



MGM INSTITUTE OF HEALTH SCIENCES

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

Grade 'A' Accredited by NAAC

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CHOICE BASED CREDIT SYSTEM

(CBCS)

(with effect from 2025-26 Batches)

Curriculum for M.Sc. Clinical Embryology

Amended as per AC-53/2026, Dated 21/04/2026

Amended History

1. Approved as per AC-51/2025, [Resolution No. 3.1,(Annexur-3.3)]; [Resolution No.3.5, (Annexur-7)]; Dated 29/04/2025.
2. Amended as per AC-52/2025, [Resolution No. 5.1,(Annexur-17C)]; [Resolution No. 5.8, (Annexur-24C)]; Dated 28/11/ 2025.
3. Amended as per AC-53/2026, [Resolution No. 5.4,(Annexur-44A)]; Dated 21/04/2026.

Resolution No. 3.1 of Academic Council (AC-51/2025): Resolved to approve the CBCS syllabus, including Program Outcomes (POs), Course Outcomes (COs), and PO-CO Mapping for 15 two-year postgraduate programs under MGMSBS for Semesters I and II. These include: M.Sc. Medical Biotechnology, M.Sc. Medical Genetics, **M.Sc. Clinical Embryology**, M.Sc. Clinical Nutrition, M.Sc. Medical Dialysis Technology, M.Sc. Molecular Biology, M.Sc. Medical Radiology & Imaging Technology, M.Sc. Cardiac Care Technology, M.Sc. Operation Theatre and Anaesthesia Technology, M.Sc. Emergency and Trauma Care, M. Optometry, Master in Hospital Administration, Master of Public Health, M.Sc. Health Informatics & M.Sc. Clinical Research to be effective from batch admitted in Academic Year 2025-26 onwards [ANNEXURE-3.1 to 3.30].

Annexure-3.3 of AC-51/2025



MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI **(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**

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Grade “A⁺⁺” Accredited by NAAC

Sector 1, Kamothe Navi Mumbai-410209, Tel.No.022-27437631, 27437632

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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M. Sc. Clinical Embryology

Semester I & II

DIRECTOR'S MESSAGE

Welcome Message from the Director

Dear Postgraduate Students,

Welcome to **MGM School of Biomedical Sciences (MGMSBS)**, **MGMIHS**, a premier institution dedicated to advancing allied and health sciences education. As you embark on this transformative academic journey, you are joining a community that fosters excellence in research, clinical expertise, and innovation.

MGMIHS, accredited with NAAC '**A++**' **Grade (CGPA 3.55, 2022)** and recognized as a **Category I Institution by UGC**, offers an ecosystem that nurtures both academic and professional growth. With **NIRF (151-200 rank band) recognition**, **NABH-accredited hospitals**, **NABL-accredited diagnostic labs**, and **JCI accreditation for MGM New Bombay Hospital**, we uphold global benchmarks in education and healthcare.

At MGMSBS, our **15 postgraduate programs** are meticulously designed to align with the National Commission for Allied and Healthcare Professionals (NCAHP) standards, National Education Policy (NEP) 2020, and the National Credit Framework (NCrF). We have implemented the **Choice-Based Credit System (CBCS)** to provide academic flexibility while ensuring rigorous training in clinical and technical skills. **Our** state-of-the-art research laboratories, digital classrooms, and the Central Research Laboratory (CRL) foster an environment that encourages innovation and evidence-based learning.

Postgraduate education at MGMSBS goes beyond theoretical learning—our curriculum integrates **hands-on clinical training, interdisciplinary collaboration, and exposure to real-world healthcare challenges**. We emphasize **research-driven education**, encouraging students to actively participate in **scientific discoveries, publications, and international collaborations**.

Beyond academics, we believe in **holistic development**, with initiatives such as the **AARAMBH Science and Wellness Club**, which promotes **mental well-being, leadership, and professional networking**.

As you step into this **next phase of academic and professional growth**, we encourage you to explore new ideas, engage in impactful research, and contribute meaningfully to the **healthcare ecosystem**. We are confident that your journey at MGMSBS will shape you into **skilled, compassionate, and visionary professionals**, ready to lead in the ever-evolving healthcare landscape.

We look forward to witnessing your achievements and contributions!

Dr. Mansee Thakur

Director, MGM School of Biomedical Sciences
MGM Institute of Health Sciences, Navi Mumbai

ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES

Mission

To improve the quality of life, both at individual and community levels by imparting quality medical education to tomorrow's doctors and medical scientists and by advancing knowledge in all fields of health sciences through meaningful and ethical research.

Vision

By the year 2020, MGM Institute of Health Sciences aims to be top-ranking Centre of Excellence in Medical Education and Research. Students graduating from the Institute will have the required skills to deliver quality health care to all sections of the society with compassion and benevolence, without prejudice or discrimination, at an affordable cost. As a research Centre, it shall focus on finding better, safer and affordable ways of diagnosing, treating and preventing diseases. In doing so, it will maintain the highest ethical standards.

About – School of Biomedical Sciences

MGM School of Biomedical Sciences is formed under the aegis of MGM IHS with the vision of offering basic Allied Science and Medical courses for students who aspire to pursue their career in the Allied Health Sciences, teaching as well as research.

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well-equipped labs. The school encompasses 23 courses each with its own distinct, specialized body of knowledge and skill. This includes 8 UG courses and 15 PG courses. The college at its growing years started with mere 100 students has recorded exponential growth and is now a full-fledged educational and research institution with the student strength reaching approximately **800** at present.

Our consistent theme throughout is to encourage students to become engaged, be active learners and to promote medical research so that ultimately they acquire knowledge, skills, and understanding so as to provide well qualified and trained professionals in Allied Health Sciences to improve the quality of life.

As there is increased need to deliver high quality, timely and easily accessible patient care system the collaborative efforts among physicians, nurses and allied health providers become ever more essential for an effective patient care. Thus the role of allied health professionals in ever-evolving medical system is very important in providing high-quality patient care.

Last but by no means least, School of Biomedical Sciences envisions to continuously grow and reform. Reforms are essential to any growing institution as it fulfills our bold aspirations of providing the best for the students, for us to serve long into the future and to get ourselves updated to changing and evolving trends in the health care systems.

Name of the Degree: M.Sc. Clinical Embryology

Objectives of the program -

1. To acquire and comprehend foundational and advanced scientific and clinical concepts in embryology to support industrial applications, healthcare practices, and entrepreneurial ventures.
2. To apply critical thinking skills to analyze and interpret complex problems in reproductive science and implement systematic, evidence-based solutions.
3. To develop decision-making capabilities to assess and manage challenges in clinical and research settings, ensuring precision and ethical integrity.
4. To demonstrate proficiency in planning, designing, executing, and utilizing research methodologies for advancements in reproductive healthcare and community well-being.
5. To cultivate the ability to function effectively as an individual and as part of a multidisciplinary team, ensuring collaborative success in clinical, industrial, and research domains.
6. To Exhibit strong written and oral communication skills to articulate scientific and clinical concepts effectively in healthcare, industry, academia, and research environments.
7. To uphold ethical principles and professional responsibilities in both clinical and research practices, ensuring adherence to regulatory and social frameworks.
8. To foster a continuous learning mindset and adaptability to technological advancements, enhancing professional growth and societal contributions.

Teaching Strategies and Learning Activities:

Different teaching strategies and learning activities practiced in the institute assist the teacher in choosing the appropriate educational method for conveying knowledge and influencing attitudes and behavior.

Duration of Study: The duration of the study for M.Sc. Clinical Embryology will be of four semesters spread over two years.

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

For any query visit the website: www.mgmsbsnm.edu.in



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Annexure-44A of AC-53/2026

CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M. Sc. Clinical Embryology

Semester I & II

Resolution No. 5.4 of Academic Council (AC-53/2026):

Resolved to approve the proposal to conduct separate practical examinations for M.Sc. Clinical Embryology, M.Sc. Medical Biotechnology and M.Sc. Medical Genetics for Semesters I and II by revising the programme index and removing the previously approved combined practical structure. Under the revised structure, separate practical subjects corresponding to their respective theory courses will be introduced, while the already approved theory and practical syllabus will remain unchanged. The revised index also incorporates Programme Outcomes (POs) and Course Outcomes (COs). The revised structure will be implemented from the Academic Year 2026-27 onwards.

[ANNEXURE-44A, 44B & 44C - Syllabus for Semesters I and II].

[ANNEXURE-45A, 45B & 45C - Program Outcomes (POs) and Course Outcomes (COs)]

M.Sc. Clinical Embryology**Program Outcomes (POs)**

Program Code	Program Objective
PO1	Knowledge – Acquire and comprehend foundational and advanced scientific and clinical concepts in embryology to support industrial applications, healthcare practices, and entrepreneurial ventures.
PO2	Comprehension & Application – Apply critical thinking skills to analyze and interpret complex problems in reproductive science and implement systematic, evidence-based solutions.
PO3	Analysis & Evaluation – Develop decision-making capabilities to assess and manage challenges in clinical and research settings, ensuring precision and ethical integrity.
PO4	Research Skills – Demonstrate proficiency in planning, designing, executing, and utilizing research methodologies for advancements in reproductive healthcare and community well-being.
PO5	Collaboration & Leadership – Cultivate the ability to function effectively as an individual and as part of a multidisciplinary team, ensuring collaborative success in clinical, industrial, and research domains.
PO6	Communication Skills – Exhibit strong written and oral communication skills to articulate scientific and clinical concepts effectively in healthcare, industry, academia, and research environments.
PO7	Ethical & Professional Integrity – Uphold ethical principles and professional responsibilities in both clinical and research practices, ensuring adherence to regulatory and social frameworks.
PO8	Lifelong Learning & Adaptability – Foster a continuous learning mindset and adaptability to technological advancements, enhancing professional growth and societal contributions.

Semester I

MCE 101 T	Relevant Gross Anatomy	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	To demonstrate and understand the relevant gross anatomy of male and female reproductive system	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To understand the relevant gross anatomy of urinary bladder	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	To understand the relevant gross anatomy of endocrine system	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 102 T	Histology	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	To describe the histology of male and female reproductive system	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To identify and study the histology of urinary system	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	To understand the histology of endocrine system	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 103 T	Genetics in Assisted Reproduction	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	To have detail knowledge about chromosomes, Molecular Genetics, Developmental genetics, Prenatal diagnosis and genetic counselling,	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To study the importance and basics of Genetics in infertility	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ

CO3	To understand Epigenetis and The Human Genome Project.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 104 T	General & Systemic Embryology	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	To able to understand in detail general embryology as week wise development from 1st week to 4th week and trophoblast development with twinning	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To understand trophoblast development with twinning	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	To able to understand in detail systemic embryology under urinary system, MRS, FRS	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CC 001 T	Research Methodology & Biostatistics (Core Course)	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis interpretation & reporting of Results and use of statistical software.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Group Discussion, Workshops	Theory Exam, Practical Exam, Viva-voce, Internal assessment, University exam, Station exercise, seminar presentation, MCQ

Semester I

MCE 105 (A) P	Relevant Gross Anatomy	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Identify and analyze the gross anatomical features of the male reproductive system, including the testis, epididymis, spermatic cord, vas deferens, seminal vesicle, and prostate.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Illustrate and evaluate the anatomical organization of the female reproductive system, including the mammary gland, ovary, fallopian tube, uterus, and vagina.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO3	Examine and interpret the structural and functional characteristics of the urinary system, particularly the urinary bladder.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO4	Analyze and integrate the anatomical aspects of the endocrine glands (pituitary, thyroid, suprarenal) with their hormonal functions, emphasizing their clinical significance in reproductive and metabolic health.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
MCE 105 (B) P	Histology	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Recall and describe the structural organization of general tissues (epithelial, connective, muscle, and nervous) and their functional significance in human anatomy	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Identify and analyze the histological features of the male reproductive system, including the testis, epididymis, spermatic cord, vas deferens, seminal vesicle, and prostate, correlating their functions with reproductive physiology.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO3	Illustrate and evaluate the histological organization of the female reproductive system, including the mammary gland, ovary, fallopian tube, uterus, and vagina, and relate them to menstrual and reproductive physiology.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO4	Examine and interpret the structural and functional characteristics of the urinary system, particularly the urinary bladder, to understand its role in excretion and homeostasis.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book

