretory system, digestive system, and nervous system.
4. Describe major muscles of the thorax and upper limb with their origin, insertion, and action.
5. Apply knowledge of surface anatomy and basic radiological interpretation in clinical practice.

Recommended books

a. Human Anatomy (Vol-I, II, III) – B.D. Chaurasia

b. Ross and Wilson Anatomy and Physiology

c. Human Anatomy for Students – B.D. Ghosh

d. Textbook of Anatomy (Vol-1,2,3) – Samar Mitra

BAOTT-004: Physiology (100 Hours)

Course Objectives

1. To explain basic cellular physiology, blood composition, and mechanisms of acid–base balance.
2. To develop understanding of cardiovascular and respiratory physiology, including ECG and lung function tests.
3. To describe renal and reproductive physiology, including GFR, electrolyte balance, and menstrual cycle.
4. To explain the functions of the central nervous system and major endocrine glands.
5. To understand gastrointestinal physiology, digestion, absorption, and special senses assessment.

Learning Objectives

Learn about cellular physiological processes, blood composition and functions, cardiovascular, respiratory, excretory, reproductive, central nervous, endocrine, gastrointestinal tract, vital signs, electrocardiogram interpretation, and respiratory examinations. Learn how to take vital signs, interpret electrocardiograms, and do respiratory tests. Learn about the activities of the central nervous system and the endocrine system, as well as the physiological architecture of the gastrointestinal tract.

Unit 1: The Cell: -18 Hours

b) Acid base balance and disturbances of acid base balances (Alkalosis, Acidosis)

The Blood:

a) Composition of Blood, functions of the blood and plasma proteins, classification and protein, Blood Cascade, Bleeding and Clotting time.
b) Pathological and Physiological variation of the RBC.
c) Function of Haemoglobin.
d) Erythrocyte Sedimentation Rate.
e) Detailed description about WBC-Total count (TC), Differential count (DC) and functions.
f) Platelets – formation and normal level and functions.
g) Blood groups and Rh factor.

Unit 2:

Cardio-Vascular System: - 25 Hours

a) Physiology of the heart.
b) Heart sounds.
c) Cardiac cycle, Cardiac output.
d) Auscultation
e) Arterial pressures, blood pressure.
f) Hypertension.
g) Electro cardiogram (ECG.)

Respiratory system:

a) Respiratory ventilation
b) Oxygenation
c) Definitions and Normal values of Lung volumes and Lung capacities.

Unit 3: Excretory system: - 18 Hours

a) Renal System:
b) Urine volume and specific gravity measurements
c) Renal function tests, including assessment of glomerular filtration rate (GFR)
d) Analysis of renal tubular function
e) Study of renal handling of electrolytes and water
f) Assessment of acid-base balance and renal regulation of pH.

Reproductive system:

a) Formation of semen and spermatogenesis.
b) Brief account of menstrual cycle.

Unit 4: Central Nervous system: -19 Hours

a) Functions of CSF.

Endocrine system:

a) Functions of the pituitary, thyroid, parathyroid, adrenal and pancreatic Hormones.

Unit 5: Digestive system: - 20 Hours

a) Physiological Anatomy of the GIT.
b) Food Digestion in the mouth, stomach, intestine
c) Absorption of foods
d) Role of bile in the digestion.

Special Senses:

- Vision testing and assessment of visual acuity
- Auditory tests and assessment of hearing function
- Study of taste and olfaction perception
- Analysis of vestibular system and balance control
- Assessment of proprioception and kinesthetic sense

Practical in Physiology (40 Hours)

a) Determination of Blood Groups.
b) Vital signs measurement: Students can learn how to measure and interpret vital signs, including blood pressure, heart rate, respiratory rate, and body temperature. This may involve using instruments such as sphygmomanometers, stethoscopes, and thermometers.
c) Electrocardiography (ECG): Students can practice performing and interpreting electrocardiograms to study the electrical activity of the heart. This may involve placing electrodes on the body to record the ECG waveform and analyzing abnormalities.
d) Spirometry: Students can learn how to perform spirometry tests to measure lung. This involves using a spirometer to assess parameters such as tidal function volume, vital capacity, forced expiratory volume, and peak expiratory flow rate.
e) Examination of Respiratory system to count respiratory rate and measure inspiration and respiration.

