GURU KASHI UNIVERSITY

Masters of Science in Operation Theater & Anesthesia Technology

PG Curriculum (Appendix-III)

Session: 2025-26

Faculty of Health & Allied Sciences

Graduate Attributes of the Programme: -Masters of Science in Operation Theater & Anesthesia Technology.

Type of learning outcomes	**The Learning Outcomes Descriptors**
Graduates should be able to demonstrate the acquisition of:	
Learning outcomes that are specific to disciplinary/interdisciplinary areas of learning	Clinical Expertise: Demonstrate advanced knowledge and skills in managing operation theater procedures and anesthesia techniques to ensure patient safety and efficient surgical support.
	Emergency Response: Exhibit competency in managing anesthesia-related complications and surgical emergencies with prompt and effective interventions.
	Patient Care & Safety: Apply critical knowledge of preoperative, intraoperative, and postoperative care to minimize risks and enhance patient recovery.
	Technological Proficiency: Operate, maintain, and troubleshoot anesthesia machines, surgical instruments, and monitoring equipment effectively.
	Evidence-Based Practice: Integrate research findings and best practices into clinical decision-making and procedural improvements.
	Interdisciplinary Collaboration: Work effectively with surgeons, anesthesiologists, nurses, and other healthcare professionals to ensure seamless operation theater management.
Generic learning outcomes	Critical Thinking and Problem-Solving: Analyze complex situations in the operation theater and develop appropriate solutions using logical reasoning and evidence-based practices.
	Leadership and Teamwork: Demonstrate leadership qualities and teamwork capabilities to enhance efficiency in a high-pressure surgical environment.
	Lifelong Learning: Engage in continuous professional development and learning to keep up with advancements in surgical and anesthetic technology.
	Research and Analytical Skills: Conduct research and apply analytical skills to contribute to advancements in anesthesia and surgical care.
	Adaptability and Innovation: Respond proactively to evolving healthcare challenges and integrate innovative practices to improve patient outcomes

Programme learning outcomes: A post graduate degree is awarded to students who have demonstrated the achievement of the outcomes located at level 6:

Element of the Descriptor	**Programme learning out comes relating to Post graduate degree (2years)**
The Post graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Comprehensive knowledge of operation theater management, anesthesia procedures, and surgical safety protocols.
	In-depth understanding of patient care, surgical techniques, and technological advancements in anesthesia and surgery.
	Awareness of current research and innovations in the field of operation theater and anesthesia technology.
General, technical and professional skills required to perform and accomplish tasks	Proficiency in handling and maintaining anesthesia equipment, surgical instruments, and monitoring devices.
	Ability to effectively coordinate with multidisciplinary teams in surgical and emergency settings.
	Mastery of infection control measures, patient positioning, and preparation for surgery.
Application of knowledge and skills	Effective integration of theoretical knowledge into clinical practice.
Generic learning outcomes	Application of best practices to enhance patient safety and optimize surgical procedures.
Constitutional, humanistic, ethical, and moral values	Execution of emergency protocols in critical situations related to anesthesia and surgery.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Readiness for careers in hospitals, surgical centers, emergency care units, and research institutions. Development of leadership skills for managing operation theaters and anesthesia teams. Entrepreneurial mindset for establishing independent healthcare service unit
Credit requirements	Successful completion of first two semesters of 2-year PG programme and earns 44 credits, and

	then a Post Graduate Diploma in Operation Theatre & Anesthesia Technology will be awarded to that candidate.
Entry requirements	B.Sc. OTT/B.Sc. OT&AT with at least 45% in the aggregate.

Program Structure

Semester 1st									
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
MOA1400	Surgical Equipment and Technology	Core Course	4	0	0	4	30	70	100
MOA1401	Pre operative Assessment & Optimization Strategies	Core Course	4	0	0	4	30	70	100
MOA1402	Directed Clinical Education - I	Core Course	4	0	0	4	30	70	100
MOA1403	Operation Theatre & Anesthesia Techniques I	Practicum Course	0	0	8	4	30	70	100
IKS0022	Indian Cultural Studies	Indian Knowledge System	2	0	0	2	15	35	50
Discipline Elective (Any one of the following)									
MOA1405	General Principles of Hospital Practices	Disciplinary Elective	4	0	0	4	30	70	100
MOA1406	Fundamentals of Operation Theatre								
Total			**18**	**00**	**08**	**22**	**165**	**385**	**550**

Semester 2nd									
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
MOA2450	Advanced Anesthesia Techniques	Core Course	4	0	0	4	30	70	100
MOA2451	Concept of Disease in Relation to Anesthesia & Critical Care	Core Course	4	0	0	4	30	70	100
MOA2452	Directed Clinical Education - II	Core Course	4	0	0	4	30	70	100
MOA2453	Advanced Operation Theatre & Anesthesia Techniques II	Practicum Course	0	0	8	4	30	70	100
MOA2454	Project I	Skill Based	0	0	4	2	15	35	50
Discipline Elective (Any one of the following)									
MOA2455	Microbiology and Pathology	Disciplinary Elective	4	0	0	4	30	70	100
MOA2456	Transfusion Medicine								
Total			**16**	**00**	**12**	**22**	**165**	**385**	**550**

Programme learning outcomes: A post graduate degree is awarded to students who have demonstrated the achievement of the outcomes located at level 6.5:

Element of the Descriptor	**Programme learning out comes relating to Post graduate degree (2years)**
The Post graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	A deep understanding of theoretical and practical knowledge within their field of study.
	The ability to critically evaluate and synthesize information from various sources to solve complex problems.
	Awareness of current trends, challenges, and developments in their professional domain.
General, technical and professional skills required to perform and accomplish tasks	Apply specialized knowledge and skills to perform tasks effectively in their professional practice.
	Demonstrate problem-solving, analytical, and critical thinking abilities in various contexts.
	Utilize relevant technologies and methodologies to enhance professional efficiency.
	Exhibit leadership, teamwork, and collaboration skills in professional and academic environments.
Application of knowledge and skills	Integrate academic knowledge with real-world applications to address industry-specific challenges. Adapt to evolving professional landscapes through continuous learning and self-improvement.
Generic learning outcomes	Demonstrate effective communication skills in both written and oral formats.Engage in lifelong learning and self-directed study to enhance professional development.
Constitutional, humanistic, ethical, and moral values	Uphold ethical standards and integrity in academic and professional settings. Apply humanistic and moral values to their decision-making processes.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Demonstrate professional readiness with relevant industry-specific competencies. Exhibit entrepreneurial skills, including creativity, innovation, and business acumen. Display adaptability, resilience, and initiative in various employment contexts.
Credit	A student will be awarded with Master of Science in

requirements	Operation Theatre & Anesthesia Technology after successful completion of four semesters of 2-year PG Programme by earning 88 credits, OR A student will be awarded with Master of Science in Operation Theatre & Anesthesia after successful completion of two semesters of 1-year PG Programme by earning 44 credits in the case of lateral entry to 2nd year after 4-year Bachelor Degree (Honors) or 4-year Bachelor Degree (Honors with Research) or after 1-year PG Diploma in the concerned subject as per the eligibility conditions.
Entry requirements	Bachelor's degree with Honors/ Honors with Research in relevant subject (4-Years) or One-year PG Diploma in relevant subject with at least 45% marks or equivalent CGPA in aggregate, after 3-year Bachelor Degree.