CO5	Analyze and integrate the histological aspects of the endocrine glands (pituitary, thyroid, suprarenal) with their hormonal functions, emphasizing their clinical significance in reproductive and metabolic health.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
MCE 106 (A) P	Genetics in Assisted Reproduction	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Perform and interpret genetic analysis techniques such as karyotyping, PCR, and FISH to detect chromosomal abnormalities and assess their relevance in assisted reproduction	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Evaluate and integrate embryology and genetics in clinical applications by analyzing ART procedures, embryo biopsy techniques, and preimplantation genetic diagnosis (PGD) for reproductive medicine.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO3	Correlate developmental processes with clinical implications by identifying congenital anomalies, genetic disorders, and their inheritance patterns, justifying their impact on reproductive health.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
MCE 106 (B) P	General & Systemic Embryology	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate foundational knowledge of embryonic development by recalling key stages such as gametogenesis, fertilization, implantation, neural tube formation, and placental development using models and charts.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Apply systemic embryology concepts by illustrating the development of the urinary and reproductive systems, including nephron formation, gonadal differentiation, and testicular descent, while analyzing congenital anomalies.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book

MCE 107 CP	MCE Directed Clinical Education- I	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation
CO2	Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation
CO3	Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation

Semester II				
MCE 108 T	Reproductive Hormones & Infertility	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Students should be able to understand hormonal regulation of reproduction	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To explain infertility types and causes, interpret diagnostic tests for infertility.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Students should recognize appropriate management strategies for infertility.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 109 T	Ovulation Induction Methods	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Students should be able to understand patient selection and hormone use in ART.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To explain ovulation induction, stimulation protocols, and monitoring, identify complications of ovarian stimulation.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	To describe ovum pick-up, equipment, and quality control in ART.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 110 T	Quality Assessment, Quality Control & Handling Data in ART	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Understand QA & QC in ART labs.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Explain lab practices, equipment maintenance, and safety.	PO1, PO2, PO3, PO4, PO5, PO6, PO7,	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz,	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ

		PO8	case study, Flip classroom	
CO3	Identify quality control measures and regulatory standards.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Apply risk management strategies in ART procedures.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 111 T	IVF Procedures	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Students should be able to understand IVF, in-vitro maturation, and related ART procedures,	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	To explain sperm and embryo preparation, grading, and selection methods, describe embryo transfer techniques, patient preparation, and post-transfer care	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom, posters/ videos	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	To identify IVF complications and the role of patient counseling.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ

Semester II

MCE 112 (A) P	Reproductive Hormones & Infertility	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the role of reproductive hormones , including testicular, ovarian, and placental hormones, in regulating fertility and reproductive physiology.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Identify and analyze the causes, investigations, and management of male and female infertility , incorporating techniques such as semen analysis, sperm function tests, tubal patency tests, and ovulation assessment methods.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
MCE 112 (B) P	Ovulation Induction Methods	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate knowledge of ovulation induction methods , including the pharmacological basis, stimulation protocols, ovulation triggers, and patient monitoring techniques.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Evaluate the risks and complications of ovarian stimulation , including ovarian hyperstimulation syndrome (OHSS), and formulate strategies for its prevention and management.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO3	Integrate ovum retrieval techniques with clinical protocols, assessing their role in assisted reproductive technologies (ART) and optimizing patient outcomes.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
MCE 113 (A) P	Quality Assessment, Quality Control & Handling Data in ART	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain and apply quality assurance protocols in the IVF laboratory, including good lab practices, biomedical waste management, and risk assessment to ensure compliance with safety and ethical guidelines.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Analyze the legal and ethical aspects of ART, including PC-PNDT Act, MTP Act, and surrogacy-related cases, ensuring adherence to national and international reproductive regulations.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book

MCE 113 (B) P	IVF Procedure	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate proficiency in advanced ART techniques , including in-vitro maturation, pre-implantation genetic screening (PGS), assisted hatching, and embryo reduction, for optimizing clinical outcomes.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO2	Evaluate sperm preparation, gamete grading, and embryo selection techniques , assessing their impact on embryo development, metabolism, and implantation success.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO3	Integrate and apply embryo culture and transfer techniques , including ZIFT, GIFT, and embryo transfer methodologies, while identifying and managing potential complications in ART procedures.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book
CO4	Develop patient-centered counseling strategies , addressing potential IVF complications and psychological aspects to enhance patient care in assisted reproduction.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos,	Internal Assessment, University exam, Practical Exam, Station Exercise, Viva-voce, Log book

MCE 114 CP	MCE Directed Clinical Education- II	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation
CO2	Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation
CO3	Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case-Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case- study presentation
SEC 001 T	Nutrition and Reproductive Health	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Understand the relationship between nutrition and reproductive health.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Viva-voce, University exam, MCQ
CO2	Analyze the role of macro- and micronutrients in fertility and pregnancy also assess the impact of dietary patterns on reproductive disorders.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Viva-voce, University exam, MCQ
CO3	Evaluate the influence of nutrition on Assisted Reproductive Outcomes (ART) outcomes.	PO1, PO2,PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Viva-voce, University exam, MCQ

OUTLINE OF COURSE CURRICULUM
M.Sc. CLINICAL EMBRYOLOGY

Semester I

Semester I														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCE 101 T	Relevant Gross Anatomy	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 102 T	Histology	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 103 T	Genetics in Assisted Reproduction	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 104 T	General & Systemic Embryology	3	-	-	-	3	45	-	-	-	45	20	80	100
CC 001 T	Research Methodology & Biostatistics (Core Course)	3	-	-	-	3	45	-	-	-	45	-	50	50
Discipline Specific Core Practical														
MCE 105 (A) P	Relevant Gross Anatomy	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 105 (B) P	Histology	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 106 (A) P	Genetics in Assisted Reproduction	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 106 (B) P	General & Systemic Embryology	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 107 CP	MCE Directed Clinical Education-I	-	-	-	9	3	-	-	-	135	135	-	50	50
CC 001 P	Research Methodology & Biostatistics (Core Course)	-	-	4	-	2	-	-	60	-	60	-	50	50
Total		15	0	12	9	24	225	0	180	135	540	120	630	750

OUTLINE OF COURSE CURRICULUM
M.Sc. CLINICAL EMBRYOLOGY

Semester II

Semester II														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCE 108 T	Reproductive Hormones & Infertility	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 109 T	Ovulation Induction Methods	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 110 T	Quality Assessment, Quality Control & Handing data in ART	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 111 T	IVF Procedures	3	-	-	-	3	45	-	-	-	45	20	80	100
Discipline Specific Core Practical														
MCE 112 (A) P	Reproductive Hormones & Infertility	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 112 (B) P	Ovulation Induction Methods	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 113 (A) P	Quality Assessment, Quality Control & Handing data in ART	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 113 (B) P	IVF Procedures	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 114 CP	MCE Directed Clinical Education-II	-	-	-	12	4	-	-	-	180	180	-	50	50
Skill Enhancement Course														
SEC 001 T	Nutrition and Reproductive Health	2	-	-	-	2	30	-	-	-	30	-	100	100
SEC 002 T	NPTEL / SWAYAM (Name of the Course Chosen by the Student)													
Total		14	0	8	12	22	210	0	120	180	510	120	630	750

Resolution No. 5.8 of Academic Council (AC-52/2025):

The Academic Council resolved to approve the continuation of SWAYAM/NPTEL elective courses for postgraduate students, wherever applicable to their respective programmes. Accordingly, students admitted from the Academic Year 2025-26 onwards shall be permitted to choose any one approved elective course. The Council further approved the inclusion of 2 and 3 credit courses in the index. This approach is in alignment with the current NCAHP curriculum guidelines, which recommend flexibility for open electives through recognized national platforms.

Accordingly, the names of individual elective courses shall be removed from the existing syllabi. The links of SWAYAM/NPTEL courses (https://swayam.gov.in/nc_details/NPTEL) shall be incorporated in the syllabus index under the existing course code SEC-002 T, titled: "NPTEL/SWAYAM (Name of the Course Chosen by the Student)"

In alignment with Resolution No. 3.1 of the Academic Council (AC-51/2025), the detailed syllabi of individual courses shall be removed and replaced with the approved links of SWAYAM/NPTEL or common reference pool courses. The complete course content shall remain accessible on the official SWAYAM/NPTEL portals. Students may select any one course from the provided links, in alignment with the credit requirements mentioned in their respective syllabi, as per Annexures 24A, 24B, 24C, 24D, 24E, 24F, 24G, 24H, 24I, 24J, 24K, 24L, 24M, 24N, and 24O.

FIRST YEAR**M.Sc. Clinical Embryology****SEMESTER-I**

CODE NO	CORE SUBJECT
Discipline Specific Core Theory	
MCE 101 T	Relevant Gross Anatomy
MCE 102 T	Histology
MCE 103 T	Genetics in Assisted Reproduction
MCE 104 T	General & Systemic Embryology
CC 001 T	Research Methodology & Biostatistics (Core Course)
Discipline Specific Core Practical	
MCE 105 (A) P	Relevant Gross Anatomy
MCE 105 (B) P	Histology
MCE 106 (A) P	Genetics in Assisted Reproduction
MCE 106 (B) P	General & Systemic Embryology
MCE 107 CP	MCE Directed Clinical Education-I
CC 001 P	Research Methodology & Biostatistics (Core Course)

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester I
Name of the Course	Relevant Gross Anatomy
Subject Code	MCE 101 T

Teaching Objectives	• To understand the anatomy, blood supply, nerve supply, lymphatic drainage, and clinical relevance
Course Outcomes	• To demonstrate and understand the relevant gross anatomy of male and female reproductive system • To understand the relevant gross anatomy of urinary bladder • To understand the relevant gross anatomy of endocrine system

Sr. No.	Topic		No. of Hrs.
1	Introduction	Introduction to anatomy and terminology Introduction to reproductive system	3
2	Male reproductive system -	Testis – structure, coverings, blood supply, nerve supply, lymphatic drainage, applied anatomy Epididymis - structure, blood supply, applied anatomy Spermatic cord – coverings, contents, applied anatomy Vas deferens - structure, course & relations, blood supply, nerve supply, applied anatomy Seminal vesicle - structure, blood supply, applied anatomy Prostate - structure, capsule, blood supply, nerve supply, lymphatic drainage, applied anatomy Penis- structure, coverings, blood supply, nerve supply, lymphatic drainage, applied anatomy Scrotum- structure, coverings, blood supply, nerve supply, lymphatic drainage, applied anatomy	15
3	Female reproductive system -	Ovary - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy Fallopian tube - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy Uterus - structure, supports, blood supply, nerve supply, lymphatic drainage, applied anatomy Vagina - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy External genitalia (Vulva)- structure, applied anatomy Mammary gland - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy	15

4	Urinary system -	Urinary bladder - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy	3
5	Endocrine system -	Hypothalamus - structure, nuclei, blood supply, applied anatomy	9
		Pituitary - structure, relations, blood supply, nerve supply, applied anatomy	
		Thyroid - structure, capsule, relations, blood supply, nerve supply, lymphatic drainage, applied anatomy	
		Suprarenal - structure, relations, blood supply, nerve supply, lymphatic drainage, applied anatomy	
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester I
Name of the Course	Histology
Course Code	MCE 102 T

Teaching Objectives	To understand the microscopic structure and cellular composition, including their functional significance.
Course Outcomes	- To describe the histology of male and female reproductive system - To identify and study the histology of urinary system - To understand the histology of endocrine system

Sr. No.	Topic		No. of Hrs.
1	General	Introduction to histology	7
		Cell - basic unit of life: Prokaryotic & Eukaryotic cell Structure of Eukaryotic cell, cell organelles	
		Epithelial tissue – introduction, classification, details of each type	
		Connective tissue - introduction, classification, details of each type, Connective tissue cells and extracellular matrix	
		Muscle histology - introduction, classification, details of each type, structure of sarcomere, myofibrils	
		Nervous tissue – introduction, structure and classification of neurons, introduction, structure and classification of neuroglia	
2	Male reproductive system	Histology of Testes + anatomy of sperm	15
		Histology of Epidydimis	
		Histology of Vas deferens, seminal vesicle	
		Histology of Prostate	
		Histology of Scrotum	
3	Female reproductive system	Histology of ovary	15
		Histology of Fallopian tube	
		Histology of uterus	
		Histology of mammary gland	
		Histology of placenta, Umbilical Cord	
4	Urinary system	Histology of urinary bladder	2
5	Endocrines	Histology of pituitary	6
		Histology of thyroid	
		Histology of suprarenal	
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester I
Name of the Course	Genetics in Assisted Reproduction
Course Code	MCE 103 T

Teaching Objectives	To understand the advance trauma and critical care.
Course Outcomes	- To have detail knowledge about chromosomes, Molecular Genetics, Developmental genetics, Prenatal diagnosis and genetic counselling, - To study the importance and basics of Genetics in infertility - To understand Epigenetis and The Human Genome Project.