Course outcomes

- Describe cellular functions, blood components, and mechanisms of acid–base regulation.
- Explain cardiac cycle, cardiac output, blood pressure, ECG interpretation, and respiratory physiology with normal values.
- Interpret basic renal function tests, urine analysis findings, and describe reproductive physiology.
- Explain functions of CSF, major endocrine hormones, and their physiological roles.
- Describe digestion, absorption, role of bile, and assess basic functions of vision, hearing, taste, smell, balance, and proprioception.

Recommended books

a. Essentials of Medical Physiology – K. Sembulingam
b. Comprehensive Textbook of Medical Physiology – G.K. Pal
c. Ross and Wilson Anatomy and Physiology
d. Practical Physiology – G.K. Pal & Pravati Pal
e. Ganong's Review of Physiology – Barrett, Barman, Brooks & Yuan

BAOTT-005: Health Care Quality & Patient Safety (60 Hours)

Course Objectives

1. To develop knowledge and practical skills in basic life support (BLS), CPR, AED use, and emergency care procedures.
2. To provide understanding of infection prevention and control practices to reduce healthcare-associated infections.
3. To educate students on biomedical waste management and environmental safety practices.
4. To introduce principles of quality assurance, quality improvement tools, and healthcare standards including NABH guidelines.
5. To create awareness about antibiotic resistance, antimicrobial stewardship, and disaster preparedness and management.

Learning Objectives

Learn essential life support and emergency care procedures, such as vital sign and primary assessment, infection prevention and control principles, and recognizing prevalent healthcare-associated infections. Identify and implement infection prevention and control methods, as well as enhance environmental safety through biomedical waste management. Proficiency in BLS procedures, accurate vital sign assessment, infection prevention and control, and environmental safety through biomedical waste management practices are among the course outcomes.

Quality assurance and management, antibiotic resistance, disaster readiness, and disaster preparedness are among the learning objectives. Understanding the core concepts of care quality, approaches to improvement, standards, and instruments for improving healthcare procedures are all part of quality assurance. Antibiotic resistance is an increasing concern in healthcare settings, with a variety of forms, trends, and tactics required to effectively combat it. Principles and strategies for antimicrobial stewardship are also discussed. Understanding psychological effect management, resource management, readiness and risk reduction concepts, critical response functions, institutional procedures, and the importance of information management in coordinating and communicating during catastrophes are all part of disaster preparedness and management.

The course covers four key areas of healthcare management: quality assurance and management, antibiotic resistance, disaster preparedness and management. Students will learn to apply quality of care concepts, implement quality improvement approaches, adhere to standards, and use tools to identify areas for improvement. They will also understand the significance of NABH guidelines and their role in promoting quality and patient safety in healthcare organizations.

Antibiotic resistance is addressed by understanding the historical context, factors contributing to its spread, different types of resistance, monitoring trends, advocating for actions and policies, and implementing antimicrobial stewardship practices. Disaster preparedness and management involves applying emergency management principles, managing the psychological impact, managing resources efficiently, developing preparedness plans, coordinating key response functions, contributing to recovery, rehabilitation, and reconstruction efforts, and utilizing information management systems for effective communication and coordination during disasters.

Unit 1: Basics of emergency care (10 Hours)

Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:

a) Vital signs and primary assessment
b) Basic emergency care – first aid and triage
c) Ventilations including use of bag-valve-masks (BVMs)

Unit 2: Life support skills.