Semester 3rd									
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
MOA3500	CSSD Procedures	Core Course	4	0	0	4	30	70	100
MOA3501	Principles of Anesthesia Technology	Core Course	4	0	0	4	30	70	100
MOA3502	Dissertation (Phase I)	Skill Based	0	0	0	12	200	100	300
MOA3503	Project II	Skill Based	0	0	4	2	15	35	50
Total			**08**	**00**	**04**	**22**	**275**	**275**	**550**

Semester 4th									
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
MOA4550	Research Methodology and Biostatistics	Core Course	4	0	0	4	30	70	100
MOA4551	Dissertation (Phase II)	Skill Based	0	0	0	12	200	100	300
MOA4552	Employability and Entrepreneurship in Operation Theatre and Anesthesia	EEC	2	0	0	2	15	35	50
Discipline Elective (Any one of the following)									
MOA4553	Biomedical Instrumentation	Disciplinary Elective	4	0	0	4	30	70	100
MOA4554	Research Publication Ethics and Intellectual Property Right								
Total			**10**	**00**	**00**	**22**	**275**	**275**	**550**
Grand Total			**52**	**00**	**24**	**88**	**880**	**1,320**	**2,200**

1st SEMESTER

Course Title: Surgical Equipment and Technology	L	T	P	Cr.
Course Code: MOA1400	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Describe the fundamental principles and components of common surgical instruments and equipment.
2. Explain the purpose and functionality of various surgical tools, including their uses in different surgical procedures.
3. Describe methods and protocols for cleaning, disinfection, and sterilization of surgical tools.
4. Diagnose common issues and malfunctions in surgical equipment and apply appropriate troubleshooting techniques.
5. Identify and describe the functions of common surgical instruments and equipment used in various surgical procedures.

Course Contents

UNIT-I **14 Hours**

Role and responsibilities of an OT technician. Rules and regulations in operation theatre. Ethics of an OT technician, Carrier path of an OT technician. Biomedical waste management, Personal protective equipment's. Introduction of operation theatre, Pre-operative, post-operative rooms. Operation theatre complex-layout -location, types, zones, size, Care and maintenance of surgical equipment's including open surgery, Laparoscopic, endoscopic and robotic equipment's Cleaning of O.T Fumigation of O.T. Sterilization.

UNIT-II **16 Hours**

Methods & Types Operating table O.T lights Diathermy machine (Electrocautery) General surgical procedures and instruments. Preparation of operation theatre to receive patient. Care of surgical patients. Transportation of surgical patient, Preparation of surgical instruments trolley.

UNIT-III **16 Hours**

Importance of sterilization &preparation of surgical instruments for sterilization Preparation of laparoscopic instruments. Cleaning and care of laparoscopic instruments. Incision and its types, Major abdominal incision. Cleaning and care of wound. Dressing materials, different types of

Dressings. Dressing procedure Surgical Positioning and its.

UNIT-IV **14 Hours**

Types, of Suture Materials & types of Suturing. Different types of Drains, Catheters, Drip Sets, and Bags. IV Operating team, operating room staff, Introduction of assisting of surgery, surgical hand scrubbing, gowning and gloving, Part preparation, drapes and draping. Instruments used for general surgery, orthopedic surgical instruments, Gynecology procedure instruments, Minor surgical procedure instruments.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings:

- *Ajay Yadav and Arora Synopsis of medical instruments Jaypee Pramila*
- *Bhalla Operation room technician's APH M.P. Sharma Operation Theatre Techniques & AITBS Publishers Management*

Course Title: Pre-operative Assessment & Optimization Strategies	L	T	P	Cr.
Course Code: MOA1401	4	0	0	4

Total Hours: 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Explain the principles and importance of preoperative assessment in surgical care.
2. Evaluate patient risk factors using standardized assessment tools and clinical guidelines.
3. Design optimization strategies to improve surgical outcomes for diverse patient populations.
4. Analyze ethical considerations and special requirements in emergency and high-risk surgeries.
5. Integrate postoperative planning into preoperative optimization frameworks.

Course Contents

UNIT-I **14 Hours**

Introduction to Preoperative Assessment,Definition, objectives, and scope of preoperative assessment, Ethical considerations: Informed consent, patient autonomy, and shared decision-making, Overview of perioperative care pathways, Role of multidisciplinary teams in preoperative evaluation.

UNIT-II **14 Hours**

Risk Stratification and Patient Evaluation, Cardiovascular and respiratory risk assessment (e.g., MET scores, ASA classification), Renal, hepatic, and endocrine system evaluations, Nutritional status, frailty, and cognitive assessments, Use of biomarkers and diagnostic tools (e.g., ECG, echocardiography, pulmonary function tests), Risk communication strategies for patients and families.

UNIT-III **16 Hours**

Optimization Strategies for Surgical Patients,Pharmacological optimization: Managing comorbidities (hypertension, diabetes, anemia), Prehabilitation: Physical therapy, nutritional supplementation, and smoking cessation, psychological preparation and stress reduction techniques, Blood management strategies and thromboembolism prophylaxis,Tailoring strategies for pediatric, geriatric, and obese patients.

UNIT-IV **16 Hours**

Special Considerations and Postoperative Planning, Emergency surgeries:

Rapid assessment and optimization protocols,managing highrisk patients (e.g., sepsis, immunocompromised), Transition from preoperative to postoperative care: Pain management and early mobilization,Ethical dilemmas in resourcelimited settings, Case studies on failed optimization and lessons learned.

Transactional modes: Video based teaching, collaborative case discussions, simulation workshops, problem-based learning.

Suggested Readings:

- *Lee A. Fleisher, "EvidenceBased Practice of Anesthesiology", 3rd Edition, Elsevier (2019).*
- *Michael F. Roizen and John Clapp, "Preoperative Assessment and Management", Lippincott Williams & Wilkins (2015).*
- *Paul G. Barash et al., "Clinical Anesthesia", 8th Edition, Wolters Kluwer (2017).*
- *National Institute for Health and Care Excellence (NICE), "Guidelines for Perioperative Care" (2021).*
- *Kate Leslie and Warwick Jamieson, "Effective Perioperative Practice: Optimisation and Risk Reduction", Cambridge University Press (2020)*

Course Title: Directed Clinical Education-I	L	T	P	Cr
Course Code: MOA1402	4	0	0	4

Total Hours: 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Demonstrate foundational clinical skills in patient assessment and care.
2. Apply ethical principles in clinical decision-making and patient interactions.
3. Perform basic clinical procedures under supervision with adherence to safety protocols.
4. Evaluate the role of interdisciplinary collaboration in healthcare settings.
5. Reflect on professional responsibilities and communication strategies in clinical practice.

Course Contents

UNIT-I **15 Hours**

Clinical education fundamentals: definition and scope of clinical education, roles and responsibilities of clinical students, overview of healthcare systems and clinical environments, professionalism and ethical conduct in clinical settings, patient confidentiality and HIPAA compliance.

UNIT-II **15 Hours**

Patient assessment and communication: principles of patient history taking and physical examination, effective communication with patients, families, and healthcare teams, cultural competency and empathy in patient care, documentation and electronic health records (HER) basics, case studies on patient interaction scenarios.

UNIT-III **15 Hours**

Clinical safety and procedures: infection control protocols including hand hygiene, PPE, and sterilization, basic clinical skills such as vital signs measurement, wound care, and specimen collection, safe medication administration principles (oral, topical), emergency response for recognizing and reporting critical changes in patient status, simulation labs for skill practice and error analysis.

Unit-IV **15 Hours**

Ethics and professional growth: ethical dilemmas in clinical practice

including informed consent and endoflife care, legal responsibilities and malpractice awareness, interprofessional collaboration and teamwork, self-care and burnout prevention strategies for healthcare professionals, portfolio development through reflective journaling and competency tracking.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Bickley, L. S., & Szilagyi, P. G. "Bates' Guide to Physical Examination and History Taking." Lippincott Williams & Wilkins (2021).*
- *Guido, G. W. "Legal and Ethical Issues in Nursing." Pearson Education (2019).*
- *Gropper, M. A., et al. "Clinical Ethics in Anesthesia: A CaseBased Textbook." Cambridge University Press (2020).*
- *Hopp, L., &Rittenmeyer, L. "Introduction to EvidenceBased Practice: A Practical Guide for Nursing." F.A. Davis Company (2021).*
- *National Council of State Boards of Nursing. "Clinical Judgment Measurement Model: Guidance for Educators." NCSBN (2022).*

Course Title: Operation Theatre and Anesthesia Techniques I	L	T	P	Cr.
Course Code: MOA1403	0	0	8	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Understand Surgical Equipment – Identify and describe the function of common surgical instruments and advanced surgical equipment.
2. Explain Operating Room (OR) Technology – Understand the principles behind surgical imaging, electrosurgery, robotics, and minimally invasive surgery.
3. Safety and Sterilization – Explain sterilization techniques, infection control measures, and safe handling of surgical instruments.
4. Troubleshooting and Maintenance – Recognize common technical issues in surgical devices and understand basic troubleshooting and maintenance protocols.
5. Perform Basic Equipment Maintenance – Follow protocols for cleaning, sterilizing, and storing surgical tools and devices.