Sr. No.	Topic		No. of Hrs.
1.	Introduction and Chromosomes	Introduction and branches of genetics	6
		Mendel's law of inheritance	
		Chromosomes	
		Chromosomal disorders	
2.	Molecular genetics	Molecular genetics	3
		Modes of inheritance and gene disorders	
3.	Developmental Genetics	Developmental Genetics	3
4.	Preimplantation genetic diagnosis and prenatal diagnosis	Preimplantation genetic diagnosis	6
		Preimplantation genetic testing (PGT)- PGT-A, PGT-M, PGT-SR	
		Prenatal diagnosis and treatment of genetic disease	
5.	Genetic counseling	Genetic counseling	2
6.	Genetic techniques	Recombinant DNA Technology	7
		PCR, qPCR, RT PCR	
		FISH	
		NGS	
		Karyotyping	
		CGH	
7.	Genetics in infertility	Role of genetics in infertility	6
		Genes and recurrent pregnancy losses	
		Chromosomal and genetic analysis in IVF	
		Embryo biopsies	
8.	Innovative techniques in gamete & embryo viability assessment	Transcriptomics, Proteomics, Metabolomics	6
9.	Epigenetics	Epigenetics	4
10.	The Human genome project	The Human genome project.	2
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester I
Name of the Course	General & Systemic Embryology
Course Code	MCE 104 T

Teaching Objectives	- To provide an understanding of embryological development, including cell division, fertilization, and organ formation. - To explain the development of the urinary and reproductive systems, including male and female differentiation. - To introduce assisted reproductive technologies (ART) and discuss clinical implications of embryology.
Course Outcomes	- To able to understand in detail general embryology as week wise development from 1st week to 4th week and trophoblast development with twinning - To understand trophoblast development with twinning - To able to understand in detail systemic embryology under urinary system, MRS, FRS

Sr. No.	Topic		No. of Hrs.
1	Introduction	Introduction to embryology	5
		Cell division – cell cycle, mitosis, meiosis, apoptosis	
		Gametogenesis – spermatogenesis, oogenesis	
		Menstrual cycle, Ovarian cycle	
2	1 st week	Fertilization	5
		1 st week of development with implantation	
		Introduction to Assisted reproduction technology	
3	2 nd week	2 nd week of development – amniotic cavity, yolk sac, bilaminar germ disc	5
4	3 rd week	Gastrulation , Primitive streak and three germ layers	5
		Notochord	
		Neural tube development	
5	4 th week	Fate of germ layers and derivatives of germ layers	6
		Folding of embryo	
6	Trophoblast and twinning	Development of trophoblast and its derivatives	5
		Development of placenta	
		Twinning	
8	Urinary system	Development of Urinary system	4
9	MRS	Development of Male reproductive system	5
10	FRS	Development of Female reproductive system	5
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester I
Name of the Subject	Research Methodology & Biostatistics (Core Course)
Subject Code	CC 001 T

Teaching Objective	The course is intended to give an overview of research and statistical models commonly used in medical and bio-medical sciences. The goal is to impart an intuitive, understanding and working knowledge of research designs and statistical analysis. The strategy would be to simplify, analyze the treatment of statistical inference and to focus primarily on how to specify and interpret the outcome of research.
Learning Outcomes	Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis, interpretation & reporting of results and use of statistical software.

Sr. No	Topic	No. of Hrs.
A	Research Methodology:	23
1	Scientific Methods of Research: Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology	4
2	Research Designs: Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case – Control Studies, Cross-sectional studies, Intervention studies.	5
3	Sampling Designs: Census and Sample Survey, Need and importance for Sampling, Implications of a Sample Design, Different Types of Sample Designs (Probability sampling and non-probability sampling), Systematic sampling, Stratified sampling, Cluster sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	5
4	Measurement in research: Measurement Scales, Sources of Error in Measurement,	3
5	Methods of Data Collection: Types of data, Collection of Primary Data, Observation Method, Interview Method	4
6	Research Ethics and plagiarism	2
B	Biostatistics	22
7	Data Presentation: Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, scatter plots, line graphs	3
8	Measures of Central Tendency and Dispersion: Mean, Median, Mode, Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits).	3
9	Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, power of test, Normal distribution, Parametric Tests including Z-test, t-test, and ANOVA	4

10	Chi-square Test: Chi-square as a Non-parametric Test, Applications.	2
11	Measures of Relationship: Correlation and Simple Regression Analysis	3
12	Non-parametric test: Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test, Kruskal Walli's test, Friedman's test, and Spearman Rank correlation test.	3
13	Vital Health Statistics: rate, crude rate, age specific rate, Measurement of fertility, Rate, Measures of mortality.	4
Total		45 hrs

CC 001 P–Research Methodology & Biostatistics

Sr. No.	Topics	No. of Hrs.
A	Research Methodology	
1	Research Article Presentation (Seminar)	5
B	Biostatistics	
2	Data Presentation	4
3	Measures of Central Tendency and Dispersion	6
4	Testing of Hypotheses	16
5	Chi-square Test	4
6	Measures of Relationship	6
7	Analysis of Variance	5
8	Non parametric or Distribution-free Tests	8
9	Computer Application Using Statistical Software including SPSS	6
Total		60 hrs

Reference Books:

1. Daniel WW. Biostatistics: A foundation for analysis in the health sciences. 10th ed. Wiley; 2013.
2. Gupta SC, Kapoor VK. Fundamentals of mathematical statistics. Sultan Chand & Sons; 2020 Sep.
3. Kothari CR, Garg G. Research methodology: Methods and techniques. 2019.
4. Mahajan BK. Methods in biostatistics for medical students and research workers. 7th ed. Jaypee Brothers Medical Publishers; 2010.
5. Murthy MN. Sampling theory and methods. Statistical Publishing Society; 1967.
6. Singh YK. Fundamental of research methodology and statistics. New Age International; 2006.

Resolution No. 3.5 of Academic Council (AC-51/2025):

Resolved to approve the submitted list of recommended books for M.Sc. Clinical Nutrition and the course on **Biostatistics and Research Methodology** [ANNEXURE-7].

Annexure-7 of AC-51/2025

Biostatistics & Research Methodology Books List

Subject	Book Name	Author
Biostatistics & Research Methodology	Biostatistics: A Foundation for Analysis in the Health Sciences (10th ed.)	Daniel WW.
	Biostatistical Analysis (5th ed.)	Zar JH.
	Research Methodology: Methods and Techniques	Kothari CR, Garg G.
	Methods in Biostatistics for Medical Students and Research Workers (7th ed.)	Mahajan BK.
	Sampling Theory and Methods	Murthy MN.
	Fundamentals of Research Methodology and Statistics	Singh YK.
	Fundamentals of Biostatistics (8th ed.)	Rosner B.
	An Introduction to Medical Statistics (4th ed.)	Bland M.

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester I
Name of the Subject	Relevant Gross Anatomy
Subject Code	MCE 105 (A) P

Teaching Objectives	• To understand the anatomy, blood supply, nerve supply, lymphatic drainage, and clinical relevance
Course Outcomes	• Identify and analyze the gross anatomical features of the male reproductive system, including the testis, epididymis, spermatic cord, vas deferens, seminal vesicle, and prostate. • Illustrate and evaluate the anatomical organization of the female reproductive system, including the mammary gland, ovary, fallopian tube, uterus, and vagina. • Examine and interpret the structural and functional characteristics of the urinary system, particularly the urinary bladder. • Analyze and integrate the anatomical aspects of the endocrine glands (pituitary, thyroid, suprarenal) with their hormonal functions, emphasizing their clinical significance in reproductive and metabolic health.

Sr. No.	Topic		No. of Hrs.
1	Gross Anatomy of Male reproductive system	Testis, Epididymis, Spermatic cord, Vas deferens, Seminal vesicle, Prostate	30
2	Gross Anatomy of Female reproductive system	Mammary gland, Ovary, Fallopian tube, Uterus, Vagina	
3	Gross Anatomy of Urinary system	Urinary bladder	
4	Gross Anatomy of Endocrine system	Pituitary, Thyroid, Suprarenal	
Total			30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester I
Name of the Subject	Histology
Subject Code	MCE 105 (B) P

Teaching Objectives	• To understand the microscopic structure and cellular composition, including their functional significance.
Course Outcomes	• Recall and describe the structural organization of general tissues (epithelial, connective, muscle, and nervous) and their functional significance in human anatomy • Identify and analyze the histological and gross anatomical features of the male reproductive system, including the testis, epididymis, spermatic cord, vas deferens, seminal vesicle, and prostate, correlating their functions with reproductive physiology. • Illustrate and evaluate the histological and anatomical organization of the female reproductive system, including the mammary gland, ovary, fallopian tube, uterus, and vagina, and relate them to menstrual and reproductive physiology. • Examine and interpret the structural and functional characteristics of the urinary system, particularly the urinary bladder, to understand its role in excretion and homeostasis. • Analyze and integrate the histological and anatomical aspects of the endocrine glands (pituitary, thyroid, suprarenal) with their hormonal functions, emphasizing their clinical significance in reproductive and metabolic health.

Sr. No.	Topic		No. of Hrs.
1	General histology	Cell, Epithelial tissue, Connective tissue, Muscle, Nervous tissue	30
2	Histology of Male reproductive system	Testis, Epididymis, Spermatic cord, Vas deferens, Seminal vesicle, Prostate	
3	Histology of Female reproductive system	Mammary gland, Ovary, Fallopian tube, Uterus	
4	Histology of Urinary system	Urinary bladder	
5	Histology of Endocrine system	Pituitary, Thyroid, Suprarenal	
Total			30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester I
Name of the Subject	Genetics in Assisted Reproduction
Subject Code	MCE 106 (A) P

Teaching Objectives	• To understand the advance trauma and critical care.
Course Outcomes	• Perform and interpret genetic analysis techniques such as karyotyping, PCR, and FISH to detect chromosomal abnormalities and assess their relevance in assisted reproduction • Evaluate and integrate embryology and genetics in clinical applications by analyzing ART procedures, embryo biopsy techniques, and preimplantation genetic diagnosis (PGD) for reproductive medicine. • Correlate developmental processes with clinical implications by identifying congenital anomalies, genetic disorders, and their inheritance patterns, justifying their impact on reproductive health.

Sr. No.	Topic		No. of Hrs.
1	Disorders	Chromosomal disorders	
		Modes of inheritance and gene disorders	
2	Techniques	Karyotyping with reference to chromosome 21	
		Karyotyping with reference to chromosome 13	
		Karyotyping with reference to chromosome 18	
		Recombinant DNA Technology	
		PCR with relation to Genetic Diseases	
		FISH	
		Preimplantation genetic diagnosis	
		Embryo biopsy	
Total			30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester I
Name of the Subject	General & Systemic Embryology
Subject Code	MCE 106 (B) P

Teaching Objectives	- To provide an understanding of embryological development, including cell division, fertilization, and organ formation. - To explain the development of the urinary and reproductive systems, including male and female differentiation. - To introduce assisted reproductive technologies (ART) and discuss clinical implications of embryology.
Course Outcomes	Demonstrate foundational knowledge of embryonic development by recalling key stages such as gametogenesis, fertilization, implantation, neural tube formation, and placental development using models and charts. Apply systemic embryology concepts by illustrating the development of the urinary and reproductive systems, including nephron formation, gonadal differentiation, and testicular descent, while analyzing congenital anomalies.

Sr. No.	Topic		No. of Hrs.
General embryology (models and charts)			30
1	Introduction	Cell division, Gametogenesis, ovarian cycle, Sperm, ovum, Menstrual cycle	
2	1 st week	Fertilization, implantation, Assisted reproduction technology	
3	2 nd week	amniotic cavity, yolk sac, Bilaminar germ disc	
4	3 rd week	Primitive streak and three germ layers, Notochord, Neural tube	
5	4 th week	Folding of embryo	
6	Trophoblast and twinning	Placenta, Twinning	
Systemic embryology (models and charts)			
7	Urinary system	Metanephricblastema, ureteric bud, ascent of kidneys	
8	MRS	Gonad, mesonephric duct, descent of testis	
9	FRS	Gonad, paramesonephric duct, descent of ovary	
Total			30 hrs

Course code- MCE 107 CP: MCE Directed Clinical Education – I

Course Outcomes	• Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology. • Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols. • Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.
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This module introduces students to key embryology laboratory techniques within clinical or research settings. It covers assisted reproductive technologies (ART), laboratory workflows, quality control, ethics, and patient-centered practices, bridging theoretical knowledge with clinical application. **(Total - 135 hrs.)**

FIRST YEAR

M.Sc. CLINICAL EMBRYOLOGY

SEMESTER-II

Code No.	Core Subjects
Discipline Specific Core Theory	
MCE 108 T	Reproductive Hormones & Infertility
MCE 109 T	Ovulation Induction Methods
MCE 110 T	Quality Assessment, Quality Control & Handling Data in ART
MCE 111 T	IVF Procedures
Discipline Specific Core Practical	
MCE 112 (A) P	Reproductive Hormones & Infertility
MCE 112 (B) P	Ovulation Induction Methods
MCE 113 (A) P	Quality Assessment, Quality Control & Handling Data in ART
MCE 113 (B) P	IVF Procedures
MCE 114 CP	MCE Directed Clinical Education-II
Skill Enhancement Course	
SEC 001 T	Nutrition and Reproductive Health
SEC 002 T	NPTEL Swayam

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester II
Name of the Course	Reproductive Hormones & Infertility
Course Code	MCE 108 T

Teaching Objectives	- To understand the causes, diagnosis, and management of infertility. - To explain normal reproductive physiology and the role of key hormones. - To outline the investigations for male and female infertility. - To discuss treatment options, including medical, surgical, and ART.
Course Outcome	- Students should be able to understand hormonal regulation of reproduction - To explain infertility types and causes, interpret diagnostic tests for infertility. - Students should recognize appropriate management strategies for infertility.