Choking, rescue breathing methods (15 Hours)
One- and Two-rescuer CPR
Using an AED (Automated external defibrillator).
Managing an emergency including moving a patient

At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

Unit 3: Infection prevention and control. (15 Hours)

The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –

a) Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
b) Prevention & control of common healthcare associated infections,
c) Components of an effective infection control program, and
d) Guidelines (NABH and JCI) for Hospital Infection Control

Unit 4: Bio medical waste management and environmental safety. (8 Hours)

The aim of this section will be to help prevent harm to workers, property, the environment, and the public. Topics to be covered under the subject are as follows:

a) Definition of Biomedical Waste
b) Waste minimization
c) BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
d) Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
e) BMW Management & methods of disinfection
f) Modern technology for handling BMW
g) Use of Personal protective equipment (PPE)
h) Monitoring & controlling of cross infection (Protective devices)

Unit 5: Quality assurance and management. (12 Hours)

The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.

a) Concepts of Quality of Care
b) Quality Improvement Approaches
c) Standards and Norms
d) Quality Improvement Tools

Course Outcomes

1. Perform basic life support, CPR, AED operation, airway management, and primary emergency assessment in simulation settings.
2. Apply evidence-based infection prevention and control measures including hand hygiene, sterilization, and PPE usage.
3. Implement proper biomedical waste segregation, disposal, and environmental safety practices as per guidelines.
4. Apply quality assurance concepts, quality improvement tools, and adhere to healthcare standards (NABH) to enhance patient safety.
5. Demonstrate understanding of antibiotic resistance, antimicrobial stewardship principles, and disaster preparedness strategies in healthcare settings.

Recommended Books

- **The Language of Medicine** — *Davi-Ellen Chabner*
- **Ross and Wilson Anatomy and Physiology in Health and Illness** — *Anne Waugh & Allison Grant*
- **Medical Physiology** — *Walter F. Boron & Emile L. Boulpaep*
- **Improving Healthcare: A Handbook for Practitioners** — *Lesley Baillie & Elaine Maxwell*

SEMESTER 2

BAOTT-006: Medical Law and Ethics, Professionalism & Values, Principles of Management
(70 Hours)

Course Objectives

1. To develop understanding of medical law, ethical principles, patient rights, and medico-legal responsibilities in healthcare practice.
2. To familiarize students with professional values, code of conduct, accountability, and ethical behaviour in healthcare settings.
3. To introduce core management principles including planning, organizing, directing, controlling, and leadership.
4. To provide knowledge of personnel and financial management in healthcare organizations.
5. To create awareness about legal acts related to medical practice, malpractice, biomedical waste, patient privacy, and consumer protection.

Learning Objectives

This course delves into the legal and ethical issues that arise in medical practice. Medical ethics, confidentiality, informed consent, euthanasia, organ transplantation, medico-legal implications of medical data, and professional indemnity insurance are among the topics covered.

The professionalism module emphasizes the significance of professionalism in the healthcare system and its impact on the patient environment. It addresses professional values like integrity, objectivity, competence, confidentiality, ethical or moral values, attitude and behavior, code of conduct, professional accountability, responsibility, misconduct, differences between professions, team efforts, and cultural issues in the healthcare setting. The programme emphasizes the value of collaboration and adhering to ethical norms in the healthcare system.

This course focuses on management principles and functions in a variety of situations, including healthcare organizations. Planning, organizing, directing, controlling, motivation, communication, leadership, coordination, human management, financial management, and healthcare technology management are among the themes covered.

Unit 1: Medical law and ethics (30 Hours)

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society‟s legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.[26]

Medical ethics has developed into a well based discipline which acts as a “bridge” between theoretical bioethics and the bedside. The goal is “to improve the quality of patient care by identifying, behavior, and attempting to resolve the ethical problems that arise in practice” Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

a) Medical ethics – Definition – Goal – Scope
b) Introduction to Code of conduct
c) Basic principles of medical ethics – Confidentiality
d) Malpractice and negligence – Rational and irrational drug therapy
e) Autonomy and informed consent – Right of patients
f) Care of the terminally ill- Euthanasia Organ transplantation
g) Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC – ownership of medical records – Confidentiality Privilege communication – Release of medical information – Unauthorized disclosure – retention of medical records – other various aspects.
h) Professional Indemnity insurance policy
i) Development of standardized protocol to avoid near miss or sentinel events.
j) Obtaining an informed consent.