Course content

List of Practical's / Experiments: **60 Hours**

Introduction to Surgical Instruments

- Identification and classification of surgical instruments (cutting, grasping, retracting, etc.).
- Handling and sterilization techniques.

Basics of Sterilization & Infection Control

- Practical demonstration of autoclaving, ethylene oxide (ETO) sterilization, and plasma sterilization.
- Use of disinfectants and aseptic techniques in surgery.

Suturing Techniques & Wound Closure

- Hands-on practice with different suturing techniques (simple interrupted, continuous, mattress sutures, etc.).
- Use of staplers, adhesive tapes, and tissue glue.

Electrosurgical Instruments & Cautery

- Understanding monopolar and bipolar cautery.
- Practical demonstration of electrosurgical units and safety precautions.

Laparoscopic Surgery Basics

- Introduction to laparoscopic instruments (trocar, camera, insufflator, etc.).

Endoscopy & Fiber Optics in Surgery

- Demonstration of an endoscope and its working principle.

Microsurgery Techniques & Operating Microscope

- Demonstration of micro-instruments and micro-suturing.
- Use of a surgical microscope for precision procedures.

Robotic Surgery & Artificial Intelligence in Surgery

- Introduction to robotic surgical systems (e.g., da Vinci robot).
- Simulated hands-on experience with robotic-assisted surgery trainers.

Laser Technology in Surgery

- Understanding the physics of lasers used in surgery (CO_2, Nd:YAG, etc.).
- Demonstration of laser safety protocols and applications in surgery.

Imaging & Navigation Systems in Surgery

- Use of ultrasound, fluoroscopy, and CT/MRI-based surgical navigation.
- Hands-on session with a surgical navigation system.

3D Printing & Prosthetics in Surgery

- Understanding the role of 3D printing in custom implants and surgical planning.
- Demonstration of 3D-printed prosthetics and anatomical models.

Biomedical Sensors & Monitoring Equipment

- Introduction to patient monitoring systems (ECG, pulse oximeter, blood pressure monitors).

Cryosurgery & Ultrasonic Surgical Devices

- Working principles and applications of cryosurgery in tumor ablation.
- Demonstration of ultrasonic scalpel and cavitation effects.

Tissue Engineering & Bioprinting in Surgery

- Introduction to bioengineered tissues for reconstructive surgery.
- Demonstration of bioprinting techniques and scaffold preparation.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question Answer

Suggested Readings:

- *Ajay Yadav and Arora Synopsis of medical instruments Jaypee Pramila*
- *Bhalla Operation room technician's APH M.P. Sharma Operation Theatre Techniques & AITBS Publishers Management*

Course Title: Indian Cultural Studies	L	T	P	Cr.
Course Code: IKS0022	2	0	0	2

Total Hours: 30

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Understanding Modern Indian Thought: Students will gain a theoretical foundation to explore how Indian philosophical and cultural ideas since the early 20th century have shaped individual and collective experiences.
2. Analyzing Cultural Transformations: Learners will investigate the impact of modern Indian thought on personal identity and cultural context, understanding its role in shaping societal values and worldviews.
3. Developing Conceptual Vocabulary: Students will become familiar with key ideas and terminologies introduced in the course, enabling them to critically engage with and interpret modern Indian intellectual traditions.
4. Articulating Personal and Shared Experiences: Learners will cultivate the ability to express their own and others & experiences using the conceptual and philosophical frameworks discussed in the course.
5. Demonstrate a comprehensive understanding of the linguistic, religious, regional, and ethnic diversity within Indian culture.

Course Content

Unit 1 **7 Hours**

Introduction: (Orientalist, colonial and contemporary representation of India)

Unit 2 **8 Hours**

Indian difference: (Aurobindo, Ramanujan, Bankimchandra, Malhotra and others),

Self and subjectivity: (Gandhi, Upadhyay, M.N. Roy, Ashis Nandy, Dharmapal and others)

Unit 3 **7 Hours**

Home, Nation and the World: (Nehru, Tagore, Ambedkar, Savarkar, Mazumdar,

Malaviya and others)

Unit 4 **8 Hours**

Swaraj: (Lajpat Rai, Gandhi, Tilak, Rajaji, Alvares, Balagangadhar and

others), Art and aesthetics: (Coomaraswamy, Hiriyana, Radhakrishnan, Aurobindo, Naipaul, Devy and others)

Transactional Mode: Seminars, Group discussion, Team teaching, Focused group discussion, Assignments, Project-based learning, Simulations, reflection and Self-assessment

Suggested Readings:

- *Knut A. Jacobsen. Ed. Modern Indian Culture and Society. Routledge: London, 2009.*
- *Upadhyay, Deendayal. Integral Humanism. 1965. http://www.chitrakoot.org/download/IntegralHumanism.pdf*
- *Savarkar, V.D. The Essentials of Hindutva. http://savarkar.org/en/encyc/2017/5/23/2_12_12_04_essentials_of_hind tva.v001.pdf_1.pdf*
- *Vasudha Dalmia & Rashmi Sadana. Eds. The Cambridge Companion to Modern Indian Culture. Cambridge University Press: Cambridge, 2012.*
- *Alvares, Claude. "A Critique of the Eurocentric Social Science and the Question of Alternatives". Economic and Political Weekly. 46. 22, 2011.*
- *Ambedkar, B.R. Pakistan or the Partition of India. Columbia University:*
- *http://www.columbia.edu/itc/mealac/pritchett/00ambedkar/ambedkar_partition*
- *Balagangadhara,S.N. Reconceptualizing India Studies. Oxford University Press: New Delhi, 2012.*
- *Chatterjee, Partha. Nationalist Thought and the Colonial World: A Derivative Discourse. Zed Books: London,1993.*
- *Chattopadhyay, Bankimchandra. "Is Nationalism a Good Thing?" and "Critics of Hinduism". In Awakening Bharat Mata, ed. Swapan Dasgupta. Penguin: New Delhi, 2019.*
- *Coomaraswamy, A.K. "Indian Nationality". Indian Philosophy in English: From Renaissance to Independence. Oxford University Press: New York, 2011.*
- *Gandhi, M.K. Hind Swaraj. Navjeevan Publishing: Ahmedabad, 1938.*
- *Ghosh, Aurobindo. "A Defence of Indian Culture". The Renaissance in India and other Essays on Indian Culture. Sri Aurobindo Ashram: Pondicherry, 2002.*

Course Title: General Principles of Hospital Practices	L	T	P	Cr.
Course Code: MOA1405	4	0	0	4

Total Hours: 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Demonstrate ethical decision-making in patient care, respecting confidentiality, autonomy, and informed consent.
2. Exhibit professional behavior, including punctuality, accountability, and teamwork.
3. Adhere to hospital policies, regulations, and national healthcare guidelines.
4. Perform comprehensive patient evaluations, including history-taking and physical examinations.
5. Interpret common laboratory tests, imaging studies, and other diagnostic tools.