Sr. No.	Topic		No. of Hrs.
1	Infertility	Introduction, physiological infertility, unexplained infertility, criteria for investigation	4
		Normal follicular genesis, ovulation, menstrual cycle, spermatogenesis	
2	Physiology of reproductive hormones	Pituitary hormones- FSH, LH, Prolactin, Oxytocin	11
		Thyroid hormones	
		Testicular hormones	
		Ovarian hormones with placental hormone	
		Immunophysiology	
3	Male infertility	Causes	15
		Investigations – - History - Semen analysis (WHO criteria)- effective sperm count, Sperm morphology assessment by Strict (Kruger) criteria, sperm vitality, fructose test, Semen biochemistry - Endocrine evaluation - USG- Scrotal (Testicular Volume), transrectal- TRUS(prostate), Transabdominal (CBAVD) - Sperm function assessment- Sperm mucus test, Acrosome reaction, sperm penetration and survival test - Advanced sperm testing- Antisperm antibody test, Sperm DNA damage, Microfluidics, Testicular biopsy, Chromosomal study, Immunological and FISH level studies - General Examination- Scrotal & abdomen examination	
		Management – Medical, Surgical and ART	

4	Female infertility	Causes	15
		Investigations – i. History ii. General examination- Tubal patency; Study normalcy of ovulation (basal body temperature, cytology, USG, Fern test, Spinn Barkeit test, endometrial biopsy, hormonal study)	
		Management – medical, surgical, ART	
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester II
Name of the Course	Ovulation Induction Methods
Course Code	MCE 109 T

Teaching Objectives	- To explain patient selection, hormonal regulation, and drug use in ART. - To discuss ovarian stimulation, ovulation triggers, and patient monitoring. - To highlight complications, ovum pick-up procedures, and quality assurance in ART.
Course Outcome	- Students should be able to understand patient selection and hormone use in ART. - To explain ovulation induction, stimulation protocols, and monitoring, identify complications of ovarian stimulation. - To describe ovum pick-up, equipment, and quality control in ART.

Sr. No.	Topic		No. of Hrs.
1.	Introduction	Selection of patient	3
2.	Drugs of infertility	Hormones	10
		Ovulation induction drugs	
		Drugs acting on uterus	
		Drugs during pregnancy	
		Drugs during lactation	
3.	Stimulation protocols	Drugs and method	14
		Natural cycle/ modified natural cycle, minimal stimulation cycle, Conventional IVF cycle	
		Ovarian stimulation protocols	
		Ovulation trigger	
4.	Monitoring	Follicular study, Patient monitoring	4
5.	Complications and OHSS	Diminished ovarian reserve	6
		Hyper stimulation and OHSS (ovarian hyper stimulation syndrome)	
		Complications of stimulation – Miscarriage, Ectopic pregnancy, Multiple gestation, Heterotrophic pregnancy	
6.	Ovum pick up	Equipments & Consumables	8
		Anaesthesia	
		Ovum pick up procedure	
		Quality assurance, Associated pathologies and complications	
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester II
Name of the Course	Quality Assessment, Quality Control & Handling Data in ART
Course Code	MCE 110 T

Teaching Objectives	- To explain QA & QC principles, lab safety, and equipment management in ART labs. - To discuss contamination control, traceability, and regulatory standards. - To highlight risk management and error prevention strategies in ART procedures.
Course Outcome	Students should be able to : - Understand QA & QC in ART labs. - Explain lab practices, equipment maintenance, and safety. - Identify quality control measures and regulatory standards. - Apply risk management strategies in ART procedures.

Sr. No.	Topic		No. of Hrs.
1	Introduction	Introduction to QA, QC in ART labs	4
		Good lab practice in IVF lab	
		Biomedical waste management	
2	Instruments in the IVF Lab	Equipment for andrology, embryology& cryopreservation lab	5
		Equipment logs	
		Maintenance & Calibration of instruments used in ART Lab	
3	Quality Management	Lab maintenance protocol	5
4	Quality Control	Internal & external quality control, Quality standards	15
		Quality indicators (key performance indicators)	
		Contaminations, ART media, Disposables, Embryo culture & Cryopreservation	
		Traceability in ART, Lab witnessing system	
		Useful Routine Quality Control Procedures	
		New technologies in QC	
5	Data Handling	Identity check, Confidentiality, Keeping records	6
6	Risk in the IVF Laboratory	Contaminated samples, Basic Housekeeping Procedures in the IVF Laboratory, Safety and Health in the IVF Lab	3
7	Staff Management	Managing an IVF team, Hygiene, Protective measurements (gloves, masks etc) for staff , Actions upon injury	3
8	Adverse events, back – up strategies	How to avoid, what to do?, E.g. Mix – up of gametes , loss or damages during handling, Transfer of wrong embryos, Breakdown of equipment, back – up strategies	4
Total			45 hrs

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester II
Name of the Course	IVF Procedures
Course Code	MCE 111 T

Teaching Objectives	- To explain the principles and techniques of In-Vitro Fertilization (IVF) and related procedures. - To describe embryo development, metabolism, grading, selection, and transfer techniques. - To discuss sperm preparation methods, including advanced techniques like MACS. - To outline pre-implantation genetic screening, assisted hatching, and embryo reduction. - To highlight complications of IVF and the importance of patient counseling.
Course Outcome	- Students should be able to understand IVF, in-vitro maturation, and related ART procedures, - To explain sperm and embryo preparation, grading, and selection methods, describe embryo transfer techniques, patient preparation, and post-transfer care - To identify IVF complications and the role of patient counseling.

Sr. No.	Topic		No. of Hrs.
1	Introduction to IVF	Introduction to In-vitro fertilization	2
2	Non- routine methods	In-Vitro Maturation, Pre-implantation Genetic Screening, Assisted Hatching, Embryo reduction	4
3	Embryo development and metabolism	Normal and abnormal embryo development	5
		Metabolism of embryo	
4	Sperm preparation techniques	Simple wash, Swim-up method, Density Gradient method	6
		Sperm preparation for HIV- infected samples, Retrograde ejaculation samples, testicular & epididymal spermatozoa	
		Magnetic activating cell sorting (MACS)	
5	Grading of gamete and embryo	Grading of oocyte	14
		Grading of sperm	
		Assessment of fertilization	
		Grading of embryo	
		Selection of embryo	

6	Embryo transfer techniques	ZIFT, GIFT	10
		Embryo transfer Procedure	
		Factors associated with ET, Duration of ET	
		Patient Preparation for Embryo Transfer, Post Embryo transfer related issues	
7	Complications and counselling	Complications of IVF	4
		Patient counseling	
Total			45 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Subject	Reproductive Hormones & Infertility
Subject Code	MCE 112 (A) P

Teaching Objectives	• To understand the causes, diagnosis, and management of infertility. • To explain normal reproductive physiology and the role of key hormones. • To outline the investigations for male and female infertility. • To discuss treatment options, including medical, surgical, and ART.
Course Outcome	• Explain the role of reproductive hormones, including testicular, ovarian, and placental hormones, in regulating fertility and reproductive physiology. • Identify and analyze the causes, investigations, and management of male and female infertility, incorporating techniques such as semen analysis, sperm function tests, tubal patency tests, and ovulation assessment methods.

Sr. No.	Topics		No. of Hrs.
1	Reproductive hormones	Testicular hormones	
		Ovarian hormones with placental hormone	
2	Male infertility	Causes of Male infertility	
		Investigation of Male infertility- Semen analysis, Sperm function test, Semen Biochemistry	
		Management of Male infertility	
3	Female infertility	Causes of Female infertility	
		Investigation of Female infertility- Tubal patency; Study normalcy of ovulation (basal body temperature, cytology, USG, Fern test, Spinn Barkeit test, endometrial biopsy, hormonal study)	
		Management of Female infertility	
Total			30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Subject	Ovulation Induction Methods
Subject Code	MCE 112 (B) P

Teaching Objectives	• To explain patient selection, hormonal regulation, and drug use in ART. • To discuss ovarian stimulation, ovulation triggers, and patient monitoring. • To highlight complications, ovum pick-up procedures, and quality assurance in ART.
Course Outcome	• Demonstrate knowledge of ovulation induction methods, including the pharmacological basis, stimulation protocols, ovulation triggers, and patient monitoring techniques. • Evaluate the risks and complications of ovarian stimulation, including ovarian hyperstimulation syndrome (OHSS), and formulate strategies for its prevention and management. • Integrate ovum retrieval techniques with clinical protocols, assessing their role in assisted reproductive technologies (ART) and optimizing patient outcomes.

Sr. No.	Topics			No. of Hrs.
1	Drugs of infertility	Drugs of infertility	Use of various drugs of infertility	30
2	Stimulation protocol	Monitoring	Various stimulation protocols	
			Ovulation trigger	
			Follicular study	
			Patient monitoring and complications	
			Hyper stimulation and OHSS (ovarian hyper stimulation syndrome)	
			Complications of stimulation	
3	Ovum pick up	Ovum pick up		
Total				30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Subject	Quality Assessment, Quality Control & Handling Data in ART
Subject Code	MCE 113 (A) P

Teaching Objectives	- To explain QA & QC principles, lab safety, and equipment management in ART labs. - To discuss contamination control, traceability, and regulatory standards. - To highlight risk management and error prevention strategies in ART procedures.
Course Outcome	Explain and apply quality assurance protocols in the IVF laboratory, including good lab practices, biomedical waste management, and risk assessment to ensure compliance with safety and ethical guidelines. Analyze the legal and ethical aspects of ART, including PC-PNDT Act, MTP Act, and surrogacy-related cases, ensuring adherence to national and international reproductive regulations.

Sr. No.	Topic	No. of Hrs.
1	Good lab practice in IVF lab	30
2	Biomedical waste management	
3	Risk in the IVF Laboratory	
4	PC PNDT act related rules and cases	
5	MTP Act related rules and cases	
6	Surrogacy related rules and cases	
Total		30 hrs

Name of the Course	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Subject	IVF Procedures
Subject Code	MCE 113 (B) P

Teaching Objectives	- To explain the principles and techniques of In-Vitro Fertilization (IVF) and related procedures. - To describe embryo development, metabolism, grading, selection, and transfer techniques. - To discuss sperm preparation methods, including advanced techniques like MACS. - To outline pre-implantation genetic screening, assisted hatching, and embryo reduction. - To highlight complications of IVF and the importance of patient counseling.
Course Outcome	Demonstrate proficiency in advanced ART techniques, including in-vitro maturation, pre-implantation genetic screening (PGS), assisted hatching, and embryo reduction, for optimizing clinical outcomes. Evaluate sperm preparation, gamete grading, and embryo selection techniques, assessing their impact on embryo development, metabolism, and implantation success. Integrate and apply embryo culture and transfer techniques, including ZIFT, GIFT, and embryo transfer methodologies, while identifying and managing potential complications in ART procedures. Develop patient-centered counseling strategies, addressing potential IVF complications and psychological aspects to enhance patient care in assisted reproduction.