Unit 2: Professionalism and values. (10 hours)

The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

Professional ethics act (2002)

- Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
- Personal values- ethical or moral values
- Attitude and behavior- professional behavior, treating people equally.
- Code of conduct, professional accountability and responsibility, misconduct
- Differences between professions and importance of team efforts
- Cultural issues in the healthcare environment

Unit 3: Principals of Management (30 Hours)

Principles of management: -20 Hours

a) Development of Management: Definitions of Management – Contributions of F.W. Taylor, Henry Fayol, and others.
b) Functions of Management: Planning – Organizing – Directing – Controlling Planning: Types of planning – Short–term and long plans – Corporate or Strategic Planning – Planning premises – Polices – Characteristics and sources – principles of policy making – Strategies as different from policies – Procedures and methods– Limitations of planning.
c) Organizing: Importance of organization – Hierarchy – Scalar chain – Organization relationship – Line relationship – Staff relationship – Line staff relationship – Functional relationship – Committee organization – Management committees – Depart mentation.
d) Motivation: Motivation theories – McGregor‟s theory X and theory Y – Maslow‟s and Herzberg‟s theory – Porter and Lawler model of complex view of motivation– Other theories – Diagnostic signs of motivational problems – Motivational Techniques.
e) Communication: Types of communication – Barriers of effective communication– Techniques for improved communication.

f) Directing: Principles relating to Direction process – Principles and theories of leadership – Leadership Styles – Delegation of authority. Controlling: Span of control – Factors limiting effective span of control – Supper management, General managers, Middles managers and supervisors – Planning and controlling relationships – Management control process – Corrective measures– Strategic control points – Budgetary control – Types of budgets.

g) Co-ordination: Co-ordination and co-operation – Principles of co-ordination – Techniques of co-ordination charts and records – Standard procedure instructions.

h) Acts: CPA Act (1986 & 2019), BMW Act (1998,2016), Drugs Act(1940), IMC Act(1956), Patient Privacy – IT Rules, 2011

i) Medical Malpractice sections: - 304A, 337 and IPC 1860.

Unit 4: Personnel management: - 5 Hours

Objective of Personnel Management – Role of Personnel Manager in an organization – Staffing and work distribution techniques – Job analysis and description – Recruitment and selection processes – Orientation and training – Coaching and counseling – disciplining – Complaints and grievances – Termination of employees – Performance appraisal – Health and safety of employees – Consumer Protection Act as applicable to health care services.

Unit 5: Financial management: -5 Hours

Definition of financial Management – Profit maximization – Return maximization– wealth maximization – Short term Financing – Intermediate Financing – Long term Financing – leasing as a source of Finance – cash and Security Management – Inventory Management – Dividend policies – Valuations of Shares – Financial Management in a hospital – Third party payments on behalf of patients. Insurance – health schemes and policies.

Course Outcomes

1. Apply principles of medical ethics including confidentiality, informed consent, autonomy, and professional indemnity in clinical practice.
2. Identify medico-legal issues, malpractice risks, and legal provisions relevant to healthcare professionals.
3. Demonstrate professional behavior, integrity, teamwork, and cultural sensitivity in healthcare environments.
4. Apply management functions such as planning, organizing, leadership, motivation, communication, and control in healthcare settings.
5. Understand personnel and financial management concepts, legal acts, and regulatory frameworks applicable to healthcare organizations

Recommended books

1. **Medical Ethics and Law for Doctors — *P. S. N. Rao***
2. **Legal and Ethical Aspects of Health Care Administration — *George D. Pozgar***
3. **Principles of Management — *P. C. Tripathi & P. N. Reddy***
4. **Hospital Administration and Human Resource Management — *B. M. Sakharkar***

BAOTT-007: Basics of Biomedical sciences in surgery and Anesthesia (40 Hours)

Course Objectives

1. To introduce fundamental biomedical engineering principles applied in surgery and anaesthesia.
2. To provide knowledge of surgical instruments and devices used in operation theatres.
3. To develop understanding of anaesthesia machines, delivery systems, and patient monitoring devices.
4. To explain principles of biomedical imaging and surgical navigation systems.
5. To create awareness about technological advances and safety considerations in surgical and anaesthesia practice.

Learning Objectives

This course introduces biomedical engineering principles and technology in the realms of surgery and anaesthesia. It discusses surgical and anaesthesia devices, biomedical imaging, surgical navigation and guidance systems, anaesthesia delivery and monitoring, healthcare technology management, and ethical and legal issues in biomedical engineering.