Course Content

UNIT-I **15 Hours**

Introduction to Hospital Practice

- Overview of hospital organization and administration
- Roles and responsibilities of healthcare professionals
- Hospital departments and interdisciplinary collaboration
- Hospital accreditation and quality assurance

Ethical and Legal Considerations

- Medical ethics and patient rights
- Informed consent and confidentiality (HIPAA/GDPR regulations)
- Handling medical errors and professional accountability
- Medicolegal documentation and malpractice prevention

UNIT-II **15 Hours**

Hospital Policies and Standard Operating Procedures (SOPs)

- Admission, discharge, and transfer (ADT) procedures
- Electronic Health Records (EHR) and documentation best practices
- Medication management and prescription safety
- Emergency protocols and resuscitation guidelines (BLS, ACLS, Code Blue)

Patient Safety and Quality Care

- Infection control and hand hygiene protocols
- Preventing hospital-acquired infections (HAIs)
- Falls prevention and patient mobility safety

- Surgical safety checklists and protocols

UNIT-III **15 Hours**

Communication and Teamwork in Hospital Practice

- Effective communication with patients and families
- Handoffs and transitions of care (SBAR technique)
- Dealing with difficult patients and conflict resolution
- Working in a multidisciplinary team

Emergency and Critical Care Principles

- Recognition and management of acute medical conditions
- Basics of triage and emergency department workflow
- Critical care unit (ICU) essentials and monitoring parameters
- Ethical dilemmas in end-of-life care

UNIT-IV **15 Hours**

Clinical Skills and Bedside Etiquette

- Professionalism in patient interactions
- Cultural competence in healthcare
- Conducting rounds and presenting cases
- Breaking bad news and counseling skills

Research and Continuous Medical Education (CME)

- Introduction to Evidence-Based Medicine (EBM)
- Understanding clinical trials and hospital research protocols
- Continuing professional development in hospital practice
- Leadership and career development in hospital medicine

Transactional modes: Video-based teaching, Collaborative teaching, Case based teaching, Question Answer.

Suggested Readings:

- *House of God" by Samuel Shem – A satirical yet insightful take on hospital life and medical practice.*
- *"The Real Doctor Will See You Shortly" by Matt McCarthy – A memoir about a doctor's first year in residency.*
- *"Being Mortal" by Atul Gawande – A discussion on end-of-life care and the ethics of modern medicine.*
- *"How Doctors Think" by Jerome Groopman – A book on medical decision making and common cognitive errors.*
- *NEJM Resident 360 – Offers case studies and principles of hospital practice in an easy-to-understand format*

Course Title: Fundamentals of Operation Theatre		L	T	P	Cr.
Course Code: MOA1406		4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Describe the structure, design, and functional zones of a modern operation theatre (OT).
2. Demonstrate adherence to aseptic techniques and infection control protocols in the OT.
3. Identify the roles and responsibilities of the surgical team, including surgeons, anesthetists, nurses, and technicians.
4. Operate and maintain critical OT equipment with safety and precision.
5. Apply ethical principles and safety standards in managing surgical emergencies and patient care.

Course Contents

UNIT-I **15 Hours**

Overview of operation theatre: historical evolution, design principles, and zoning (sterile, semi sterile, and nonsterile areas), types of OTs (general, specialized, and modular), workflow management, temperature and ventilation standards, safety protocols for staff and patients, legal and regulatory guidelines governing OT operations.

UNIT-II **15 Hours**

Principles of asepsis: sterilization vs. disinfection, methods of sterilization (autoclaving, chemical, radiation), surgical hand scrubbing, gowning, and gloving, use of personal protective equipment (PPE), management of biohazardous waste, prevention of surgical site infections (SSIs), WHO surgical safety checklist, role of laminar airflow and HEPA filters in maintaining OT sterility.

UNIT-III **15 Hours**

Classification and handling of surgical instruments (cutting, grasping, retracting, and suturing tools), anesthesia machines and ventilators: components and safety checks, electrosurgical units (ESU) and laparoscopic equipment, operating lights, tables, and suction systems, care and maintenance of OT equipment, troubleshooting common technical issues, documentation of equipment logs.

UNIT-IV **15 Hours**

Roles of the surgical team: surgeon, anesthetist, scrub nurse, circulating nurse, and OT technician, preoperative preparation: patient positioning,

draping, and skin preparation, intraoperative communication and teamwork, handling emergencies (e.g., hemorrhage, anaphylaxis), postoperative care: patient transfer and OT cleanup, incident reporting and error prevention strategies.
Ethics, Legal Aspects, and Emerging Trends (6 Hours) Ethical dilemmas in OT: patient consent, confidentiality, and endoflife decisions, legal frameworks for OT malpractice and negligence, advancements in robotic surgery and minimally invasive techniques, environmental sustainability in OT practices, future trends in OT design and technology integration.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested readings:

- *Rothrock, J. C. "Alexander's Care of the Patient in Surgery." Elsevier (2023).*
- *Phillips, N. "Berry & Kohn's Operating Room Technique." Mosby (2022).*
- *World Health Organization. "WHO Guidelines for Safe Surgery." WHO Press (2009).*
- *Gruendemann, B. J., & Mangum, S. S. "Infection Prevention in Surgical Settings." Saunders (2021).*
- *AORN. "Guidelines for Perioperative Practice." AORN Journal (2023).*

2ND SEMESTER

Course Title: Advanced Anesthesia Techniques	L	T	P	Cr.
Course Code: MOA2450	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Analyze advanced anesthesia techniques for diverse surgical procedures.
2. Apply principles of patient monitoring and hemodynamic stability during anesthesia.
3. Manage anesthesia-related complications and emergencies.
4. Evaluate emerging technologies in anesthesia delivery systems.
5. Understand and apply advanced airway management techniques, including fiber optic intubation and video laryngoscopy.

Course Contents

Unit I **14 Hours**

Difficult airway algorithms, fiber optic intubation, video laryngoscopy, supraglottic airway devices, pediatric and geriatric airway challenges, emergency cricothyroidotomy techniques.

Unit II **16 Hours**

Ultrasound-guided nerve blocks, spinal and epidural anesthesia, pharmacokinetics of local anesthetics, complications of regional anesthesia, postoperative pain management strategies.

Unit III **14 Hours**

Inhalational vs. intravenous anesthetics, neuromuscular blocking agents, reversal drugs, opioids paring techniques, and pharmacogenomics in anesthesia.

Unit IV **16 Hours**

Anesthesia considerations in cardiac, obstetric, trauma, and obese patients, perioperative management of comorbidities (diabetes, hypertension).
Anaphylaxis, malignant hyperthermia,cardiac arrest protocols, and simulation-based training for critical scenarios.

Transactional modes: Video-based teaching, Collaborative teaching, Case-based teaching, Question-Answer.

Suggested Readings:

- *Miller's Anesthesia (9th Ed.), Elsevier (2023).*

- *Stoelting's Pharmacology & Physiology in Anesthetic Practice, Wolters Kluwer (2022).*

Course Title: Concept of Disease in Relation to Anesthesia & Critical Care	L	T	P	Cr.
Course Code: MOA2451	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Correlate disease pathophysiology with anesthesia management.
2. Design anesthesia plans for patients with systemic diseases.
3. Interpret diagnostic tests for perioperative risk stratification.
4. Integrate critical care principles into anesthesia practice.
5. Discuss the significance of inflammation, infection, and sepsis in critically ill patients.

Course Contents

UNIT-I **15 Hours**

Cardiovascular diseases (CAD, heart failure), respiratory disorders (COPD, asthma), renal and hepatic dysfunction, endocrine disorders (diabetes, thyroid).

UNIT-II **15 Hours**

Mechanical ventilation, hemodynamic monitoring, sepsis management, fluid and electrolyte balance, nutritional support in the ICU**.**

UNIT-III **15 Hours**

Preanesthetic evaluation, ASA classification, interpretation of ECG, echocardiography, and pulmonary function tests.

UNIT-IV **15 Hours**

Damage control resuscitation, polytrauma management, anesthesia for emergency surgeries, and mass casualty protocols.

End-of-life decisions, palliative care, and informed consent in critically ill patients.

Transactional modes: Video-based teaching, Collaborative teaching, Case-based teaching, Question and Answer.

Suggested Readings:

- *Barash's Clinical Anesthesia (8th Ed.), Wolters Kluwer (2021). 22*
- *Marino's The ICU Book (5th Ed.), Lippincott (2022).*

Course Title: Directed Clinical Education II	L	T	P	Cr.
Course Code: MOA2452	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Perform advanced clinical assessments under supervision.
2. Demonstrate proficiency in anesthesia equipment handling.
3. Collaborate effectively in multidisciplinary teams.
4. Reflect on ethical and professional challenges in clinical settings.
5. Describe the role of different imaging modalities in diagnosing various medical conditions.