Sr. No.	Topic		No. of Hrs.
1	Non- routine methods	In-Vitro Maturation, Pre-implantation Genetic Screening, Assisted Hatching, Embryo reduction	30
2	Embryo development and metabolism	Normal and abnormal embryo development	
3	Sperm preparation	Various methods	
4	Grading of gamete and embryo	Grading of oocyte, sperm, embryo and selection of embryo	
5	Embryo culture and transfer techniques	Embryo transfer – consumables, loading techniques, embryo transfer techniques	
		ZIFT, GIFT	
		Embryo reduction	
6	Complications and counselling	Complications of IVF	
		Patient counseling	
Total			30 hrs

Course code- MCE 114 CP: MCE Directed Clinical Education – II

Course Outcomes	• Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology. • Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols. • Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.
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This module introduces students to key embryology laboratory techniques within clinical or research settings. It covers assisted reproductive technologies (ART), laboratory workflows, quality control, ethics, and patient-centered practices, bridging theoretical knowledge with clinical application. **(Total - 180 hrs.)**

SKILL ENHANCEMENT COURSES

Name of the Program	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Subject	Nutrition and Reproductive Health
Subject Code	SEC 001 T

Course Outcome	- Understand the relationship between nutrition and reproductive health. - Analyze the role of macro- and micronutrients in fertility and pregnancy also assess the impact of dietary patterns on reproductive disorders. - Evaluate the influence of nutrition on Assisted Reproductive Outcomes (ART) outcomes.
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Sr. No.	Topics		No. of Hrs.
1	Introduction	Basics of nutrition: Macronutrients and micronutrients	30
		Nutritional requirements for reproductive health	
		Impact of malnutrition on fertility (undernutrition and overnutrition)	
		Impact of other lifestyle factors on fertility	
2	Nutrition and Fertility	Dietary factors affecting menstrual cycle and ovulation	
		Role of nutrients and phytochemicals in female infertility	
		Influence of diet on hormone balance and reproductive longevity	
		Nutritional management of PCOS and endometriosis	
3	Nutrition During Pregnancy and Fetal Development	Nutritional requirements during pregnancy	
		Impact of maternal diet on fetal programming and epigenetics	
4	Nutrition needs and factors related to high risk pregnancy	Obesity and pregnancy	
		Pregnancy and weight loss surgery	
		Nutrition in multifetal pregnancy	
		Adolescent Pregnancy: where do we start?	
		Anoxeria nervosa and bulimia nervosa during pregnancy	
		Diabetes and pregnancy	
		Preeclampsia	
5	Nutrition and Assisted Reproductive Technologies	AIDS/HIV in pregnancy	
		Preconception nutrition for IVF success	
		Influence of maternal and paternal nutrition on ART outcomes	
		Nutritional supplementation in ART (e.g., folic acid, vitamin D, CoQ10)	
Total			30 hrs

Name of the Program	M.Sc. Clinical Embryology
Semester	Semester II
Name of the Course	NPTEL Swayam
Course Code	SEC 002 T

Note: The links of SWAYAM/NPTEL courses (https://swayam.gov.in/nc_details/NPTEL)

Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

Question		Marks distribution	Marks allotted per section	Marks
Sec: A	MCQ	10 x 1 M = 10	10	10
Sec: B	SAQ	3/4x 5 M = 15	15	35
Sec: B	LAQ	2/3 x 10 M = 10	20	
Sec: C	SAQ	3/4x 5 M = 15	15	35
Sec: C	LAQ	2/3x 10 M = 10	20	
Total				80 Marks

Marks Scheme for the University Examination (50 Marks)

Final theory marks will be 50 marks University Theory exam pattern Research Methodology & Biostatistics (Core course)

Question	Question No.	Question Type	Marks Distribution	Marks
Sec: A	1.	LAQ (2 out of 3)	2 X 10 Marks = 20	20
Sec: B	2.	SAQ (6 out of 8)	6 X 05 Marks = 30	30
Total				50 Marks

Marks Scheme for the University Examination (100 Marks)

Final theory marks will be 100 marks University Theory exam pattern Elective Course

Question	Question No.	Question Type	Marks Distribution	Marks
Sec: A	1.	LAQ (10 out of 12)	10 X 10 Marks = 100	100
Total				100 Marks

Practical exam pattern: Total 40 marks with following breakup:

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x15=15 M
Q No 2	Station exercise	2x5M=10 M
Q No 3	VIVA	10 M
Q No 4	Journal	5M
Total		40 Marks

**Practical exam pattern Research Methodology & Biostatistics (Core course)
Total 50-mark distribution:**

Exercise	Description	Marks
Q No 1	Practical/Problem-Solving: These questions can assess statistical analysis, research design, hypothesis testing, or interpretation of data etc.	2 × 10 marks each) = 20 marks
Q No 2	Identification of study designs, Critical appraisal of research papers, Application of biostatistical tools, Sampling techniques etc.	(4 × 5 marks each) = 20 marks
Q No 3	Viva Voce (Oral Examination) Assessing conceptual clarity, application of research methodology, and statistical reasoning.	10 marks
Total		50 Marks

Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

Breakup of theory IA calculation for 20 marks

Description	Marks
Internal exam (at department)	15 marks
Seminar	5 marks
Total	20 Marks

Breakup of practical IA calculation:

Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
Total	20 Marks

Note –20 marks to be converted to 10 marks weightage for submission to the university.

Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____ Date: _____

Program: _____

Semester: _____ Name of the Internal faculty/Observer: _____

Name of the External Faculty/Observer: _____

Core Competencies		
	Marks allotted	Marks obtained
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.		
Clinical Teaching		
a. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	50 Marks	

Sign of Internal Examiner: _____

Sign of External Examiner: _____

Resolution No. 5.1 of Academic Council (AC-52/2025):

Resolved to approve the CBCS syllabus, including Program Outcomes (POs) and Course Outcomes (COs), for Postgraduate (PG) 2-year programs under MGMSBS (semester III & IV) for M.Sc. Medical Biotechnology, M.Sc. Medical Genetics, M.Sc. Clinical Embryology, M.Sc. Clinical Nutrition, M.Sc. Medical Dialysis Technology, M.Sc. Molecular Biology, M.Sc. Medical Radiology & Imaging Technology, M.Sc. Cardiac Care Technology, M.Sc. Operation Theatre and Anaesthesia Technology, M.Sc. Emergency and Trauma Care, M. Optometry, Masters in Hospital Administration, Masters of Public Health, M.Sc. Health Informatics, M.Sc. Medical Laboratory Technology, M.Sc. Clinical Research, to be effective from batch admitted in the Academic Year 2025-26 onwards. Guidelines for selected programmes as per National Commission for Allied & Healthcare Professions will be adopted for the given programmes from academic year 2026-27 onwards [ANNEXURE -17A, 17B, 17C, 17D, 17E, 17F, 17G, 17H, 17I, 17J, 17K, 17L, 17M, 17N, 17O & 17P and ANNEXURE-18A, 18B, 18C, 18D, 18E, 18F, 18G, 18H, 18I, 18J, 18K, 18L, 18M, 18N, 18O & 18P].

Annexure-17C of AC-52/2025



MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI
(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

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

Grade "A⁺⁺" Accredited by NAAC

Sector 1, Kamothe, Navi Mumbai-410209, Tel.No.022-27437631, 27437632

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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M. Sc. Clinical Embryology

Semester III & IV

Course Outcome Semester III

MCE 115 T, MCE 121 P	Introduction to IVF Lab	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the design, layout, and setup of IVF, andrology, and cryopreservation labs.	PO1, PO2, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Identify and manage essential laboratory equipment, consumables, and environmental parameters.	PO1, PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Apply maintenance, sterilization, and quality control protocols in ART labs.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Maintain lab records, ensure traceability, and follow regulatory requirements	PO3, PO4, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO5	Evaluate ethical considerations and implement national/international ART guidelines.	PO3, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO6	Participate in lab planning, work rosters, and collaborative problem-solving.	PO5, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 116 T, MCE 122 P	Cryopreservation Techniques in Assisted Reproduction	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the physiological principles, history, and role of cryoprotectants in cryobiology, and compare different types for specific applications.	PO1, PO2, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Apply appropriate techniques for semen, oocyte, embryo, and gonadal tissue cryopreservation, including slow freezing and vitrification, ensuring sample quality and viability.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Maintain and manage cryopreserved sample inventories using best practices, quality control protocols, and regulatory compliance.	PO2, PO5, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Analyze the effects of cryopreservation on embryo survival, implantation, and pregnancy outcomes using evidence-based data.	PO2, PO3, PO8	Lecture, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO5	Evaluate and integrate emerging	PO1, PO2,	Lecture, Practical,	Theory Exam, Internal

	cryopreservation and cryo-storage technologies for clinical and research applications.	PO8	Demonstration, Assignment, Seminar, Group discussion	assessment, University exam, seminar presentation, MCQ
MCE 117 T, MCE 123 P	Culture System in ART	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the historical evolution, types, and components of embryo culture media, and their interactions with gametes and embryos.	PO1, PO2, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Apply optimal handling techniques for culture media, preparation of culture dishes, and use of oils, buffers, and incubators to maintain embryo viability.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Perform and interpret quality control tests for IVF media, troubleshoot culture-related problems, and control key variables affecting embryo development.	PO2, PO3, PO5, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Compare monoculture, sequential culture, blastocyst culture, co-culture, and time-lapse systems for their impact on embryo development and clinical outcomes.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO5	Evaluate advances in culture media and emerging embryo culture technologies for integration into clinical practice.	PO1, PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 118 T, MCE 124 P	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the history, philosophy, indications, contraindications, and underlying principles of ICSI, including micromanipulation physics and workstation setup.	PO1, PO2, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Apply techniques for sperm retrieval (PESA, MESA, TESA, TESE), immobilization, selection, and preparation from ejaculates or testicular biopsies for ICSI.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Operate, calibrate, and maintain micromanipulators, micropipettes, and related ICSI equipment, ensuring precision and troubleshooting technical issues.	PO2, PO3, PO5, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Perform oocyte denuding, ICSI dish preparation, gamete micromanipulation, fertilization assessment (fert check), and handle specialized ICSI media.	PO2, PO3, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO5	Evaluate advanced sperm selection techniques (IMSI, PICSI, Piezo-ICSI, MACS, microfluidics, HBA, Raman spectroscopy, AI-assisted selection) for	PO1, PO2, PO5, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ

	their clinical applicability and outcomes.			
MCE 119	Research Project/ Dissertation	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Identify and define a relevant research problem in reproductive science or related fields, based on current scientific literature.	PO1, PO2	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO2	Design and execute an experimental or analytical study using appropriate methodologies and ethical standards.	PO2, PO3, PO4, PO6, PO7	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO3	Analyze and interpret research data using suitable statistical and analytical tools to derive evidence-based conclusions.	PO2, PO3, PO4	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO4	Present research findings effectively through written dissertation and oral defense, adhering to academic and professional guidelines.	PO5, PO6	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
MCE 120 CP	MCE Directed Clinical Education- III	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO2	Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO3	Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation

SEMESTER IV

MCE 125 T	Bioethics, IPR & Biosafety	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Evaluate ethical concerns in biomedical and biotechnological practices.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Understand different types of IPR and their applications.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Apply various national and international guidelines in biomedical and health research.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Lecture, Practical, Demonstration, Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 126 T	Stem Cell in Human Reproduction	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the fundamental concepts of stem cell biology, including their role in gamete generation, germline stem cell function, and reproductive potential.	PO1, PO2	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO2	Apply molecular biology principles to study gamete development, genetic characteristics, and controlled differentiation from embryonic stem cells to gamete-like cells.	PO1, PO2, PO3	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Evaluate the influence of growth factor signaling in germline specification and maintenance of pluripotency.	PO1, PO2	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO4	Analyze stem cell-based therapeutic approaches for male infertility, including applications of trophoblast, Wharton's jelly, amniotic fluid, and bone marrow stem cells.	PO1, PO2, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO5	Critically appraise recent advances in human embryonic stem cell (hESC) research and their translational potential in reproductive medicine.	PO1, PO2, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 127 T	Quality Control and Audit in ART	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Explain the principles of Quality Management Systems (QMS) in ART, including regulatory requirements, accreditation processes, and the importance of internal and external quality control.	PO1, PO2, PO7	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ

CO2	Apply QC protocols and auditing practices in embryology, andrology, and cryopreservation, including equipment calibration, maintenance, and validation.	PO2, PO3, PO5	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
CO3	Analyze and set Key Performance Indicators (KPIs) for ART laboratories, compare them to benchmark values, and implement corrective actions for quality improvement.	PO2, PO3, PO8	Lecture, Assignment, Seminar, Group discussion, Quiz	Theory Exam, Internal assessment, University exam, seminar presentation, MCQ
MCE 119	Research Project/ Dissertation	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Identify and define a relevant research problem in reproductive science or related fields, based on current scientific literature.	PO1, PO2, PO8	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO2	Design and execute an experimental or analytical study using appropriate methodologies and ethical standards.	PO2, PO3, PO4, PO6, PO7, PO8	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO3	Analyze and interpret research data using suitable statistical and analytical tools to derive evidence-based conclusions.	PO2, PO3, PO4, PO8	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
CO4	Present research findings effectively through written dissertation and oral defense, adhering to academic and professional guidelines.	PO5, PO6, PO8	Assignment, Seminar, Group discussion, Quiz, case study, Flip classroom	Viva-voce, University exam
MCE 128 P	Internship/Training (Clinical/ Industrial)	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Demonstrate in-depth knowledge of assisted reproductive technologies (ART), laboratory workflows, and clinical embryology concepts, including their applications in healthcare, industry, and entrepreneurial ventures	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO2	Apply critical thinking and problem-solving skills to analyze complex reproductive science challenges and implement evidence-based solutions in laboratory and clinical settings	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO3	Perform key embryology laboratory techniques—gamete handling, embryo culture, micromanipulation, and cryopreservation—while adhering to quality assurance protocols and research methodologies	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO4	Design, execute, and interpret research studies in reproductive healthcare, utilizing scientific methodologies to advance clinical	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops,	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar

	practice and community well-being		Industrial Visit, Guest lecture	Presentation, Case-study presentation
CO5	Demonstrate professional integrity, ethical decision-making, and patient-centered communication in clinical embryology practice, ensuring adherence to regulatory, social, and ethical frameworks	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation
CO6	Exhibit leadership and collaborative skills to function effectively in multidisciplinary teams, while communicating scientific concepts clearly in clinical, academic, and industrial environments	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8	Practical, Demonstration, Group Discussion, Quiz, Posters/ Videos, Case- Study, Problem based learning, Seminar, Workshops, Industrial Visit, Guest lecture	University exam, Practical Exam, Station Exercise, Viva-voce, Log book, Seminar Presentation, Case-study presentation

OUTLINE OF COURSE CURRICULUM														
M. Sc. CLINICAL EMBRYOLOGY														
Semester III														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCE 115 T	Introduction to IVF Lab	2	-	-	-	2	30	-	-	-	30	20	80	100
MCE 116 T	Cryopreservation Techniques in Assisted Reproduction	2	-	-	-	2	30	-	-	-	30	20	80	100
MCE 117 T	Culture System in ART	2	-	-	-	2	30	-	-	-	30	20	80	100
MCE 118 T	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques	2	-	-	-	2	30	-	-	-	30	20	80	100
MCE 119	Research Project/ Dissertation	-	-	10	-	5	-	-	150	-	150	50	-	50
Discipline Specific Core Practical														
MCE 120 CP	MCE Directed Clinical Education-III	-	-	-	9	3	-	-	-	135	135	-	50	50
MCE 121 P	Introduction to IVF Lab	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 122 P	Cryopreservation Techniques in Assisted Reproduction	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 123 P	Culture System in ART	-	-	2	-	1	-	-	30	-	30	10	40	50
MCE 124 P	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques	-	-	2	-	1	-	-	30	-	30	10	40	50
Total		8	0	18	9	20	120	0	270	135	525	170	530	700

Semester IV														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Discipline Specific Core Theory														
MCE 125 T	Bioethics, IPR & Biosafety	3	-	-	-	3	45	-	-	-	45	20	80	100
MCE 126 T	Stem Cell in Human Reproduction	2	-	-	-	2	30	-	-	-	30	20	80	100
MCE 127 T	Quality Control and Audit in ART	2	-	-	-	2	30	-	-	-	30	20	80	100
Discipline Specific Core Practical														
MCE 128 P	Internship/Training (Clinical/ Industrial)	-	-	-	9	3	-	-	-	135	135	-	50	50
MCE 119	Research Project/ Dissertation	-	-	22	-	11	-	-	330	-	330	-	200	200
Total		7	0	22	9	21	105	0	330	135	570	60	490	550

SECOND YEAR
M.Sc. Clinical Embryology
SEMESTER-III

CODE NO	CORE SUBJECT
Discipline Specific Core Theory	
MCE 115 T	Introduction to IVF Lab
MCE 116 T	Cryopreservation Techniques in Assisted Reproduction
MCE 117 T	Culture System in ART
MCE 118 T	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques
MCE 119	Research Project/ Dissertation
Discipline Specific Core Practical	
MCE 120 CP	MCE Directed Clinical Education-III
MCE 121 P	Introduction to IVF Lab
MCE 122 P	Cryopreservation Techniques in Assisted Reproduction
MCE 123 P	Culture System in ART
MCE 124 P	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester III
Name of the Course	Introduction to IVF Lab
Subject Code	MCE 115 T

Teaching Objectives	• To equip students with essential knowledge and practical skills for designing, establishing, and maintaining an IVF laboratory in accordance with regulatory, ethical, and quality standards in reproductive technology.
Course Outcomes	• Explain the design, layout, and setup of IVF, andrology, and cryopreservation labs • Identify and manage essential laboratory equipment, consumables, and environmental parameters. • Apply maintenance, sterilization, and quality control protocols in ART labs. • Maintain lab records, ensure traceability, and follow regulatory requirements. • Evaluate ethical considerations and implement national/international ART guidelines. • Participate in lab planning, work rosters, and collaborative problem-solving.

Sr. No.	Topic		No. of Hrs
1	Introduction	Introduction to lab	30
2	Various lab set ups	IVF lab set-up	
		Details of Lab – set up for andrology	
		Details of Lab – set up for cryopreservation	
3	Lab designing and establishment	How to establish and equip IVF lab	
		Laboratory Equipment	
		Designing of IVF lab and its location in the clinic, Laboratory Layout	
		Light Exposure during ART Procedures	
		Consumables & Disposables	
		“Burning In” of the Finished Facility and Outgassing of New Equipment	
4	IVF Laboratory Equipment and Culture Systems	Maintenance Planning and Sterilization	
		Essential Instruments and Disposable Supplies for an IVF Laboratory, Co2 and Low-O2 Incubators, LAF	
5	Records and maintenance	Record keeping	
		Lab maintenance protocol	
		Roster of work (Daily, Weekly, and Regular Preparations for the IVF Laboratory)	
		Traceability in ART	
6	Air Quality Management	Ambient Air Quality, Particle Testing, Volatile organic compound, Viable particles	
7	Quality improvement	Quality improvement techniques	
		Laboratory Support Systems	
8	Control Variables of	Temperature, Ph, Osmolarity, Culture Media, Oxygen tension & Gas supply, air, sound/music vibration, equipment performance, staff performance	
9	Legislation	National legislation (what is allowed in your country), Ethical	

		consideration, Code of practice	
		Regulation, Licensing, and Accreditation of the ART Laboratory	
		Review of international guide lines	
10	The EU- Directive	Examples of what the directive covers, Implementation in own country	
Total			30 hrs.

MCE 121 P: Introduction to IVF Lab

Sr. No.	Topic	No. of Hrs.
1	IVF lab set-up	30
2	Details of Lab - set up for andrology	
3	Details of Lab – set up for cryopreservation	
4	Designing of IVF lab and its location in the clinic, Laboratory Layout	
5	Consumables & Disposables	
6	Maintenance Planning and Sterilization	
7	Laboratory support system	
8	Roster of work	
9	Record keeping	
10	Lab maintenance protocol	
11	National legislation	
Total		30 hrs.

References:

- Textbook of Assisted Reproductive Techniques (2-Volume Set) – David K. Gardner et al.
- Building and Managing an IVF Laboratory: A Practical Guide – Z. Peter Nagy, Ashok Agarwal, Alex Varghese
- Clinical Embryology: A Practical Guide – Z. Peter Nagy, Alex Varghese, Ashok Agarwal

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester III
Name of the Course	Cryopreservation Techniques in Assisted Reproduction
Course Code	MCE 116 T

Teaching Objectives	To develop comprehensive understanding and practical skills in cryobiology, cryopreservation of gametes, embryos, tissues, and the management of cryo-systems with a focus on quality, safety, and ethical practice.
Course Outcomes	The student will be able to: - Explain the physiological principles, history, and role of cryoprotectants in cryobiology, and compare different types for specific applications. - Apply appropriate techniques for semen, oocyte, embryo, and gonadal tissue cryopreservation, including slow freezing and vitrification, ensuring sample quality and viability. - Maintain and manage cryopreserved sample inventories using best practices, quality control protocols, and regulatory compliance. - Analyze the effects of cryopreservation on embryo survival, implantation, and pregnancy outcomes using evidence-based data. - Evaluate and integrate emerging cryopreservation and cryo-storage technologies for clinical and research applications.

Sr. No.	Topic		No. of Hrs.
1	Introduction	Introduction and history	30
2	Cryoprotectant	Physiology of cryobiology	
		Role of cryoprotectant	
		Types of cryoprotectants	
3	Equipment	Cryopreservation disposables, consumables and cryo devices	
4	Cryopreservation of various samples	Semen cryopreservation – neat and processed sample	
		Human Epididymal and testicular sperm cryopreservation	
		Slow freezing of oocyte and embryos	
		Vitrification of oocyte and embryos	
		Gonadal cryopreservation	
5	Thawing technique	Retrieval of cryopreserved gamete and embryo	
6	Quality control and management	Influence of cryopreservation on embryo survival, implantation, and pregnancy outcomes	
		Maintenance and management of cryopreserved samples	
		Continuous Quality Improvement (CQI) and Key Performance Indicators (KPIs) in Cryopreservation	
7	Recent development in cryobiology	Semen banking, oocyte banking	
		Cord blood and tissue banking	
		New technology in cryopreservation and cry-storage	
Total			30 hrs.

MCE 122 P: Cryopreservation Techniques in Assisted Reproduction

Sr. No.	Topic		No. of Hrs.
1.	Cryoprotectant	Physiology of cryobiology	30
		Role of cryoprotectant	
		Types of cryoprotectants	
2.	Equipments	Cryopreservation disposables, consumables and cryo devices	
3.	Semen Cryopreservation	freezing, and thawing (neat and processed).	
4.	Oocyte/Embryo Cryopreservation	Slow freezing and vitrification techniques; post-thaw viability check	
5.	Thawing	Gamete and embryo	
6.	Sample Management	Labeling, storage, handling, risk management, sample tracking	30 hrs.
7.	Equipments	Cryopreservation disposables, consumables and cryo devices	
Total			30 hrs.

References:

- Cryopreservation in Assisted Reproduction: A Practitioner's Guide to Methods, Management and Organization – Zsolt Peter Nagy, Alex C. Varghese, Ashok Agarwal
- Vitrification in Assisted Reproduction: A User's Manual – Gautam Nand Allahbadia, Masashige Kuwayama, Goral Gandhi
- Fertility Cryopreservation – Ri-Cheng Chian, Patrick Quinn
- Textbook of Assisted Reproduction for Scientists in Reproductive Technology – Steven D. Fleming
- Textbook of Assisted Reproduction – Gautam Allahbadia, Baris Ata, Steven R. Lindheim, Bala Bhagavath
- Practical Manual of In Vitro Fertilization: Advanced Methods and Novel Devices – Z. Peter Nagy, Alex Varghese, Ashok Agarwal

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester III
Name of the Course	Culture System in ART
Course Code	MCE 117 T

Teaching Objectives	To provide students with in-depth knowledge and hands-on skills in handling, preparing, and optimizing embryo culture media, understanding embryo-media interaction, use of advanced culture systems, and ensuring quality control for improved clinical outcomes in ART.
Course Outcomes	The student will be able to: - Explain the historical evolution, types, and components of embryo culture media, and their interactions with gametes and embryos. - Apply optimal handling techniques for culture media, preparation of culture dishes, and use of oils, buffers, and incubators to maintain embryo viability. - Perform and interpret quality control tests for IVF media, troubleshoot culture-related problems, and control key variables affecting embryo development. - Compare monoculture, sequential culture, blastocyst culture, co-culture, and time-lapse systems for their impact on embryo development and clinical outcomes. - Evaluate advances in culture media and emerging embryo culture technologies for integration into clinical practice.

Sr. No.	Topic		No. of Hrs
1	Introduction	Introduction	30
		History to culture media	
		Types of Media for Embryo culture	
2	Culture media	Media and embryo interaction	
		Handling of culture media	
		Components & Preparation of culture media and buffer	
		Paraffin and mineral oil	
		Preparation of the Culture Dishes	
3	Various embryo culture media techniques	Optimal Handling Techniques for Culture of Human Gametes and Embryos	
		Monoculture and Sequential culture	
		Blastocyst culture technique	
		Types of culture incubators	
4	Co-culture	Co-culture techniques	
5	Time- Lapse embryo development system	History, Theoretical & Practical Aspects of TLT, Types and Characteristics of TLT devices Time – lapse embryo development monitoring system	
6	Quality Control Tests for IVF Media	Types of Quality Control Tests for IVF Media	
		Quality Control of an Open IVF Media Pack	
		Troubleshooting Embryo Culture Problems	
		Control of Variables for optimal embryo development	

7	Recent Developments in IVF Culture	Advances in IVF culture media	
		Emerging techniques and future directions in embryo culture	
Total			30 hrs.