This course contains following modules:

Unit 1

- Introduction to Biomedical Engineering in Surgery and Anaesthesia. -8 Hours
- Laparoscopic cart (including various scopes), Veress needle, Trocars, and various instruments.
- Surgical Microscope.

Unit 2

- **Surgical devices:** The surgical devices mentioned include OT table, OT light, laparoscopic cart (including various scopes), Veress needle, trocars, surgical microscope, video laryngoscopes, bronchoscopes, diathermy, drills, coagulation devices like ESU, LASER, ultrasonic devices, RF devices and harmonic scalpels. -10 Hours

Unit 3

Anesthesia devices

- The anesthesia devices mentioned include infusion pumps, TCA pumps, 12 lead ECG, $EtCO_2$ monitor, pulse oximeter and blood pressure monitor. -5 Hours

Unit 4

- Biomedical Imaging in Surgery and Anaesthesia. - 8 Hours
    - Principles and technologies of medical imaging (e.g., X-ray, computed tomography, magnetic resonance imaging) Image-guided surgical procedures and interventions
    - Image processing and analysis techniques for surgical planning and intraoperative guidance
    - Advances in real-time imaging and its integration into surgical and Anaesthesia workflows

- Surgical Navigation and Guidance Systems.
    - Principles of surgical navigation systems and their applications
    - Use of imaging, tracking, and registration techniques in surgical navigation.

Unit 5

- Anesthesia Delivery and Monitoring. - 9 Hours
    - Anaesthesia machines and delivery systems
    - Design and development of Anesthesia monitoring devices.
    - Physiological monitoring parameters and their interpretation during Anesthesia
    - Advances in Anesthesia technology, such as closed-loop Anaesthesia delivery systems.

Course Outcomes

1. Describe the role of biomedical engineering in surgical and anaesthesia settings.
2. Identify and explain the functions of surgical devices such as laparoscopic equipment, microscopes, diathermy, LASER, and harmonic scalpel.
3. Demonstrate understanding of anaesthesia machines, infusion pumps, ECG, pulse oximeter, $EtCO_2$ monitor, and other monitoring devices.
4. Explain principles of medical imaging (X-ray, CT, MRI) and their application in image-guided surgery and navigation systems.
5. Interpret physiological monitoring parameters and understand advances such as closed-loop anaesthesia delivery systems.

Recommended Books

a. Fundamentals of Biomedical Instrumentation – Dr. O.N. Pandey

b. Handbook of Medical Instrumentation – R.S. Khandpur

c. The Anaesthesia Technologist's Manual – Emily S. Guimaraes, Mathew Davis, Jeffrey R. Kirsch, Glenn Woodworth

d. Surgical Technology for the Surgical Technologist – Association of Surgical Technologists

BAOTT-008 Biochemistry & Hematology (40+30 Hours)

Course Objectives

1. To provide knowledge of vitamins, minerals, and trace elements and their physiological importance.
2. To explain metabolic concepts including calorific value of food, basal metabolic rate (BMR), and respiratory quotient (RQ).
3. To develop understanding of acid–base balance, pH, buffers, and related biochemical calculations.
4. To introduce basic hematological parameters including hemoglobin, blood cell counts, and coagulation tests.
5. To explain common hematological disorders and principles of blood transfusion.

Bio-chemistry

Unit1: **(40 Hours)**

- Vitamins & Minerals: Fat soluble vitamins (A, D, E, K) - 10 hours

Unit 2

- Water soluble vitamins – B-complex vitamins- principal elements (Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine, and sulfur) - 10 Hours

Unit 3

- Trace elements – Calorific value of foods - 5 Hours

Unit 4

- Basal metabolic rate (BMR) – respiratory quotient (RQ). - 5 Hours

Unit 5

- Acids and bases: Definition, pH, Henderson – Hassel Balch equation, Buffers, Indicators, Normality, Molarity, Molality. - 10 Hours