Course Contents

UNIT-I **15 Hours**

- Review of hospital and department protocols.
- Advanced patient positioning, assessment, and safety.
- Handling special populations (pediatric, geriatric, trauma patients).
- Ethical and legal considerations in clinical practice.

UNIT-II **15 Hours**

- Mastery of complex imaging procedures (CT, MRI, ultrasound, fluoroscopy).
- Contrast media administration and adverse reaction management.
- Radiation safety and dose optimization strategies.
- Hands-on training in surgical or interventional procedures.

UNIT-III **15 Hours**

- Calibration and quality assurance of imaging equipment.
- Troubleshooting imaging artifacts and machine errors.
- Emerging technologies (AI-assisted imaging, 3D imaging, robotic surgery applications).
- Hands-on practical evaluation in real-time clinical scenarios.
- Self-reflection and feedback from clinical instructors.
- Discussion on areas for improvement and strategies for professional growth.

UNIT-IV **15 Hours**

- Review of challenging real-world cases in clinical imaging and diagnostics.
- Multidisciplinary discussions on complex patient conditions.
- Correlating imaging findings with pathophysiology and treatment

plans.
- Evidence-based practice and research integration in clinical decision making.
- Effective team collaboration in a clinical setting.
- Enhancing communication with patients, physicians, and healthcare staff.
- Documentation, reporting, and quality assurance in clinical settings.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:
- *Clinical Anesthesia Procedures of the Massachusetts General Hospital (10th Ed.), Lippincott (2023).*
- *Morgan & Mikhail's Clinical Anesthesiology (7th Ed.), McGrawHill (2022).*

Course Title: Advanced Operation Theatre and Anesthesia Techniques II	L	T	P	Cr.
Course Code: MOA2453	0	0	8	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Analyze advanced anesthesia techniques for diverse surgical procedures.
2. Apply principles of patient monitoring and hemodynamic stability during anesthesia.
3. Manage anesthesia-related complications and emergencies.
4. Evaluate emerging technologies in anesthesia delivery systems.
5. Demonstrate proficiency in video laryngoscopy and supraglottic airway devices.

List of Practical's / Experiments **60 Hours**

- Endotracheal intubation using video laryngoscopy.
- Fiberoptic bronchoscope-guided intubation.
- Cricothyroidotomy and emergency surgical airway management.
- Ultrasound-guided peripheral nerve blocks (e.g., brachial plexus, femoral nerve, sciatic nerve).
- Epidural anesthesia: placement and troubleshooting.
- Spinal anesthesia: technique, complications, and management.
- Principles and setup of TIVA using propofol and remifentanil.
- Target-controlled infusion (TCI) – pharmacokinetics and practical application.
- Simulation-based practice of difficult airway algorithms. etc.).
- Use of supraglottic airway devices (laryngeal mask airway, i-gel, Understanding volatile anesthetics (sevoflurane, desflurane, isoflurane).
- Calibration and troubleshooting of anesthesia gas delivery systems.
- Arterial line placement and waveform interpretation.
- Central venous catheter insertion and pressure monitoring.
- Use of advanced hemodynamic monitors (PiCCO, LiDCO, transesophageal echocardiography).

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question Answer

Suggested Readings:

- *Miller's Anesthesia (9th Ed.), Elsevier (2023).*

- *Stoelting's Pharmacology & Physiology in Anesthetic Practice, Wolters Kluwer (2022).*

Course Title: Project I	L	T	P	Cr.
Course Code: MOA2454	0	0	4	2

Total Hours 30

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Students will be able to independently research a specific topic related to the field of study, identify key questions or problems, and gather relevant information from reliable sources.
2. Students will be able to design a clear and feasible project plan, including objectives, methodology, timeline, and resource management.
3. Students will demonstrate the ability to collaborate effectively within a team, contributing to group discussions, decision-making, and the completion of the project.
4. Students will reflect on their learning experiences throughout the project, evaluating their strengths.
5. Demonstrate an understanding of both fields' foundational principles, practices, and techniques.

Course Contents

List of Project I **30 Hours**

Comparative Study of Different Airway Management Techniques

- Objective: Compare the effectiveness of video laryngoscopy, fiberoptic intubation, and supraglottic airway devices in difficult airway management.
- Methodology: Simulated scenarios, patient case studies, or literature review.

Role of Anesthesia Monitoring in Patient Safety

- Objective: Analyze how advanced monitoring techniques (EEG, BIS, capnography) improve Anesthesia depth assessment.
- Methodology: Case studies and data collection in an Anesthesia setting.

Evaluation of Different Sterilization Techniques in Operation Theatres

- Objective: Assess the efficacy of autoclaving, EtO gas, and plasma sterilization on surgical instruments.
- Methodology: Laboratory testing and comparison of microbial contamination. Design and Implementation of a Simulation-Based

Training Program for Anesthesia Emergencies

- Objective: Develop a simulation protocol for training technologists in crisis management (e.g., anaphylaxis, cardiac arrest, malignant hyperthermia).

- Methodology: Create a training module and assess learning outcomes.

Impact of Temperature and Humidity Control in OT on Infection Rates

- Objective: Evaluate how maintaining ideal OT conditions reduces surgical site infections (SSIs).
- Methodology: Data collection from hospital OT settings and comparative analysis.

Course Title: Microbiology and Pathology	L	T	P	Cr.
Course Code: MOA2455	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Identify microbial pathogens relevant to anesthesia practice.
2. Analyze pathological mechanisms of surgical infections.
3. Apply microbiology principles to infection control in OT.
4. Interpret histopathological reports for perioperative planning.
5. Understand microbial growth, metabolism, and factors influencing microbial survival.

Course Contents

UNIT-I **15 Hours**

Bacteria, viruses, fungi, and parasites in surgical infections, antibiotic resistance, sterilization techniques, hospitalacquired infections (SSIs, UTIs).

UNIT-II **15 Hours**

Inflammation, neoplasia, cardiovascular pathology, respiratory disorders, sepsis and multiorgan dysfunction.

UNIT-III **15 Hours**

Culture and sensitivity tests, PCR, serology, imaging correlates of pathology (Xray, CT, MRI).

UNIT-IV **15 Hours**

Surveillance of OT infections, disinfection protocols, role of microbiological audits, WHO guidelines for OT safety.Microbiological and pathological analysis of perioperative complications (e.g., sepsis, wound dehiscence).

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings:

- *Jawetz, Melnick & Adelberg's Medical Microbiology (28th Ed.), McGrawHill (2023).*
- *Robbins &Cotran Pathologic Basis of Disease (10th Ed.), Elsevier (2021).*

Course Title: Transfusion medicine	L	T	P	Cr.
Course Code: MOA2456	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Understand the composition and functions of blood and itscomponents.
2. Explain the indications, contraindications, and risks of blood transfusion.
3. Describe the ABO and Rh blood group systems and their clinical significance.
4. Interpret cross-matching techniques and their role in ensuring safe transfusion.
5. Identify the indications for using packed red blood cells (PRBCs), platelets, plasma, and cryoprecipitate.