MCE 123 P: Culture System in ART

Sr. No.	Topic		No. of Hrs.
1	Culture media	Media and embryo interaction	30
		Components & Preparation of culture media and buffer	
		Preparation of the Culture Dishes	
2	Various embryo culture media techniques	Monoculture and Sequential culture	
		Blastocyst culture technique	
		Types of culture incubators	
4	Time- Lapse embryo development system	Working principle and monitoring of embryo development	
5	Quality Control Tests for IVF Media	Quality Control Tests for IVF Media	
Total			30 hrs.

References:

- Textbook of Assisted Reproduction for Scientists in Reproductive Technology – Steven D. Fleming
- Textbook of Assisted Reproduction – Gautam Allahbadia, Baris Ata, Steven R. Lindheim, Bala Bhagavath
- Practical Manual of In Vitro Fertilization: Advanced Methods and Novel Devices – Z. Peter Nagy, Alex Varghese, Ashok Agarwal

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester III
Name of the Course	ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques
Course Code	MCE 118 T

Teaching Objectives	To train students in the principles, equipment handling, and practical procedures of ICSI, including sperm selection methods, micromanipulation techniques, and advanced technologies used for enhancing fertilization outcomes in ART.
Course Outcomes	The student will be able to: • Explain the history, philosophy, indications, contraindications, and underlying principles of ICSI, including micromanipulation physics and workstation setup. • Apply techniques for sperm retrieval (PESA, MESA, TESA, TESE), immobilization, selection, and preparation from ejaculates or testicular biopsies for ICSI. • Operate, calibrate, and maintain micromanipulators, micropipettes, and related ICSI equipment, ensuring precision and troubleshooting technical issues. • Perform oocyte denuding, ICSI dish preparation, gamete micromanipulation, fertilization assessment (fert check), and handle specialized ICSI media. • Evaluate advanced sperm selection techniques (IMSI, PICSI, Piezo-ICSI, MACS, microfluidics, HBA, Raman spectroscopy, AI-assisted selection) for their clinical applicability and outcomes.

Sr. No.	Topic		No. of Hrs.
1	Introduction	History and philosophy of ICSI	30
2	Indications and contraindications	Indications and contraindications of ICSI	
	Azoospermia	Obstructive and non-obstructive azoospermia	
3	Surgical sperm aspiration Techniques	PESA, MESA, TESA, TESE	
4	Micromanipulator	Micromanipulator Physics of micromanipulation, workstation installation Troubleshooting	
5	Equipment	Equipment for ICSI, Calibration and maintenance of ICSI equipment	
6	Pre procedure	Sperm immobilization Sperm selection techniques Sperm separation from testicular biopsies Sperm preparation for ICSI from ejaculates and testicular biopsies ICSI medias Denuding of oocyte Micropipette handling and alignment	
7	Procedure	ICSI dish preparation, micromanipulation of gametes	
8	Assessment of fertilization	Fert check	
9	Risk of anomalies	Risk of anomalies in ICSI	
10	Advanced Sperm Selection and ICSI Techniques	IMSI (Intracytoplasmic Morphologically Selected Sperm Injection) PICSI (Physiological ICSI) Piezo-ICSI (Piezo-Activated ICSI) Microfluidic sperm selection	

		Magnetic-activated cell sorting (MACS)	
		Zeta potential-based sperm selection	
		Hyaluronan binding assay (HBA)	
		Raman spectroscopy for sperm selection	
		Artificial intelligence-assisted sperm selection	
11	Microscopy	Identification of – abnormal sperms, immature sperms, Spermatids, spermatocytes and other cells	
Total			30 hrs.

MCE 124 P: ICSI (Intracytoplasmic Sperm Injection) and Advanced Sperm Selection Techniques

Sr. No.	Topic		No. of Hrs.
1	Indications and contraindications	Indications and contraindications of ICSI	30
2	Azoospermia	Obstructive and non-obstructive azoospermia	
3	Surgical sperm aspiration Techniques	PESA, MESA, TESA, TESE	
4	Micromanipulator	Physics of micromanipulation, workstation installation	
5	Equipment	Equipment for ICSI, Calibration and maintenance of ICSI equipment	
6	Pre-procedure	Sperm immobilization	
		Sperm selection techniques	
		Sperm separation from testicular biopsies	
		Sperm preparation for ICSI from ejaculates and testicular biopsies	
		ICSI medias	
		Denuding of oocyte	
		Micropipette handling and alignment	
7	Procedure	ICSI dish preparation, micromanipulation of gametes	
8	Assessment of fertilization	Fert check	
9	Risk of anomalies	Risk of anomalies in ICSI	
10	Advanced Sperm Selection and ICSI Techniques	IMSI (Intracytoplasmic Morphologically Selected Sperm Injection)	
		PICSI (Physiological ICSI)	
		Piezo-ICSI (Piezo-Activated ICSI)	
11	Microscopy	Identification of – abnormal sperms, immature sperms, Spermatids, spermatocytes and other cells	
Total			30 hrs

References:

- Textbook of Assisted Reproductive Techniques – David K. Gardner et al. (chapters on ICSI, micromanipulation)
- Practical Manual of In Vitro Fertilization – Z. Peter Nagy, Alex Varghese, Ashok Agarwal
- Non-Invasive Sperm Selection for In Vitro Fertilization: Novel Concepts and Methods – Ashok Agarwal, Ahmad Majzoub, Chak-Lam Cho, Sandro Esteves

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester III
Name of the Course	Research Project/ Dissertation
Course Code	MCE 119

Course Objectives	The objective of the dissertation course is to equip students with the knowledge and skills necessary to independently conduct research in reproductive science and allied fields. The course aims to enable students to identify and formulate relevant research problems, design and execute ethical and scientifically sound studies, critically analyze and interpret research data, and effectively communicate their findings through scholarly writing and oral presentations.
Course Outcomes	- Identify and define a relevant research problem in reproductive science or related fields, based on current scientific literature - Design and execute an experimental or analytical study using appropriate methodologies and ethical standards - Analyze and interpret research data using suitable statistical and analytical tools to derive evidence-based conclusions - Present research findings effectively through written dissertation and oral defense, adhering to academic and professional guidelines

The dissertation is a compulsory component of the M.Sc. Clinical Embryology program, intended to provide students with in-depth research experience and the opportunity to translate theoretical knowledge into practical applications. Each student undertakes an independent research project under the supervision of a faculty guide, focusing on specialized areas of clinical embryology such as assisted reproductive technology (ART), gamete and embryo biology, cryopreservation, embryonic development, genetics, molecular diagnostics, or infertility management.

The primary objective of the dissertation is to enhance students' abilities in critical thinking, problem-solving, data interpretation, and scientific writing, thereby preparing them for careers in research, clinical practice, or higher academic pursuits. The process is rigorous and extends across two years, requiring students to design a research protocol, present it to the Institutional Research Advisory Committee for approval, and subsequently obtain clearance from the Institutional Ethics Committee for human and/or animal studies. Following approval, students are expected to conduct systematic research to achieve the objectives outlined in their proposal.

The Dissertation work will begin from 3rd Semester, and will continue through the 4th Semester. (Total- 150 hrs.)

Course code- MCE 120 CP: MCE Directed Clinical Education – III

Course Outcomes	• Demonstrate comprehensive understanding of assisted reproductive technologies (ART), laboratory workflows, quality control measures, and ethical guidelines governing clinical embryology. • Develop proficiency in key embryology laboratory techniques, including gamete handling, embryo culture, micromanipulation, and cryopreservation, while adhering to quality assurance protocols. • Exhibit ethical decision-making, patient-centered communication, and professional responsibility in clinical embryology practice, ensuring adherence to regulatory and ethical standards.
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This module introduces students to key embryology laboratory techniques within clinical or research settings. It covers assisted reproductive technologies (ART), laboratory workflows, quality control, ethics, and patient-centered practices, bridging theoretical knowledge with clinical application. **(Total - 135 hrs.)**

SECOND YEAR**M.Sc. Clinical Embryology****SEMESTER-IV**

CODE NO.	CORE SUBJECT
Discipline Specific Core Theory	
MCE 125 T	Bioethics, IPR and Biosafety
MCE 126 T	Stem Cell in Human Reproduction
MCE 127 T	Quality Control and Audit in ART
Discipline Specific Core Practical	
MCE 119	Research Project/ Dissertation
MCE 128 P	Internship/Training (Clinical/ Industrial)

Name of the Program	M.Sc. Clinical Embryology
Semester	Semester IV
Name of the subject	Bioethics, IPR, and Biosafety
Subject Code	MCE 125 T

Course Objective	- To familiarize students with ethical issues in biomedical research and healthcare. - To provide knowledge about intellectual property rights and their relevance in biotechnology. - To understand biosafety principles and regulatory frameworks related to research and product development.
Course Outcomes	After completing this course, students will be able to: Evaluate ethical concerns in biomedical and biotechnological practices. Understand different types of IPR and their applications. Apply various national and international guidelines in biomedical and health research.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Bioethics: Principles of biomedical ethics: autonomy, beneficence, non-maleficence, justice. Ethics in clinical research: Informed consent, confidentiality, human and animal experimentation. Ethical guidelines: ICMR, DHR, ANRF, Helsinki Declaration, Belmont Report. Case studies in biomedical ethics.	12
2	Intellectual Property Rights (IPR): Types of IPR: Patents, Copyrights, Trademarks, Trade secrets, Plant variety protection. Patent filing process (India and international). Patentability criteria and limitations in biotechnology. Importance of IPR in academia and industry.	12
3	Biosafety and Biosecurity: Definition and classification of biological hazards, Risk assessment and management in laboratory and field research, Containment facilities: Biosafety levels (BSL I–IV), Guidelines: Cartagena Protocol, NIH Guidelines, DBT & WHO norms, Dual-use research and bioterrorism concerns.	12
4	Regulatory Frameworks and Institutional Oversight: Institutional Biosafety Committee (IBSC), Review Boards, Ethical Committees. NABH, NABH Digital Health Standards for Hospitals, NABL, JCI, ISO. National and international regulatory bodies: RCGM, GEAC, CDSCO, WHO. Biosafety and ethics in genome editing (e.g., CRISPR), stem cell research, GMOs. Recent advancements and controversies. Cyber Security, HIPAA, GDPR, DPDP Act 2023 India.	9
Total		45 hrs.

Reference Books:

- **Bioethics & Biosafety** – R. C. Dubey
- **Intellectual Property Rights in Biotechnology** – P. Narayanan
- **Bioethics and Biosafety in Biotechnology** – V. Sree Krishna
- **ICMR Ethical Guidelines for Biomedical Research** (latest version)
- WIPO, DBT, ICMR, DHR, ANRF, NABH, NABL, HIPAA, GDPR, DPDP Act 2023, India and WHO online resources.

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester IV
Name of the Course	Stem Cell in Human Reproduction
Course Code	MCE 126 T

Teaching Objectives	To equip learners with the knowledge and skills to apply stem cell biology in reproductive medicine, from gamete generation and molecular mechanisms to therapeutic applications and emerging research.
Course Outcomes	The student will be able to: - Explain the fundamental concepts of stem cell biology, including their role in gamete generation, germline stem cell function, and reproductive potential. - Apply molecular biology principles to study gamete development, genetic characteristics, and controlled differentiation from embryonic stem cells to gamete-like cells. - Evaluate the influence of growth factor signaling in germline specification and maintenance of pluripotency. - Analyze stem cell-based therapeutic approaches for male infertility, including applications of trophoblast, Wharton's jelly, amniotic fluid, and bone marrow stem cells. - Critically appraise recent advances in human embryonic stem cell (hESC) research and their translational potential in reproductive medicine.

Sr. No.	Topic		No. of Hrs
1	Introduction	Introduction to stem cell gamete Generation from Stem Cells	30
2	Female Gamete	Molecular Biology of the Gamete	
		Controlled Differentiation from ES Cells to Oocyte-Like Cells	
		Germ Line Stem Cells and Adult Ovarian Function	
		somatic stem cells and their reproductive potential	
3	Male Gamete	Development, characteristics, and genetic makeup of male gametes	
		Growth Factor Signaling in Germline Specification and Maintenance of Stem Cell Pluripotency	
		Stem Cell-Based Therapeutic Approaches for Treatment of Male Infertility	
		Adult Stem Cell Population in the Testis	
4	Human Embryonic Stem Cells	Trophoblast, Wharton's Jelly, Amniotic Fluid And Bone Marrow	
		New developments in hESC research	
Total			30 hrs.