Hematology **(30 Hours)**

Unit 1

- Hemoglobin, blood cell counts, differential count - 10 Hours

Unit 2

- Anemia, polycythemia
- Thrombocytopenia - 10 Hours

Unit 3

- Coagulation parameters- BT, CT, PT, INR, APTT - 5 Hours

Unit 4

- Coagulation disorders. - 5 Hours

Unit 5

- Blood transfusion-hazards and complications - 5 Hours

Practical (Hematology) (40 Hours)

- Phlebotomy
- CBC
- RBO Typing
- Cross Matching of blood

Course Outcomes

1. Describe functions and clinical importance of fat-soluble and water-soluble vitamins, minerals, and trace elements.
2. Explain BMR, RQ, calorific value of foods, and their clinical relevance.
3. Interpret acid–base balance concepts including pH, Henderson–Hasselbalch equation, buffers, molarity, molality, and normality.
4. Interpret hematological investigations such as Hb estimation, TC, DC, BT, CT, PT, INR, and APTT.
5. Identify common hematological disorders (anemia, polycythemia, thrombocytopenia, coagulation disorders) and understand blood transfusion hazards and complications.

Recommended Books

a. Biochemistry – U. Satyanarayana
b. Biochemistry – D.M. Vasudevan
c. An Introduction to Hematology – Nandini Mukherjee

BAOTT-009: Pathology & Microbiology (50+50 Hours)

Course Objectives

1. To introduce fundamental concepts of general pathology including cell injury, inflammation, immunity, and neoplasia.
2. To develop understanding of infectious diseases and environmental and nutritional disorders.
3. To explain morphology, growth, culture, sterilization, and disinfection in microbiology.
4. To provide knowledge of systematic bacteriology, parasitology, mycology, virology, and immunology.
5. To develop skills in laboratory diagnosis and interpretation of common pathological and microbiological tests.

Learning Objectives

This course introduces students to the fundamentals of pathology, and microbiology. injury, inflammation, immunity disorders, infectious diseases, neoplasia, environmental and nutritional disorders, morphology and growth of microorganisms, culture media, sterilization and disinfection, immunology, systematic bacteriology, parasitology, mycology, and virology are among the topics covered.

Pathology

Unit 1: Cellular adaptation, Cell injury & cell death. - 17 Hours

- Introduction to pathology.
- Overview: Cellular response to stress and noxious stimuli. Cellular adaptations of growth and differentiation.
- Overview of cell injury and cell death.
- Causes of cell injury. Mechanisms of cell injury.
- Reversible and irreversible cell injury.
- Examples of cell injury and necrosis.

Unit 2: Inflammation.

- General features of inflammation Historical highlights
- Acute inflammation
- Chemical mediators of inflammation Outcomes of acute inflammation Morphologic patterns of acute inflammation Summary of acute inflammation
- Chronic inflammation -8 Hours

Unit 3

- Immunity disorders. - 12 Hours
  General features of the immune system Disorders of the immune system

Infectious diseases.

General principles of microbial pathogenesis viral infections.
Bacterial infections-Rheumatic heart disease.
Fungal infections.
Parasitic infections.

Unit 4: Neoplasia. - 5 Hours

- Definitions Nomenclature.
- Biology of tumor growth benign and malignant neoplasms Epidemiology.
- Carcinogenic agents and their cellular interactions Clinical features of tumors.

Unit 5

Environmental and nutritional disorders. - 8 Hours

- Common environmental and occupational exposures Nutrition and disease.
- Coronary artery disease.

Clinical Microbiology (50 Hours)

Unit 1: Morphology - 6 Hours

- Classification of microorganisms, size, shape and structure of bacteria.
  Use of microscope in the study of bacteria.

Unit 2: Growth and nutrition. - 10 Hours

- Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

Culture media.

- Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.

Sterilization and Disinfection.

- Principles and use of equipment of sterilization namely hot air oven, autoclave, and serum inspissator, pasteurization, antiseptic and disinfectants.

Unit 3

Systematic Bacteriology. - 10 Hours

- Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (excluding classification, antigenic structure, and pathogenicity),
- Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, E. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes.

Unit 4

Parasitology. - 12 Hours

- Morphology, life cycle, laboratory diagnosis of following parasites: E. histolytica, Plasmodium, tape worms, Intestinal nematodes.

Immunology.