Course Contents

Unit-I **15 Hours**

- Basics of Blood Physiology
- Composition and functions of blood
- Hematopoiesis and erythropoiesis
- Blood groups and their significance (ABO, Rh, minor blood groups) Blood Collection & Donor Screening
- Blood donation criteria and donor selection
- Types of blood donation (whole blood, apheresis)
- Blood collection, anticoagulants, and storage conditionsBlood Component Preparation and Storage
- Processing of blood components (PRBCs, FFP, platelets, cryoprecipitate)
- Storage conditions and shelf-life of components
- Quality control in blood banking Blood Grouping & Crossmatching
- Techniques of ABO & Rh typing
- Direct and indirect Coombs test
- Crossmatching techniques and compatibility testing

Unit-II **15 Hours**

- Indications & Guidelines for Blood Transfusion
- Indications for transfusion of RBCs, platelets, plasma, and cryoprecipitate
- Massive transfusion protocols

- Evidence-based transfusion medicine Transfusion Reactions & Complications
- Acute hemolytic & delayed hemolytic transfusion reactions
- Febrile, allergic, and anaphylactic reactions
- Graft-versus-host disease (GVHD) and iron overload Special Blood Products & Modifications
- Leukoreduced, irradiated, and washed RBCs
- Pathogen reduction in blood components
- Pediatric and neonatal transfusions Transfusion in Special Conditions
- Transfusion in pregnancy (HDFN & Rh immune prophylaxis)
- Transfusion in immunocompromised patients
- Alternatives to transfusion (erythropoietin, iron therapy)

Unit-III **15 Hours**

- Red Cell Antigens & Alloimmunization
- Minor blood group systems (Kell, Kidd, Duffy, etc.)
- Autoimmune hemolytic anemia and alloantibodies
- Laboratory identification of alloantibodies Hemolytic Disease of the Fetus & Newborn (HDFN)
- Pathophysiology and diagnosis
- Role of Rh immunoglobulin
- Intrauterine and exchange transfusions Molecular & Advanced Transfusion Techniques
- Nucleic acid testing (NAT) in blood screening
- Next-generation sequencing in transfusion medicine
- Artificial blood and emerging therapies Apheresis & Plasma Exchange
- Types of apheresis (plasmapheresis, leukapheresis, plateletpheresis)
- Therapeutic plasma exchange and its applications
- Adverse effects and safety considerations

Unit-IV **15 Hours**

- Blood Safety & Infectious Disease Screening
- Testing for transfusion-transmitted infections (HIV, HBV, HCV, syphilis, malaria)
- Emerging pathogens and screening strategies
- Universal precautions in transfusion medicine Legal & Ethical Aspects of Blood Transfusion
- National and international blood transfusion policies
- Ethical issues in blood donation and consent
- Legal framework and regulatory authorities (FDA, WHO, NABH) Hemovigilance & Quality Assurance

- Hemovigilance programs and adverse event reporting
- Accreditation and quality control in blood banking
- Hospital transfusion committees and audit systems Future Trends in Transfusion Medicine
- 3D-printed blood and artificial blood substitutes
- Gene therapy and CRISPR applications
- Role of AI and machine learning in transfusion practices

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings:

- *Jawetz, Melnick & Adelberg's Medical Microbiology (28th Ed.), McGrawHill (2023).*
- *Robbins &Cotran Pathologic Basis of Disease (10th Ed.), Elsevier (2021).*
- *Harmening DM. Modern Blood Banking and Transfusion Practices. 7th ed. Philadelphia: F.A. Davis Company; 2019.*
- *Roback JD, Grossman BJ, Harris T, Hillyer CD. Technical Manual. 20th ed. Bethesda (MD): AABB Press; 2020.*

3rd Semester

Course Title: CSSD Procedures	L	T	P	Cr.
Course Code: MOA3500	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Explain the functions and responsibilities of the Central Sterile Supply Department.
2. Understand the importance of sterilization and infection control in healthcare settings.
3. Identify the workflow of CSSD, from receiving used instruments to dispatching sterile supplies.
4. Differentiate between critical, semi-critical, and non-critical items based on sterilization needs.
5. Identify surgical instruments, endoscopes, and reusable medical devices requiring sterilization.

Course Contents

Unit-I **16 Hours**

Introduction to CSSD and its Role in Infection Control: Importance of CSSD in hospital settings, Workflow of CSSD: Collection, Cleaning, Packaging, Sterilization, Storage, and Distribution, Principles of Sterilization and Disinfection, Factors affecting sterilization effectiveness, Methods of Sterilization: Physical methods, Chemical methods, Mechanical methods, Methods of Disinfection, Boiling, Chemical disinfection, Alcohol-based disinfection, Surface disinfection techniques.

Unit-II **14 Hours**

Dry Heat Sterilization, Mechanism and effectiveness, Hot air ovens: Procedure and precautions, Limitations and applications, Wet Heat Sterilization (Autoclaving), Gaseous Sterilization, Ethylene Oxide (EtO) sterilization: Mechanism, applications, and precautions, Formaldehyde sterilization: Uses and hazards, Chemical Sterilization, Sterilization by Radiation, Gamma radiation sterilization, Ultraviolet (UV) sterilization

Unit-III **16 Hours**

Techniques for Sterilization of Rubber Articles: Laryngeal Mask Airways (LMA), Flexible Optical Bronchoscope (FOB), Endotracheal Tubes (ETT), Laryngoscopes, Anesthesia machines and circuits, Techniques for Sterilization of Carbonized Articles, Hazards of Sterilization, Chemical exposure risks (EtO, formaldehyde, glutaraldehyde), Fire and explosion

hazards, Proper handling of sterilization equipment.

Unit-IV **14 Hours**

Precautions During Sterilization: Correct loading of autoclaves and sterilizers, Handling of sterile instruments, Storage and transport of sterilized materials, Quality Control and Monitoring of Sterilization, Use of sterility indicators (biological, chemical, and mechanical), Record-keeping and documentation in CSSD, Routine maintenance of sterilization equipment. Recent Advances in Sterilization Techniques, Advanced sterilization monitoring systems.

Transaction Modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *"Sterilization Technology for the Health Care Facility" – Marimargaret Reichert & Jack H. Young*
- *"Central Sterile Supply Department (CSSD): Concepts, Design, and Practice" – Jitendra Singh*
- *"Infection Control and Management of Hazardous Materials for the Dental Team" – Chris H. Miller*
- *"Medical Instrumentation: Application and Design" – John G. Webster*
- *"Basics in Central Sterile Supply Department" – Kuldeep Singh*

Course Title: Principles of Anesthesia Technology	L	T	P	Cr.
Course Code: MOA3501	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Explain the physiological and pharmacological principles of anesthesia.
2. Prepare and operate anesthesia delivery systems and monitoring equipment.
3. Assist in preoperative, intraoperative, and postoperative anesthesia care.
4. Recognize and respond to anesthesia related emergencies.
5. Adhere to safety protocols and ethical standards in anesthesia practice.

Course Contents

UNIT-I **15 Hours**

Introduction to anesthesia: history, types (general, regional, local), stages of general anesthesia, pharmacology of anesthetic agents (inhalational, intravenous, neuromuscular blockers), mechanisms of action, side effects, and contraindications, preoperative patient assessment and risk stratification.

UNIT-II **15 Hours**

Anesthesia workstation components: vaporizers, ventilators, breathing circuits, scavenging systems, monitoring devices (ECG, pulse oximetry, capnography, BP), calibration and safety checks, airway management tools (laryngoscopes, endotracheal tubes), maintenance and sterilization protocols, troubleshooting equipment malfunctions.

UNIT-III **15 Hours**

Preoperative preparation: patient positioning, IV line establishment, and premedication, intraoperative roles of anesthesia technicians, management of fluid balance and blood products, temperature regulation, pain management techniques, documentation of anesthesia records, handover protocols to postoperative care teams.