References:

- Stem Cells in Reproductive Medicine: Basic Science and Therapeutic Potential** – Carlos Simón, Antonio Pellicer, Renee Reijo Pera
- Human Embryonic Stem Cells: The Practical Handbook** – Stephen Sullivan, Chad A. Cowan, Kevin Eggan

- **Stem Cells in Reproductive Medicine: Methods and Protocols (Methods in Molecular Biology series)** – Edited by Irma Virant-Klun

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester IV
Name of the Course	Quality Control and Audit in ART
Course Code	MCE 127 T

Teaching Objectives	• To equip students with the knowledge and skills to implement, monitor, and improve Quality Management Systems (QMS) in Assisted Reproductive Technology (ART) laboratories, ensuring compliance with regulatory standards, optimization of clinical and laboratory performance, and adherence to ethical and professional practices.
Course Outcomes	The student will be able to: • Explain the principles of Quality Management Systems (QMS) in ART, including regulatory requirements, accreditation processes, and the importance of internal and external quality control. • Apply QC protocols and auditing practices in embryology, andrology, and cryopreservation, including equipment calibration, maintenance, and validation. • Analyze and set Key Performance Indicators (KPIs) for ART laboratories, compare them to benchmark values, and implement corrective actions for quality improvement.

Sr. No.	Topic		No. of Hrs.
1	Introduction to Quality Management in ART	Overview of Quality Management System (QMS)	30
		Importance of QC and Audit in ART	
		Regulatory and accreditation bodies	
2	Quality Control in ART	Types of QC: Internal & External	
		QC in: • Embryology: incubator monitoring, embryo grading, culture media validation • Andrology: semen analysis standardization, sperm preparation validation • Cryopreservation: temperature mapping, cryotank security systems	
		Equipment calibration and preventive maintenance	
3	Principles of Auditing	Types of audits:, Clinical, Laboratory, ADMINISRATIVE	
		Audit tools: Checklists, traceability logs, process flow mapping	
4	QC documentation formats	Record keeping and documentation	
		SOP for an ART Lab	
5	Key Performance Indicators	Clinical KPI, Laboratory KPI, KPI setting	
		KPI Benchmark value	
Total			30 hrs.

References:

- Quality Management in ART: Laboratory Practices and Clinical Outcomes – Z. Peter Nagy, Ashok Agarwal
- Good Laboratory Practice in ART: A Practical Guide – F. M. Harper, J. M. Hull
- Manual of Quality Assurance in Reproductive Medicine – Jaydeep Bhattacharya, Richard J. Paulson
- Practical Manual of In Vitro Fertilization Advanced Methods and Novel Devices

- Clean Room Technology in ART Clinics- A Practical Guide- Sandro C. Esteves, Alex C. Varghese, Kathryn C. Worriow

Name of the Program	M. Sc. Clinical Embryology
Semester	Semester IV
Name of the Course	Internship/Training (Clinical/ Industrial)
Course Code	MCE 128 P

Course Objective	• This course aims to provide students with comprehensive knowledge and practical skills in assisted reproductive technologies and clinical embryology. It emphasizes ethical practice, critical thinking, and proficiency in laboratory and research techniques to advance reproductive healthcare. Students will also develop professional communication, collaboration, and adaptability to thrive in clinical, industrial, and academic settings.
Course Outcomes	• Demonstrate in-depth knowledge of assisted reproductive technologies (ART), laboratory workflows, and clinical embryology concepts, including their applications in healthcare, industry, and entrepreneurial ventures. • Apply critical thinking and problem-solving skills to analyze complex reproductive science challenges and implement evidence-based solutions in laboratory and clinical settings. • Perform key embryology laboratory techniques—gamete handling, embryo culture, micromanipulation, and cryopreservation—while adhering to quality assurance protocols and research methodologies. • Design, execute, and interpret research studies in reproductive healthcare, utilizing scientific methodologies to advance clinical practice and community well-being. • Demonstrate professional integrity, ethical decision-making, and patient-centered communication in clinical embryology practice, ensuring adherence to regulatory, social, and ethical frameworks. • Exhibit leadership and collaborative skills to function effectively in multidisciplinary teams, while communicating scientific concepts clearly in clinical, academic, and industrial environments.

This module introduces students to key embryology laboratory techniques within clinical or research settings. It covers assisted reproductive technologies (ART), laboratory workflows, quality control, ethics, and patient-centered practices, bridging theoretical knowledge with clinical application. The student has to search the Internship/Training (Clinical/ Industrial) opportunities on their own at least 2 to 3 months prior before starting of the actual course. The student has to prepare the detailed log book along with weekly summary report **(Total - 135 hrs.)**

Name of the Program	M.Sc. Clinical Embryology
Semester	Semester IV
Name of the Subject	Research Project/ Dissertation
Subject Code	MCE 119

Course Objectives	The objective of the dissertation course is to equip students with the knowledge and skills necessary to independently conduct research in reproductive science and allied fields. The course aims to enable students to identify and formulate relevant research problems, design and execute ethical and scientifically sound studies, critically analyze and interpret research data, and effectively communicate their findings through scholarly writing and oral presentations.
Course Outcomes	- Identify and define a relevant research problem in reproductive science or related fields, based on current scientific literature - Design and execute an experimental or analytical study using appropriate methodologies and ethical standards - Analyze and interpret research data using suitable statistical and analytical tools to derive evidence-based conclusions - Present research findings effectively through written dissertation and oral defense, adhering to academic and professional guidelines

The Dissertation work will begin from 3rdSemester and will continue through the 4thSemester. (330 hrs.)

The dissertation is a mandatory component of the M.Sc. Clinical Embryology program, designed to provide students with hands-on research experience and the opportunity to apply theoretical knowledge to practical and clinical problems. It involves independent project work under the guidance of a faculty supervisor, focusing on specialized areas of clinical embryology such as assisted reproductive technology (ART), gamete and embryo biology, cryopreservation, genetics, molecular diagnostics, infertility management, or related fields.

The dissertation aims to strengthen students' abilities in critical thinking, problem-solving, data analysis, and scientific writing, thereby preparing them for careers in clinical practice, research, or higher academic pursuits. The dissertation process is rigorous and extends over two years, during which students are required to design a research protocol, present it to the Institutional Research Advisory Committee for approval, and subsequently obtain clearance from the Institutional Ethics Committee for human and/or animal studies. Following these approvals, students must conduct comprehensive project work to accomplish the objectives defined in the approved proposal.

Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

Question		Marks distribution	Marks allotted per section	Marks
Sec: A	MCQ	10 x 1 M = 10	10	10
Sec: B	SAQ	3/4x 5 M = 15	15	35
Sec: B	LAQ	2/3 x 10 M = 10	20	
Sec: C	SAQ	3/4x 5 M = 15	15	35
Sec: C	LAQ	2/3x 10 M = 10	20	
Total				80 Marks

Practical exam pattern: Total 40 marks with following breakup:

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x15=15 M
Q No 2	Station exercise	2x5M=10 M
Q No 3	VIVA	10 M
Q No 4	Journal	5M
Total		40 Marks

Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

Breakup of theory IA calculation for 20 marks

Description	Marks
Internal exam (at department)	15 marks
Seminar	5 marks
Total	20 Marks

Breakup of practical IA calculation:

Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
Total	20 Marks

Note –20 marks to be converted to 10 marks weightage for submission to the university.

Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____ Date: _____

Program: _____

Semester: _____ Name of the internal faculty/Observer: _____

Name of the External Faculty/Observer: _____

Core Competencies	Marks allotted	Marks obtained
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.		
Clinical Teaching		
a. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	50 Marks	

Sign of Internal Examiner: _____

Sign of External Examiner: _____

Evaluation for Semester III – Dissertation (PG) (Internal Assessment)

Dissertation/Project Proposal : overall performance of the student	Marks allotted	Marks Obtained
Open mindedness/ Receptivity to feedback Integrates feedback	5 Marks	
Meets deadlines / Regularity in meeting / Consistency in communication	10 Marks	
Continuous Internal evaluation (CIE)		
Interest shown in selecting topic	5 marks	
Appropriate review	10 marks	
Discussion with guide and other faculty	10 marks	
Quality of protocol	5marks	
Preparation of proforma / log book / daily reports	5marks	
TOTAL	Out of 50	

Evaluation for Semester IV - Evaluation parameter (Research Project / Dissertation)

Evaluation parameter (Semester IV)	Continuous Internal Evaluation (CIE)	Semester End Evaluation (SEE)	
	Guide	Internal examiner	External examiner
Thesis preparation, Novelty, Overall Lab Work Culture	25	-	-
Dissertation/Project work book	25	25	25
Evaluation of thesis including Viva Voce	-	50	50
Total	50	75	75
Overall Total = 200			

Evaluation for Semester IV - Evaluation of the Internship/Training (Clinical/Industrial) (PG)

Name of the student: _____ Date: _____

Program: _____

Semester: _____ Name of the internal faculty/Observer: _____

Name of the External Faculty/Observer: _____

Final Evaluation (50 Marks)

1. Technical Knowledge & Application (10 marks): _____
2. Problem-Solving & Critical Thinking (5 marks): _____
3. Communication & Teamwork (5 marks): _____
4. Professionalism & Punctuality (5 marks): _____
5. Quality of Log Book Maintenance (5 marks): _____
6. Learning Outcome & Skill Development (5 marks): _____
7. Final Internship Report Quality (5 marks): _____
8. Student's Initiative & Engagement (5 marks): _____
9. Overall Performance (5 marks): _____
10. Total: _____
11. **Final Remark:**

Sign of Internal Examiner: _____

Sign of External Examiner: _____

**MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI****(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**

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

Grade "A++" Accredited by NAAC

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Email: sbsnm@mgmuhs.com / Website: www.mgmsbsnm.edu.in**DEPARTMENT OF CLINICAL
EMBRYOLOGY****CLINICAL POSTING LOG BOOK**

Name of Student		
Roll No.		
PRN		
Batch		
Period	From	To
Name and Address of Department		

Date of Completion:

Coordinator	HOD	Director



CERTIFICATE OF COMPLETION

PRN_____

Batch _____

This is to certify that the work entered in this logbook is the work of Mr./Mrs.

.....

Student of M.Sc. Clinical Embryology, MGM School of Biomedical Sciences, MGMIHS,
Kamothe who has satisfactorily completed his / her clinical posting in the
year..... from

Course Coordinator

Head of the Department

Director

Embryologist

IVF Specialist

Centre Head

Date: / /20

POSTING ATTENDANCE RECORD

Month	Total days	Total days Present	Total days Absent	Signature

Coordinator

HOD

Center Head

APPENDIX I

1. Number of procedures Observed / Assisted / Performed under supervision during the posting

Skill / Competency	Observed	Assisted	Performed under supervision	Faculty Signature
Semen collection protocol				
Basic semen analysis				
Extended semen analysis				
Ejaculated sperm preparation				
Preparation of frozen / thawed sperm				
Preparation of viral - positive semen				
Preparation of retrograde ejaculation sample				
Preparation of totally immotile sperm				
Preparation of epididymal / testicular sperm for ART				
Sperm cryopreservation				
Sperm thawing				
Testicular sperm cryopreservation				
Testicular sperm thawing				
Media preparation				
Oocyte handling				
Oocyte hunting / harvesting				
Dish Preparation				
ICSI Setup &				

APPENDIX I

Micromanipulation				
Embryo Grading				
Embryo Transfer Loading				
Vitrification (Oocyte / Embryo)				
Warming (Oocyte / Embryo)				
Lab QC / Documentation				
Patient Counseling (Embryology-related)				

APPENDIX II

Daily Log

2. Assessment of knowledge, attitudes and fulfillment of tasks

Scoring system

A = Excellent, B = Sufficient, C = Weak, D = Unacceptable, E = Not applicable

SR. NO	YEAR	1	2
1.	Integrated Knowledge		
2.	Reaching of Appropriate Decisions : Collection and Interpretation of Data		
3.	Motivation, sense of duty, discipline, punctuality		
4.	Technical skills		
5.	Organizational skills		
6.	Administrative tasks (Medical files, correspondence, etc)		
7.	Ethics		
8.	Communication with patients		
9.	Communication with medical and other staff		
10.	Scientific interest		
11.	Scientific activity		

Date :/...../.....

Coordinator

HOD

Center Head

APPENDIX II

Daily Log

(Summarize the procedure/activity observed, assisted, or performed, and also mention the remarks/learning outcomes)

[illegible]

APPENDIX III

Section A: Academic Activities

Include clinical meets, Seminars, Webinar attended/ organized, lectures undertaken (UG/ PG),

[illegible]

APPENDIX III

Section B: Case report

Index

Sr. no	Case details	Sign

Note:

Case copies to be enclosed

APPENDIX III

Section C: Research Activities

1. Cumulative list of abstracts presented at scientific meetings

Sr. no	Abstract

Note:

Abstracts to be enclosed

2. Cumulative list of peer reviewed published papers in national / international journals

Sr. no	Details

Note:

Published manuscript to be provided



MGM INSTITUTE OF HEALTH SCIENCES

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

Grade 'A' Accredited by NAAC

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