- Immunity, vaccines, types of vaccine and immunization schedule, principles, and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.
- Rapid tests for HIV and HBsAg (excluding technical details).

Unit 5

Mycology. - 12 Hours

- Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi

Virology.

- General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

Course Outcomes

1. Explain mechanisms of cellular adaptation, cell injury, inflammation, immunity disorders, and tumor biology.
2. Describe causes, pathogenesis, and clinical features of common infectious, environmental, and nutritional diseases.
3. Identify morphology, growth characteristics, and laboratory diagnosis of important bacteria, parasites, fungi, and viruses.
4. Interpret microbiological investigations including culture methods, sterilization techniques, antimicrobial sensitivity tests, and common serological tests (Widal, VDRL, ASLO, CRP, RF, ELISA).
5. Demonstrate understanding of vaccines, immunization principles, infection control measures, and prevention of communicable diseases.

Recommended Books

a. Microbiology – Ananthanarayan and Paniker
b. Textbook of Microbiology for Nurses – C.P. Baveja
c. Textbook of Microbiology – Chakraborty
d. Pathology – Harsh Mohan
e. Basic Pathology – Robbins

BAOTT-010 Basic Concepts in Pharmacology (40 Hours)

Course Objectives

1. To introduce fundamental principles of pharmacology including pharmacokinetics, pharmacodynamics, and routes of drug administration.
2. To provide knowledge of commonly used sedatives, anxiolytics, antiemetics, and antisialagogues in clinical practice.
3. To explain the pharmacology of inhalational agents, induction agents, muscle relaxants, and reversal drugs used in anaesthesia.
4. To develop understanding of local anaesthetics, narcotics, NSAIDs, and their clinical applications.
5. To familiarize students with emergency drugs, their dosage, dilution, administration routes, and clinical effects.

Learning Objective

This course provides an overview to pharmacology. It discusses several medication classes, their modes of action, indications, contraindications, adverse effects, and interactions.

Clinical pharmacology

Unit 1

a) Introduction to Pharmacology. - 5 Hours
b) Pharmacokinetic & Pharmacodynamics & routes of drugs administration

Unit 2: - 7 Hours

- Antsialagogues: Atropine, Glycopyrrolate.
- Sedatives *I* Anxiolytics: Diazepam, Phenergan, Lorazepam, Midazolam,

Chlorpromazine, and Tricolors.

Antiemetic‟s: Metoclopramide, Ondansetron, Dexamethasone

Unit 3:

- Inhalational Gases: Gases-02, N20, Air, Agents-Ether ,Halothane, Isoflurane, Sevoflurane, Desflurane
- Induction Agent: Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate.
- Muscle Relaxants: Depolarizing - Suxamethonium, Non depolarizing - Vecuronium, Atracurium, rocuronium. - 6 Hours

Unit 4:

- Reversal Agents: Neostigmi*ne,* Glycopyrrolate, Atropine,Naloxone, Flumazenil (Diazepam). - 10 Hours

- Local Anesthetics: Xylocaine, Bupivacaine - Topical, Prilocaine-jelly, Emla - Ointment, Etidocaine. Ropivacaine.

- Narcotics: Morphine, Pethidine, Fentanyl, Pentazocine, tramadol

- NSAIDs Drugs

Unit 5: Emergency Drugs : Mode or administration, dilution, dosage and effects - 12 Hours

- Adrenaline, Atropine
- Ephedrine, Mephentermine
- Bicarbonate, calcium, potassium.
- Inotropes: dopamine, dobutamine, amiodarone
- Aminophylline, hydrocortisone, antihistaminic,
- Antihypertensive –Beta-blockers, Ca-channel blockers.
- Antiarrhythmic- xylocard
- Vasodilators- nitroglycerin & sodium nitroprusside
- Respiratory system- Bronchodilators
- Renal system- Diuretics, frusemide, mannitol

Course Outcomes

1. Explain basic pharmacokinetic and pharmacodynamic principles and different routes of drug administration.
2. Identify indications, contraindications, mechanisms of action, adverse effects, and interactions of commonly used anaesthetic and perioperative drugs.
3. Classify inhalational agents, induction agents, muscle relaxants, and reversal agents used in anaesthesia practice.
4. Describe the pharmacological profile of local anaesthetics, opioids, NSAIDs, and sedative drugs.
5. Demonstrate knowledge of emergency drugs including their preparation, dosage calculation, dilution, administration, and monitoring in critical care settings.

Recommended books

a. Essentials of Medical Pharmacology – K.D. Tripathi
b. Medical Pharmacology – Uday Kumar

BAOTT-011 Basic computers and information Science, Communication, and soft skills. (40 Hours)

Course Objectives

1. To introduce fundamental concepts of computer organization, operating systems, and software applications.
2. To develop practical skills in MS Word, Excel, PowerPoint, and internet applications.
3. To explain computer networks and applications of computers in clinical settings.
4. To enhance basic language proficiency, grammar, and professional writing skills.
5. To develop effective communication, presentation, and interpersonal skills required in healthcare environments.

Learning Objectives

This course exposes students to computer technology, including topics such as computer organization, operating systems, software applications (MS Word, Excel, and PowerPoint), computer networks, internet applications, and computer use in healthcare settings. It also includes fundamental language and communication skills such as grammar, business communication, writing techniques, and oral presentations

Basic computers and information science (24 Hours)

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

Unit 1

a) Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.

b) Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

Unit 2

c) Processor and memory: The Central Processing Unit (CPU), main memory.

d) Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

e) Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

Unit 3

f) Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
g) Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
h) Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

Unit 4

i) Introduction of Operating System: introduction, operating system concepts, types of operating system.
j) Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

Unit 5

k) Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
l) Application of Computers in clinical settings.

Practical on fundamentals of computers - 30 Hours

- Learning to use MS office: MS word, MS PowerPoint, MS Excel.
- To install different software.
- Data entry efficiency

Practical Topics:

This would involve hands-on training in computer systems and software applications. This includes learning about computer hardware components and their functions, input and output devices, processor and memory management, and storage devices.

Practical sessions can be conducted on operating systems such as MS Windows, with a focus on navigating the desktop, managing files and folders, and working with windows and shortcuts.

Students should also gain proficiency in using MS Word for document creation and formatting, MS Excel for data entry and manipulation, and MS PowerPoint for creating and delivering presentations.

Additionally, practical exercises on computer networks and internet applications, including email, file transfer, and web browsing, can be provided to enhance their understanding of computer usage in clinical settings.

Communication and soft skills

Major topics to be covered under Communication course: - 16 Hours

Unit 1

Basic Language Skills: Grammar and Usage. - 2 Hours

Unit 2:

Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation. - 2 Hours

Unit 3: Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization. - 4 Hours

Unit 4

- Basic concepts & principles of good communication
- Special characteristics of health communication - 4 Hours

Unit 5

- Types & process of communication
- Barriers of communication & how to overcome - 4 Hours

Practical in Communication & Soft Skills – 30 Hours

In terms of communication and soft skills, practical topics should aim to develop effective communication abilities for interacting with patients and healthcare professionals.

This can involve exercises in grammar and language skills, emphasizing business communication and spoken communication through conversations, discussions, and short presentations.

Practical sessions on various writing formats such as letters, emails, reports, and case studies should be included, focusing on proper organization and clarity.

Students should be taught the principles of good communication, including the special characteristics of health communication, and strategies for overcoming communication barriers. Role-playing scenarios and simulated patient interactions can also be incorporated to enhance their communication skills in a healthcare contex

Course Outcomes

1. Describe basic computer components, operating systems, storage devices, and networking concepts.
2. Demonstrate proficiency in MS Office applications for documentation, data entry, analysis, and presentations.
3. Apply internet services, email communication, and computer applications in clinical practice.
4. Draft professional documents such as letters, emails, reports, and case summaries with proper grammar and structure.
5. Demonstrate effective verbal and non-verbal communication skills, overcome communication barriers, and interact professionally with patients and healthcare teams.

Recommended books

1. **Computer Fundamentals** — *P. K. Sinha*
2. **Effective Communication Skills** — *Mohan Krishna & Meera Banerjee*
3. **Soft Skills: Enhancing Employability** — *M. K. Gupta & R. Gu*