UNIT-IV **15 Hours**

Common intraoperative emergencies: hypoxia, hypotension, arrhythmias, anaphylaxis, malignant hyperthermia, emergency drugs and reversal agents, crisis resource management (CRM), postoperative complications (nausea,

delirium, respiratory depression), case studies on critical incidents and root cause analysis.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Nagelhout, J. J., &Plaus, K. L. "Nurse Anesthesia." Elsevier (2023).*
- *Dorsch, J. A., & Dorsch, S. E. "Understanding Anesthesia Equipment." Lippincott Williams & Wilkins (2021).*
- *Miller, R. D., et al. "Miller's Basics of Anesthesia." Elsevier (2023).*
- *American Society of Anesthesiologists. "Standards for Basic Anesthetic Monitoring." ASA (2020).*
- *Stoelting, R. K., & Hillier, S. C. "Pharmacology and Physiology in Anesthetic Practice." Wolters Kluwer (2022).*

Course Title: Dissertation (Phase I)	L	T	P	Cr.
Course Code: MOA3502	0	0	24	12

Total Hours 180

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Clearly articulate a focused and significant research question or problem relevant to their field of study.
2. Demonstrate an understanding of research methodologies used in radiology and imaging technology, including qualitative and quantitative research methods, study designs, and data collection techniques.
3. Conduct a comprehensive literature review on a relevant research topic in radiology and imaging technology, synthesizing current knowledge and identifying gaps or areas requiring further research.
4. Develop a well-structured research proposal, including a clear statement of the research problem, objectives, hypotheses, and methodologies.
5. Understand and apply ethical principles in research, including obtaining informed consent, ensuring patient confidentiality, and following ethical guidelines for research involving human subjects or animal models.

Course Content

Dissertation (Phase) I will include Synopsis approval from Doctoral Advisory Committee (DAC) will be taken by the student and after that it will send to Institutional Research Committee (IRC), followed by Institutional Ethical Committee (IEC) for final approval.

Course Title: Project II	L	T	P	Cr.
Course Code: MOA3503	0	0	4	2

Total Hours 30

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Analyze complex research data using appropriate statistical tools and techniques, ensuring accurate interpretation of the findings.
2. Demonstrate advanced skills in conducting research within operation thretre including refining research methods and overcoming challenges that arose during Project I.
3. Demonstrate proficiency in scientific writing, ensuring clarity, conciseness, and logical flow of ideas, with proper referencing and adherence to ethical writing standards.
4. Ensure that the research adheres to ethical standards, including respect for participant confidentiality, informed consent, and compliance with regulations governing human subjects or animal research.
5. Reflect critically on their project process and outcomes for future improvement.

Course Contents

List of Project II **30 Hours**

Study on Postoperative Pain Management Techniques

- Objective: Compare different pain management strategies (PCA, epidural analgesia, multimodal analgesia).
- Methodology: Patient surveys and hospital case studies.

Efficiency of Rapid Sequence Induction (RSI) in Emergency Surgeries

- Objective: Assess the effectiveness of RSI techniques in reducing aspiration risk and improving intubation success rates.
- Methodology: Observational study of RSI cases in an emergency OT setting.

Development of a Mobile App for Anesthesia Drug Dosage Calculation

- Objective: Create a mobile-based tool for Anesthesia technologists to calculate drug dosages and infusion rates quickly.
- Methodology: Software development and testing with medical professionals.

A Study on Noise Levels in Operation Theatres and Their Impact on Surgical Team Performance

- Objective: Analyze how OT noise levels affect communication, stress, and efficiency.

- Methodology: Decibel measurements and surveys of OT staff

Evaluating the Role of Anesthesia Machines with Closed-Loop Feedback Systems

- Objective: Investigate the benefits of closed-loop Anesthesia delivery systems in maintaining optimal anaesthetic depth.
- Methodology: Literature review and machine performance evaluation.

4th Semester

Course Title: Research Methodology and Biostatistics	L	T	P	Cr.
Course Code: MOA4550	4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Demonstrate a comprehensive understanding of the principles of research methodology, including different types of research designs (e.g., experimental, observational, descriptive, analytical) and their appropriate applications in the field of hematology and blood banking.
2. Understand the importance of sample size, sampling methods (e.g., random, stratified, convenience), and study population in ensuring the validity and reliability of the research outcomes.
3. Identify and address ethical issues that may arise in biomedical research, particularly in the context of human blood samples, clinical studies, and patient consent.
4. Apply appropriate statistical methods to analyze research data, including t-tests, chi-square tests, ANOVA, correlation, regression analysis, and survival analysis.
5. Understand the fundamentals of scientific research, including types, designs, and ethical considerations.

Course Contents

Unit-I **15 Hours**

Introduction to Research: Definition of Research, Types & Methods of research Applied versus Fundamental research, exploratory research, Observational research, Inductive and Deductive approaches; Designing Research protocol: Research Protocol Development, Literature search, Identification of Research problem, Research gap, Research question, Research Hypothesis, Null and Alternative Hypothesis, Study Objectives; Data and types: Types of Data, Primary and Secondary data, Scales of measurement of data- Nominal data, Ordinal, Interval and Ratio scale, Variables and Confounders, Dependent and Independent Variables, Extraneous variable, Control variable.

Unit-II **15 Hours**

Literature Review: Importance of literature review, Sources of literature: Journals, books, and online databases, Organizing and synthesizing research findings; Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Different Research Designs, Basic Principles of Experimental Designs; Study population: Selecting Cases

and Control, Comparison Group, Target population, Matching, Case Definition, Inclusion and Exclusion Criteria; Qualitative vs. Quantitative research methods; Data Collection and analysis : Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling.

Unit-III **15 Hours**

Statistics: Measures of central tendency: Mean, median, and mode, Measures of dispersion: Range, variance, and standard deviation, Frequency distributions and histograms, Data visualization: Bar charts, pie charts, and box plots; Probability and Probability Distributions: Basic probability concepts, Probability distributions: Normal distribution, binomial distribution, and Poisson distribution, Law of large numbers and central limit theorem.

Unit-IV **15 Hours**

Chi-square test for independence and goodness of fit, One-way and two-way analysis of variance (ANOVA), Post-hoc tests following ANOVA; Regression Analysis: Simple linear regression, Multiple linear regression, Model assumptions and diagnostics, Logistic regression (binary outcomes), Poisson regression (count data); Biostatistics for Clinical Trials: Design and analysis of clinical trials, Randomization techniques, Statistical monitoring of trials, Regulatory considerations (e.g., FDA guidelines.

Transaction Modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *"The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams*
- *"Research Methods in Education" by Louis Cohen, Lawrence Manion, and Keith Morrison*
- *"Research Methods in Hematology" by B.L. Pati and D.P. Mahapatra*
- *"Medical Research: A Guide for the Student and Researcher" by Ian D. Young*

Course Title: Dissertation (Phase II)	L	T	P	Cr.
Course Code: MOA4551	0	0	24	12

Total Hours 180

Learning Outcomes: On completion of this course, the successful students will be able to:

1. Utilize advanced research methods and tools to analyze and interpret complex data, showing an understanding of the latest developments and trends in the field.
2. Synthesize and integrate findings from primary research with existing literature to provide a coherent discussion on the topic.
3. Structure the dissertation in a logical manner, including introduction, literature review, research methodology, results, discussion, conclusion, and recommendations.
4. Adhere to ethical guidelines in the execution and reporting of research, ensuring that research involving human subjects or clinical data complies with ethical standards (e.g., informed consent, confidentiality, data protection).
5. Present Research Plans Effectively: Communicate research ideas, design, and rationale clearly through oral presentations and written documents.

Course Content

Dissertation (Phase) II - Dissertation will be evaluated for **300 marks** on the parameter laid down in the proforma for the evaluation in which the students will give a presentation on the dissertation and an open viva-exam examination will be conducted by the external examiner. Student will submit three hard copies of her/his dissertation along with soft copy as PDF file to the Department and 1 Review & Research paper based on his/her research work.

Course Title: Employability and Entrepreneurship in Operation Theatre and Anesthesia	L	T	P	Cr.
Course Code: MOA4552	2	0	0	2

Total Hours 30

Learning Outcomes: On completion of this course, the successful students will be able to:

1. To develop employability skills required for a successful career in hematology and blood banking.
2. To equip students with entrepreneurship skills for setting up and managing blood banks, diagnostic labs, and biotech startups.
3. To enhance communication, leadership, and problem-solving skills relevant to the healthcare industry.
4. To provide an understanding of financial management, regulatory policies, and business strategies for healthcare ventures.
5. Understand the roles and responsibilities of professionals working in operation theatre and Anesthesia services, including surgeons, anesthetists, OT technicians, and nurses.

Course Contents

Unit-I **10 Hours**

Career opportunities in hematology and blood banking, Essential soft skills: Communication, teamwork, adaptability, and leadership, Resume writing, job applications, and interview techniques, Professional ethics and work culture in healthcare and diagnostics and Digital skills: Use of technology in healthcare, data management, and reporting.

Unit-II **5 Hours**

Laboratory quality assurance and accreditation (NABL, CAP, AABB standards),Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP),Automation and AI in hematology and transfusion medicine, Role of biomedical research and innovation in career advancement and continuing medical education (CME) and professional certifications.

Unit-III **10 Hours**

Fundamentals of Entrepreneurship in Healthcare: Basics of entrepreneurship and business models in healthcare, starting a blood bank, diagnostic laboratory, or biotech startup, identifying business opportunities and market analysis in blood banking, Writing a business plan: Key components and strategic planning and Risk assessment and management in healthcare entrepreneurship.

Unit-IV **5 Hours**

Basics of financial management for healthcare businesses, Funding opportunities: Government grants, venture capital, and crowdfunding, Health economics and pricing strategies for diagnostic services, Regulatory frameworks for blood banking and diagnostic startups (FDA, WHO, ICMR guidelines) and Ethical considerations and legal aspects in healthcare entrepreneurship.

Transaction Modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *"The 7 Habits of Highly Effective People" by Stephen R. Covey*
- *"Crucial Conversations: Tools for Talking When Stakes Are High" by Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler*
- *"The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg*
- *"The Hard Thing About Hard Things: Building a Business When There Are No Easy Answers" by Ben Horowitz*
- *"Good to Great: Why Some Companies Make the Leap... and Others Don't" by Jim Collins*
- *"Grit: The Power of Passion and Perseverance" by Angela Duckworth*

Course Title: Biomedical Instrumentation	L	T	P	Cr.
Course Code: MOA4553	4	0	0	4

Total Hours 60

Course Learning Outcomes: On completion of this course, the successful students will be able to:

1. Demonstrate a deep understanding of the fundamental principles and working mechanisms of various biomedical instruments, including sensors, transducers, and analyzers.
2. Identify various types of biomedical instruments used in hematology (e.g., automated hematology analyzers, centrifuges, electrophoresis machines) and blood banking (e.g., blood typing machines, blood storage refrigerators, and platelet agitators).
3. Understand and implement appropriate calibration and maintenance procedures to ensure accurate and reliable performance of biomedical instruments.
4. Analyze how various biomedical instruments influence blood banking practices such as blood typing, cross matching, donor screening, and blood product processing.
5. Design and implement basic biomedical instrumentation circuits considering safety, accuracy, and noise reduction.

Course Contents

Unit-I **15 Hours**

Introduction to Biomedical Instrumentation, Basics of biomedical instrumentation in hematology and blood banking, Classification of instruments: Analytical, Diagnostic, and Monitoring Equipment, Bioelectric signals and their measurements, Safety protocols and regulatory guidelines in biomedical instrumentation.

Unit-II **15 Hours**

Optical and Spectrophotometric Techniques: Principles of spectrophotometry, Use of UV-Vis's spectrophotometers in hemoglobin estimation, Nephelometry and Turbidimetry for protein and antigen detection, Fluorescence and chemiluminescence in blood component analysis.

Unit-III **15 Hours**

Hematology Analyzers and Automation: Introduction to automated hematology analyzers, Coulter Principle and Electrical Impedance in cell counting, Laser-based Flow Cytometry: Working principle and applications, Hematocrit measurement techniques, Reticulocyte counting and automated differential leukocyte counting.

Unit-IV **15 Hours**

Coagulation and Blood Banking Instruments: Coagulation analyzers: Prothrombin Time (PT), Activated Partial Thromboplastin Time (aPTT), Thromboelastographic (TEG) and Rotational Thermoelectrometry (ROTEM), Blood bank refrigerators and plasma freezers, Cryopreservation of blood components and stem cells, Blood bag separator and apheresis technology.

Transaction Modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *"Biomedical Instrumentation: Technology and Applications" by Omer A. Faruk and Shashank A. Joshi*
- *"Introduction to Biomedical Equipment Technology" by Joseph J. Carr and John M. Brown*
- *"Biomedical Instrumentation and Measurements" by Leslie Cromwell, Fred J. Weibell, and Erich A. Pfeiffer*
- *"Fundamentals of Biomedical Instrumentation" by David Prutchi and Michael Norris*
- *"Principles of Biomedical Instrumentation and Measurement" by Richard Aston*

Course Title: Research Publication Ethics and Intellectual Property Right	L	T	P	Cr.
Course Code: MOA4554	4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learners will be able to:

1. Demonstrate a clear understanding of fundamental ethical principles in research, including honesty, integrity, transparency, and respect for intellectual property.
2. Recognize the role of academic journals in publishing high-quality, ethical research findings and their significance in advancing knowledge in blood-related diseases, transfusion medicine, and hematological diagnostics.
3. Understand the importance of maintaining research integrity in all aspects of research, from data collection and analysis to reporting findings.
4. Learn how to protect research findings, inventions, and discoveries through appropriate intellectual property protection mechanisms (e.g., filing patents, copyright registration) and how to respect the intellectual property of others.
5. Identify and avoid unethical practices such as plagiarism, data fabrication, and falsification.

Course Contents

Unit-I **15 Hours**

Scientific Writing: Structure of a scientific paper (Title, abstract, introduction, methodology, results, discussion, conclusion); Writing a research proposal: Objectives, methodology, expected outcomes, Academic writing style and language (Clarity, conciseness, and logical flow), Citation and referencing: Understanding various citation styles (APA, MLA, Chicago, etc.), Reference management tools.

Unit-II **15 Hours**

Plagiarism: Types, plagiarism detection software, Publication misconduct and Publication Ethics, Plagiarism avoiding techniques, regulation of plagiarism in India; Publication Ethics: Integrity and Ethics, Best Practices, Intellectual Honesty & Research Integrity: Scientific Misconducts & Redundant Publications, Conflict of Interest, Publication Misconduct, Violation of Publication Ethics, Authorship and Contributor ship; Identification of Publication Misconduct: Fabrication, Falsification and Plagiarism (FFP), Predatory Publishers & Journals.

Unit-III **15 Hours**

Open Access Publishing: Concept of OER, Concept of open license, Open access publishing, Open access content management; Database and Research Metrics: Indexing Databases, Citation Databases: Web of Science, Scopus, Google Scholar, Metrics: h-index, g-ind, i10 index, Understanding Citation Metrics for Quality Research: Impact & Visualization Analysis; Peer Review and Journal Selection: Understanding the peer-review process, Types of journals: Open access vs. subscription-based journals, How to select a journal for publication, Writing a cover letter and responding to reviewer comments.

Unit-IV **15 Hours**

Intellectual Property Rights (IPR): Definition and types of intellectual property (IP): Copyright, patents, trademarks, and trade secrets; The importance of IP in research and innovation, Historical development and international IP laws (e.g., the role of WIPO, TRIPS Agreement); Key IP terms: Patentable inventions, originality, novelty, and industrial applicability; Patents: Overview of the patent system: Types of patents, Steps involved in obtaining a patent: Application, examination, and grant, Patentability requirements: Novelty, non-obviousness, and usefulness, Patent infringement and enforcement; Licensing and Commercialization of IP: Types of IP licenses: Exclusive vs. non-exclusive licenses, Licensing agreements and revenue sharing, Commercialization of research findings: Startups, spin-offs, and patent exploitation, Technology transfer offices: Role in university-based IP commercialization; Patent issues in academic research: Balancing public knowledge with commercial interests, Ethical concerns in patenting research outcomes, Impact of IP laws on collaborative research, IP in publicly funded research.

Transaction Modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *"Intellectual Property and Health Technologies: Balancing Innovation and the Public Interest" by Peter Drahos and John Braithwaite*
- *"The Ethics of Scientific Research: A Guidebook for Course Development" by B. H. Dubois*
- *"Research Ethics: A Handbook of Principles, Guidelines, and Procedures" by Barbara S. Smith*
- *"The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams*