

**Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001**



FACULTY OF PHARMACY

SYLLABUS

FOR

M.SC. (CLINICAL EMBRYOLOGY)

(2 YEARS PROGRAMME)

2023 BATCH ONWARDS

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**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

SCHEME

1 st Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Int.	Ext	Total	
MCEMS1-101	Introduction of Clinical Embryology	3	1	0	40	60	100	4
MCEMS1-102	Biochemistry including Steroid Metabolism	3	1	0	40	60	100	4
MCEMS1-103	Embryology and Physiology of Human Reproductive System	3	1	0	40	60	100	4
MCEMS1-104	Basic Concept of Cell Biology & Molecular Biology	3	1	0	40	60	100	4
MCEMS1-105	Introduction to Clinical Embryology-Practical	0	0	4	60	40	100	2
MCEMS1-106	Embryology and Physiology of Human reproductive system-Practical	0	0	4	60	40	100	2
MCEMS1-107	Basic concept of cell biology & molecular biology-Practical	0	0	4	60	40	100	2
Total		12	4	12	340	360	700	22

2 nd Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Int.	Ext	Total	
MCEMS1-201	IVF Procedure: Fertilization, Embryo Production & Cryopreservation Techniques	3	1	0	40	60	100	4
MCEMS1-202	Reproductive Disorders and Histology	3	1	0	40	60	100	4
MCEMS1-203	Infertility, and its Clinical Management, Andrology	3	1	0	40	60	100	4
MCEMS1-204	Cytogenetic	3	1	0	40	60	100	4
MCEMS1-205	IVF Procedure: Fertilization, Embryo Production & Cryopreservation Techniques -Practical	0	0	4	60	40	100	2
MCEMS1-206	Reproductive Disorders and Histology -Practical	0	0	4	60	40	100	2
MCEMS1-207	Cytogenetic -Practical	0	0	4	60	40	100	2
Total		12	4	12	340	360	700	22

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
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3 rd Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Int.	Ext	Total	
MCEMS1-301	Assisted Reproductive Techniques	3	1	0	40	60	100	4
MCEMS1-302	Research methodology -Quality Control, Research Ethics, Scientific Writing	3	1	0	40	60	100	4
MCEMS1-303	Clinical Biochemistry	3	1	0	40	60	100	4
MCEMS1-304	Assisted Reproductive Techniques - Practical	0	0	4	60	40	100	2
MCEMS1-305	Clinical Biochemistry - Practical	0	0	4	60	40	100	2
MCEMS1-306	Research methodology - Quality control, Research ethics, Scientific writing -Practical	0	0	8	60	40	100	4
Total		9	3	16	300	300	600	20

4 th Semester		Contact Hrs.			Marks			Credits
Subject Code	Subject	L	T	P	Int.	Ext	Total	
MCEMS1-401	Internship and Dissertation	0	0	40	80	120	200	20
Total		0	0	40	80	120	200	20

The candidate shall undergo internship in relevant department. The internship report shall be submitted to the parent institute & Viva-Voce examination shall be conducted by external expert.

or

The candidates will be supervised by the concerned faculty & the project report will be submitted to the institute. The Viva-Voce examination shall be conducted by external expert.

Overall Marks / Credits

Semester	Marks	Credits
1 st	700	22
2 nd	700	22
3 rd	600	20
4 th	200	20
Total	2200	84

FIRST SEMESTER

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

INTRODUCTION OF CLINICAL EMBRYOLOGY

Subject Code: MCEMS1-101

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Outcomes: After completing this module students will be able

- To know about clinical embryology
- Application and scope of clinical embryology
- To learn and solve the problems regarding reproduction and reproductive systems.
- To know about the different techniques of clinical embryology

UNIT-I (15 hrs)

Introduction of clinical embryology, application, scope, concept of embryology, Historical review of embryology, type of embryology (descriptive, comparative, experimental, chemical, analytical embryology)
Significance of Embryology.

UNIT-II (15 hrs)

Gametogenesis: Primordial germ cell, events of gametogenesis,
Oogenesis: time, duration, stages, structure of mature Ovum,
Spermatogenesis: time, duration, stages, structure of Sperm.

Unit-III (15 hrs)

Fertilization: Site of Fertilization,
Approximation of gametes, contact and fusion of gametes, effect of fertilization,
Early embryonic development: Cleavage, implantation, formation of germ layers,

Unit-IV (15 hrs)

Implantation and placentation
Preimplantation, Development of reproductive organs
Anatomy of Sperms Embryonic fields

Recommended books

1. Balinsky, B.I and Fabian, B.C. (2012) An Introduction to Embryology, 5th Edition. Cengage Publishers
2. Sastry, K.V. and Shukla, V. (2018) Developmental Biology. Rastogi Publications.
3. Mishra, S. (2010) Langman's Medical Embryology, South Asia Edition
4. Williams, Text Book of Endocrinology, 10th edition (2002), W.B. Saunders Publications

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

BIOCHEMISTRY INCLUDING STEROID METABOLISM

Subject Code: MCEMS1-102

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Outcomes:

- Biochemistry Majors will gain proficiency in basic laboratory techniques in both chemistry and biology,
- Students will be able to apply the scientific method to the processes of experimentation and hypothesis testing.
- The course aims to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis, and
- It will enable the students to acquire specialized knowledge and understanding of selected aspects by means of a stem/branch lecture series and a research project.

UNIT-I (15 hrs)

Chemical structures of biomolecules: Starch, Glycogen, Cellulose, Chitin, Hyaluronate, Chondroitin sulphate and Keratin sulphate,

UNIT-II (15 hrs)

Basic structure and classification of Amino acids., Biologically active peptides- Glutathione, Aspartame, Enkephalins, Oxytocin & Vasopressin, Super secondary structures in Protein, Protein denaturation and folding Abnormal Hemoglobin.

UNIT-III (15 hrs)

Degradation and Biosynthesis: Degradation of glucose and Palmitic acid, Biosynthesis of urea, Gluconeogenesis, Glycogen synthesis

UNIT-IV (15 hrs)

Structure and Functions of Enzymes, Immobilized enzymes and their applications. Steroid hormones, biochemistry of steroid hormones, classification, their functions, metabolism of steroid hormones

RECOMMENDED BOOK

1. Biochemistry by Mary K. Campbell Saunders and Harcourt Brace company. Florida (1999)
2. Principles of Biochemistry by Albert Lehninger, David L. Nelson and Michael M.Cox. CBSPublishers. Delhi. (2000)
3. Harper's Biochemistry, International 1 25thed. Robert K. Murray, peter A. Mayes, Daryl K.Granner. Victor W. Rodwell. McGraw Hill. Lange Medical books (1999)
4. Outline of Biochemistry, Eric. C. Conn, Paul K. Stump. George Bruening, Roy, H. Ooi, Johnwiley and sons, New York.
5. A Text-book of Biochemistry by Edward Staunton, Wilbert, K. Todd, Howard S. Mason, John T. Van Bruggen. Macmillon Publishing Co. (1974).

MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS

EMBRYOLOGY AND PHYSIOLOGY OF HUMAN REPRODUCTIVE SYSTEM

Subject Code: MCEMS1-103

L T P C
3 1 0 4

Duration: 60 Hrs.

Course Outcomes:

- The student will be able to identify the key concepts of the structure and function of human reproductive system.
- The student will be able to build communication skills while involved in peer teaching of clinical embryology.
- The students will get a comprehensive overview of the morphology and functional reproductive system of the human body.
- The course will provides an insight to the implications of disruption of normal structure and function.

UNIT-I (15 hrs)

Physiology of male reproductive System: testosterone synthesis, function, its regulation, semen composition, and its analysis, Sex determination, differentiation, physiology of Puberty, Physiology of Female reproductive System, Sex hormones

UNIT-II (1 5hrs)

Oosterogen Synthesis, function, its regulation, Progesterone: Synthesis, function and its regulation, Female reproductive Cycle, ovarian cycle, Uterine cycle, Cervical and vaginal changes.

UNIT-III (15 hrs)

Hormonal regulations of menstrual cycle, abnormalities of menstrual cycle, menopause, Ovulation and test for ovulation

UNIT-IV (15 hrs)

Physiology of pregnancy and test, physiology of Labor and lactation, Physiology of Fetus and New born, placenta: hormones.

Recommended books

1. Guyton, Text Book of Medical Physiology, 12th edition(2011), Elseveir Publication
2. Prof .G.K.Pal, Text Book of medical Physiology, 2nd Edition(2015), Ahuja Publication
3. Indu Khurana, Medical Physiology, 1st Edition (2012), Elsevier Publication
4. A.K.Jain, Text Book of Physiology , 6th edition vol i&ii, Avichal publishing company, 2016
5. Williams, Text Book of Endocrinology , 10th edition (2002), W.B. Saunders Publications

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

BASIC CONCEPT OF CELL BIOLOGY & MOLECULAR BIOLOGY

Subject Code: MCEMS1-104

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Outcomes:

- To make aware the students regarding various cell organelles and their functioning with special stress on human chromosome.
- Students will get a comprehensive overview of the structure of cell and organelles functions
- Students will get knowledge about DNA replication and genetic expression.
- Students will be able to understand the basic mechanisms behind cell growth and division

UNIT-I (15 hrs)

The Cell : cell organization, organelles, Intracellular compartments Cytoskeleton & Cell Dynamics Cell junctions; Cell adhesion; Extracellular Matrix; Cell migration, Cell signaling – Typical ligand-receptor systems; Intracellular signaling systems; Signal transduction,

UNIT-II (15 hrs)

Cell growth & Division – Basic mechanism of mitosis & apoptosis, Oncogenes, Tumor Suppressor Genes, and Programmed Cell Death.

UNIT-III (15 hrs)

DNA Replication; Mutations & Repair Mechanisms; Recombination Transcription – Synthesis of RNA; RNA Processing; Regulation Translation – Mechanism; Regulation Protein Metabolism – Synthesis;

UNIT-IV (15 hrs)

Targeting and Degradation Regulation of Gene Expression Hormonal Regulation and Metabolism, Genetic code, karyotyping and PCR

Recommended books

1. Watson, Hopkins, Roberts, Steitz and Weiner, Molecular Biology of the Gene 1984, The Benjamin/Cumming Pub. Co. Inc. California.
2. Alberts, Bray, Lewis, Raff., Roberts and Wtson (1983) Molecular Biology of the Cell, Garland pub. Inc. New York
3. Benjamin Lewin Gene IV, V, VI and VII 1997, Oxford Univ. Press. U.K.
4. Mayers R.A. Molecular Biology and Biotechnology, A comprehensive desk reference (Ed)VCH Pub. Inc. New York.
5. Brown T.A. Molecular Biology, Bios Scientific Pub. Ltd. Oxford.
6. Walker and Ginglod 1992. Molecular Biology & Biotechnology, Royal Society of Chemistry Cambridge.
7. Gardener, Simmons and Snustad. Principles of Genetics 1991, Wiley & Sons. Inc. New York

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

BASIC CONCEPT OF CELL BIOLOGY & MOLECULAR BIOLOGY PRACTICAL

Subject Code: MCEMS1-107

**L T P C
0 0 2 1**

Duration: 30 Hrs.

Course Outcomes

- Students will be able to get information regarding various cell organelles and their functioning with special stress on human chromosomes.
- Students will get a comprehensive overview of the structure of cell and organelles functions
- Students will be able to understand the basic process behind cell growth
- Students will learn about DNA replication.

PRACTICALS

1. To study the structure of cell
2. Permanent slides of mitosis and meiosis
3. Protocol of DNA Replication
4. Polymerase chain reaction (PCR)
5. Karyotyping

Recommended books

1. Watson, Hopkins, Roberts, Steitz and Weiner, Molecular Biology of the Gene 1984, The Benjamin/Cumming Pub. Co. Inc. California.
2. Alberts, Bray, Lewis, Raff., Roberts and Wtson (1983) Molecular Biology of the Cell, Garland pub. Inc. New York

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

INTRODUCTION OF CLINICAL EMBRYOLOGY PRACTICAL

Subject Code: MCEMS1-105

**L T P C
0 0 2 1**

Duration: 30 Hrs.

Course Outcomes:

- Students will be able to understand about clinical embryology after completing this module,
- Students will understand the application and scope of clinical embryology
- The student will learn to solve the problems regarding reproduction and reproductive systems.
- The student will be introduced to the different techniques of clinical embryology

PRACTICALS:

1. To study permanent slides of spermatogenesis, oogenesis
2. T.S of ovary
3. T.S of sperm
4. To study development of embryo from permanent slides
5. Demonstration of male reproductive system with the h
6. Demonstration of female reproductive system

Recommended books

1. Balinsky, B.I and Fabian, B.C. (2012) An Introduction to Embryology, 5th Edition. CengagePublishers
2. Sastry, K.V. and Shukla, V. (2018) Developmental Biology. Rastogi Publications.
3. Mishra, S. (2010) Langman's Medical Embryology, South Asia Edition
4. Williams, Text Book of Endocrinology, 10th edition (2002), W.B. Saunders Publications

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

**EMBRYOLOGY AND PHYSIOLOGY OF HUMAN REPRODUCTIVE SYSTEM
PRACTICAL**

Subject Code: MCEMS1-106

**L T P C
0 0 2 1**

Duration: 30 Hrs.

Course Outcomes:

- The student will be able to identify the key concepts of the structure and function of human reproductive system.
- The student will be able to build communication skills while involved in peer teaching of clinical *embryology*.
- The students will get a comprehensive overview of the morphology and functional reproductive system of the human body.
- The course will provide an insight into the implications of disruption of normal structure and function.

PRACTICALS:

1. To study menstrual cycle
2. To study diseases related to menstrual cycle
3. To study different months of human embryo
4. To study different types of pregnancy tests
5. Demonstration of Embryology Models
6. Histology Slides of Testes and Ovary

Reference Books

1. Guyton, Text Book of Medical Physiology, 12th edition(2011), Elsevier Publication
2. Prof .G.K.Pal, Text Book of medical Physiology, 2nd Edition(2015), Ahuja Publication
3. Indu Khurana, Medical Physiology, 1st Edition (2012), Elsevier Publication
4. A.K.Jain, Text Book of Physiology , 6th edition vol i&ii, Avichal publishing company, 2016
5. Williams, Text Book of Endocrinology , 10th edition (2002), W.B. Saunders Publications

SECOND SEMESTER

MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS

**IVF PROCEDURE: FERTILIZATION, EMBRYO PRODUCTION &
CRYOPRESERVATION TECHNIQUES**

Subject Code: MCEMS1-201

L T P C
3 1 0 4

Duration: 60 Hrs.

Course Objectives:

- After completing this module students will be able to know about clinical embryology lab techniques
- Application and scope

Course Outcomes:

The student will learn to solve the problems regarding reproduction and reproductive systems. The student will be introduced to the lab set up methods that's is useful in field of clinical embryology

UNIT-I (15 Hours)

Lab Set-up for IVF, Requirements and Protocols, Quality Control and Quality Assurance, Health and safety in the laboratory, Introduction to culture media, Handling and culture techniques, Preparation of media and buffer, Sequential culture media, Co-culture

UNIT –II (15 Hours)

Normal embryo development, abnormal embryo development, Metabolism of embryo, Grading of oocyte, Selection of embryo, Grading of embryo, Blastocyst culture –technique

UNIT –III (15 Hours)

Embryo transfer technique, USG guided embryo transfer, Embryo Reduction
Complication of IVF, Anesthesia, Patient Counseling, History of cryobiology, Physiology of cryobiology

UNIT –IV (15 Hours)

Cryoprotectant and its role, Lab Set-up for cryopreservation, Embryo freezing, Slow freezing technique, Vitrification of gamete of embryo, Recent development in cryobiology.

Recommended Books

1. David K. Gardner, Ariel,W, Coliin M. Howles, Textbook of Assisted reproductive Techniques, Vol.II ,5th Edition,2018
2. Pandy Manish R, The Techniques of IVF made easy with DVD-ROM, 1st Edition, Jaypee Brothers Medical Publisher
3. Chaitanya N., Sonal ,P., Practical Guide to Infertility Management & IVF, Jaypee Brothers Medical Publisher
4. Hirishekesh ,P., Manal on Advanced Infertility and Assisted Reproductive Techniques, Jaypee Brothers Medical Publisher 2013
5. Carol, T., Encyclopedia of Fertilty And Infertility, Viva Books Private Limited, 2010

REPRODUCTIVE DISORDERS AND HISTOLOGY

Subject Code: MCEMS1-202

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Objectives:

The student will be able to identify the key concepts of the structure and function of human reproductive system and its disorder.

Course Outcomes:

The aim of this course is to provide students with a comprehensive overview of the morphology and functional anatomy of the human reproductive system. The course provides an insight to the abnormalities of reproductive system

UNIT-I (15 Hours)

Sexual differentiation & developmental abnormalities – male & female Menstrual disorders – Precocious, delayed or absent puberty

UNIT-II (15 Hours)

Amenorrhea Fertility disorders – Sexual dysfunction; Infertility; Spontaneous pregnancy loss
Pregnancy disorders – Pre-eclampsia, IUGR, Labour abnormalities

UNIT-III (15 Hours)

Endocrine disorders – Hyperprolactinemia Autoimmune disorders Genetic disorders (mutations and syndromes),

UNIT-IV (15 Hours)

Cancers and biomarkers – Testicular; Prostate; Ovarian; Endometrial; Cervical; Breast
Reproductive pathology,

Recommended books

1. Balinsky, B.I and Fabian, B.C. (2012) An Introduction to Embryology, 5th Edition. CengagePublishers
2. Sastry, K.V. and Shukla, V. (2018) Developmental Biology. Rastogi Publications.
3. Mishra, S. (2010) Langman's Medical Embryology, South Asia Edition

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

INFERTILITY AND ITS CLINICAL MANAGEMENT, ANDROLOGY

Subject Code: MCEMS1-203

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Objectives:

- The student will be able to identify the key concepts of the Physiology of Ovulation.
- The student will be able to know about the Hormonal control of reproduction

Course Outcomes:

The aim of this course is to provide students information about Physiology of Ovulation, Folliculogenesis and the lab set up methods that's is useful in field of clinical embryology

UNIT -I (15 Hours)

Physiology of Ovulation, Folliculogenesis, Physiology of Menses, Hormonal control of human, Natural Cycle, Various stimulation protocols, Ovarian Hyperstimulation syndrome (OHSS), Complication of stimulation, Monitoring of patients, Reproductive function and causes of subfertility, Investigating male and female patients

UNIT -II (15 Hours)

Infertility and its management, Ultrasound, Elderly Patients, reproduction, Miscarriage, Ectopic Pregnancies, Multiple Gestation, Heterotrophic Pregnancies, Oocyte Donation Programme, Surrogacy

UNIT -III (15 Hours)

Physiology of Sperm, Spermatogenesis, Male Factor, Lab Set-up for andrology, Sperm separation, Semen analysis, Semen analysis as per WHO criteria, Sperm morphology assessment according to Strict (Kruger) criteria. Sperm survival test, Grading of Sperm

UNIT -IV (15 Hours)

Sperm preparation for IUI, Sperm preparation for IVF, Semen preparation for IUI-Classical method, Standard method and Density gradient method, Semen cryopreservation-both neat and processed sample, Sperm freezing, Donor Sperm Programme

Recommended Books:

1. David K. Gardner, Ariel, W, Coliin M. Howles, Textbook of Assisted reproductive Techniques, Vol.II ,5th Edition, 2018
2. Pandey Manish R, The Techniques of IVF made easy with DVD-ROM, 1st Edition, Jaypee Brothers Medical Publisher
3. Chaitanya N., Sonal ,P., Practical Guide to Infertility Management & IVF, Jaypee Brothers Medical Publisher
4. Hirishekesh ,P., Manual on Advanced Infertility and Assisted Reproductive Techniques, Jaypee Brothers Medical Publisher 2013
5. Carol, T., Encyclopedia of Fertilty And Infertility, Viva Books Private Limited, 2010

CYTOGENETIC

Subject Code: MCEMS1-204

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Objectives:

The student will be able to identify the key concepts of the molecular biology, chromosome structure, sex chromosome and different techniques of molecular biology.

Course Outcomes:

The aim of this course is to provide students information about molecular biology, chromosome and Genetic techniques that's is useful in field of clinical embryology

UNIT-I (15 Hours)

Biology of chromosomes: Metaphase chromosomes, Centromere, Kinetochore, Telomere & its maintenance Heterochromatin & Euchromatin, Sex determination: Sex chromosomes & Sex determining mechanisms, Dosage compensation in Man.

UNIT-II (15 Hours)

Cytogenetic implications and consequences of Structural changes and Numerical change, Role of genetics in infertility, Chromosomal and genetic analysis in IVF,

UNIT –III (15 Hours)

Genetic techniques, FISH, Preparation of blastomeres for FISH, CGH, Flow cytometry, Automated Karyotyping, Embryo biopsies Role of genetics in OATS, Genes and RPL (Recurrent pregnancy losses)

UNIT –IV (15 Hours)

Somatic cell geneti: Cell fusion, hybrid agents and mechanism of fusion, Heterokaryon-selective hybrids and chromosome segregation.

RECOMMENDED BOOK:

1. Edwin H. Mcconkey, 1993. Human genetics, the molecular revolution.
2. Peter J. Russel, 1998, Genetics.
3. Avers C.J., 1984, Genetics
4. Gardner, E.J., Simmons, M.J. & Snustad, P. Principles of Genetics, 1991, 1991, John Wiley & Sons Inc. New York.
5. Monroe W. Strickberger Genetics, 1985, Macmillan Publishing Company, New York.
6. Seth, P.K. & Seth, S. 1994, Human Genetics, New perspectives, Omega Scientific Publishers.
7. Strachan, Tom and Read, A.W. Human Molecular Genetics 2004, Garlandjd Science London, New York.

**IVF PROCEDURE: FERTILIZATION, EMBRYO PRODUCTION &
CRYOPRESERVATION TECHNIQUES PRACTICAL**

Subject Code: MCEMS1-205

L T P C
0 0 4 2

Duration: 60 Hrs.

Course Objectives:

- After completing this module students will be able to know about clinical embryology lab techniques
- Application and scope

Course Outcomes:

The student will learn to solve the problems regarding reproduction and reproductive systems. The student will be introduced to the lab set up methods that's is useful in field of clinical embryology

PRACTICALS

1. Introduction to lab
 - a. Lab ethics
 - b. Aseptic precaution
2. Introduction to instruments
 - a. Handling of instruments
 - b. Insemination technique
3. Identification of oocyte
 - a. Grading of oocyte
 - b. Insemination of oocyte
4. Denuding
5. Ferti-check on day 1
6. Classification of 2PN
7. Growth of embryo on day 2
8. Shifting of embryos
9. Quality of embryo on day 3
10. Grading of blastocyst
11. Selection of blastocyst for embryo transfer
12. Vitrification of blastocyst
13. Vitrification of cleaving embryos
14. Retrieval of vitrified embryos

REPRODUCTIVE DISORDERS AND HISTOLOGY PRACTICAL

Subject Code: MCEMS1-206

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Course Objectives:

The student will be able to identify the key concepts of the structure and function of human reproductive system and its disorder.

Course Outcomes:

The aim of this course is to provide students with a comprehensive overview of the morphology and functional anatomy of the human reproductive system. The course provides an insight to the abnormalities of reproductive system

PRACTICALS

1. Histology of male reproductive system Testis, Epididymis, Ductus deferens and accessory reproductive glands of male; Seminal vesicles, Prostate gland, Cowper's gland
2. Histology of female reproductive system: Ovary, Oogenesis, Structure of Ovum and Corpus luteum
3. Study of Permanent slides: Spermatogenesis, Mammary gland and Placenta.

CYTOGENETIC PRACTICAL

Subject Code: MCEMS1-207

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Course Objectives:

The student will be able to identify the key concepts of the molecular biology, chromosome structure, sex chromosome and different techniques of molecular biology.

Course Outcomes:

The aim of this course is to provide students information about molecular biology, chromosome and Genetic techniques that's is useful in field of clinical embryology

PRACTICALS

1. To study the human karyotype.
2. Genetic techniques, FISH, Preparation of blastomeres for FISH,CGH, Flow cytometry,
3. Chromosome mapping
4. To study the sex chromatin body in the human neutrophil cells.
5. To study the sex chromatin body in the human buccal mucosal cells

THIRD SEMESTER

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

ASSISTED REPRODUCTIVE TECHNIQUES

Subject Code: MCEMS1-301

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Objective:

1. To provide a brief introduction to reproductive techniques
2. To provide practically and clinically useful application of reproductive techniques

Course Outcomes:

1. To develop an understanding regarding assisted reproductive techniques
2. To make students aware of recent advances in assisted reproductive techniques

UNIT-I (15 Hrs)

Semen analysis Ovulation induction; Oocyte retrieval; In vitro maturation In vitro fertilization ICSI, GIFT.

UNIT-II (15 Hrs)

Cryopreservation of gametes & embryos; Vitrification Embryo biopsy; Embryo hatching Pre-implantation genetic diagnosis (PGD) Stem cells & therapeutic cloning C.

UNIT-III (15 Hrs)

Lab Techniques – Principles & Instrumentation Basic instrumentation – pH meter; Centrifuges; Microscopes; Electrophoresis Genetic manipulation / Nucleic acid techniques – DNA & RNA isolation; PCR etc. SDS-PAGE & Western blotting Cell biology techniques – Cell culture; Transfection etc.

UNIT-IV (15 Hrs)

Immuno techniques – RIA; ELISA; CMIA Molecular Cytogenetics techniques – FISH; Karyotyping; Microarray; PRINS; QFPCR; Array CGH; MLPA etc

Reference Books:

1. Textbook of assisted reproductive techniques by David K Gardener, Ariel Weissman, Colin M Howles and Zeev Shoham
2. Advances in assisted reproductive technology by Nayana H Patel
3. Textbook of Assisted Reproduction by Gautam Nand Allahbadia, Baris Ata, Steven R. Lindheim, Bryan J. Woodward, Bala Bhagavath.

MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS

**REASRCH METHODOLOGY-QUALITY CONTROL, REASRCH ETHICS,
SCIENTIFIC WRITING**

Subject Code: MCEMS1-302

L T P C

Duration: 60 Hrs.

3 1 0 4

Course Objectives:

1. To define the type and quantity of data that need to be collected.
2. To organize, summarize, analyze the data and draw conclusions from it. To assess the strengths of the conclusions and evaluate their uncertainty

Course Outcomes:

In this course students will learn how to

1. Effectively collect and describe data
2. To use data to make inferences and conclusions about real world.

UNIT-I (15 Hrs)

Biostatistics Introduction to Biostatistics - scope & need for the application of statistical methods in medical and biological data Definition of different terms in statistical methods - Scale of measurements; Methods of data collection Presentation of data - statistical tables, diagrams and graphs; Needs for reduction of data - measures of average and location Measures of dispersion - Range, quartile deviation, mean deviation and standard deviation.

UNIT-II (15 Hrs)

Concepts of statistical population and sample - need for sampling studies, Simple procedures of random sampling; Methods of sampling Probability: Basics concepts and theorems of probability Standard error, estimation and testing the statistical significance; Test of significance: Normal deviate test (Z test); Student's t tests; Chi-Squared tests; F - Test and one way analysis of variance and multiple range tests; Two way analysis of variance and multiple range test; Non- Parametric statistical methods; Correlation - definition and application; Regression - definition and application; Statistical methods in Diagnostic Tests

UNIT-III (15 Hrs)

Current legislation and regulation in ART, India ,Requirement for licensing, accrediting and approving ART clinics ,National guidelines for accreditation of ART clinics in India ,Ethics consideration and legal issues ,Ethical policies ,Indian Society for Assisted Reproduction (ISAR)

UNIT-IV (15 Hrs)

Surrogacy- Ethical and legal issues □ □ Ethical frameworks and principles □ □ Relevant regulatory body, Role of ethics in health care Social and ethical responsibilities with regards to patient care □ □ Patient Consent

RECOMMENDED BOOKS

1. Gupta, PK 2005. Cell and Molecular Biology. Rastogi Publications. Meerut.
2. Singh, BD 2003. Biotechnology. Kalyani Publishers. New Delhi.
3. Pavia, D.L., Lampmann, N.G.M and Kris, G.S. 2001 introduction to spectroscopy, 3rd edn. Harcourt, New York.
4. Gupta, S.C., and Kapoor, V.K, 2001 fundamentals of Applied Statistics. Sultan Chand K Sons, 3 rd edn, Jan 2001.
5. Pillai, RSN and Bagavathi; V.2001 statistics. S Chand & Company Ltd, 2001

**MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS**

CLINICAL BIOCHEMISTRY

Subject Code: MCEMS1-303

**L T P C
3 1 0 4**

Duration: 60 Hrs.

Course Objectives:

To provide a brief understanding of biochemistry to apply it in clinical embryology.

Course Outcomes:

This course aims to provide information about clinical biochemistry techniques that is useful in field of clinical embryology

UNIT I (15 hrs)

General biochemistry – chemistry of carbohydrates, lipids, proteins

Nucleic acid – nucleotides, the structure of DNA & RNA

UNIT II (15 hrs)

Vitamins (general, classification) and Minerals

Water & electrolyte balance and body fluids

Acid base balance and pH

Free radicals and antioxidants

Detoxification and biotransformation of xenobiotics

Nutrition and environmental pollution

Bioenergetics

UNIT III (15 hrs)

Over view of Metabolism – metabolism of carbohydrates, lipids, proteins

Enzymology

Hormones

Hemoglobin and plasma proteins

Immunoglobulins, Lipoproteins

UNIT IV (15 hrs)

Advanced biochemistry: mechanisms of action of hormones, immunochemistry, biochemistry of AIDS and cancer, biochemistry Aging, Clinical laboratory practices

Reference Books:

1. Clinical biochemistry- Metabolic and clinical aspects by William J Marshal, Marta Lapsley, Andrew P Day, and Ruth M Ayling
2. Textbook of Clinical Biochemistry by Ramnik Sood
3. Textbook of Clinical Biochemistry by SS Haque

MRSPTU M.SC. (CLINICAL EMBRYOLOGY)
SYLLABUS 2023 BATCH ONWARDS

ASSISTED REPRODUCTIVE TECHNIQUES PRACTICAL

Subject Code: MCEMS1-304

L T P C
0 0 4 2

Duration: 60 Hrs.

Course Objective:

1. To provide a brief introduction to reproductive techniques
2. To provide practically and clinically useful application of reproductive techniques

Course Outcomes:

1. To develop an understanding regarding assisted reproductive techniques
2. To make students aware of recent advances in assisted reproductive techniques

PRACTICALS

3. Set up of IVF lab: QA and AC for IVF lab, QA and QC practices, Precision of IVF procedure
4. Designing of IVF lab and its location in the clinic, Record keeping, Lab maintenance protocol, Roster of work
5. Introduction and maintenance of all instruments in IVF lab, Calibration of all instruments
6. Quality improvement techniques, Review national and international guidelines, Trouble shooting and its solution

Reference Books:

Practical guide in Assisted Reproductive Technology by Gita Ganguly Mukherjee, Gautam Khastgir and Sidhartha Chatterjee

CLINICAL BIOCHEMISTRY PRACTICAL

Subject Code: MCEMS1-305

**L T P C
0 0 4 2**

Duration: 60 Hrs.

Course Objectives:

1. To provide an introduction to students with the specific characteristics of a laboratory of clinical biochemistry
2. To understand the pathophysiology and molecular basis of the most prevalent diseases
3. To know the analytical methods commonly used in the clinical laboratory

Course Outcomes: Students completing the course should be able to frame a scientific question or problem and be able to undertake investigations and perform analyses that provide information about biochemical questions and help to solve biochemical problems.

Experiments:

1. Introduction to Clinical Biochemistry Laboratory
2. Buffer & pH
3. Urine Analysis
4. Blood Sugar
5. Urinary Proteins
6. Serum Electrolytes
7. HCG by ELISA
8. DNA- Isolation & Quantification
9. pH meter

Reference Books:

1. Practical Clinical Biochemistry- Methods and Interpretations by Ranjna Chawla
2. Practical Clinical Biochemistry by Harold Varley
3. Practical Clinical Biochemistry by Shruti Mohanty and Aparna B Varma

**REASRCH METHODOLOGY-QUALITY CONTROL, REASRCH ETHICS,
SCIENTIFIC WRITING PRACTICAL**

Subject Code: MCEMS1-306

**L T P C
0 0 8 4**

Duration: 120 Hrs.

Course Objectives: The course provides the theoretical insight and practical skills required to plan, implement, analyze, and report scientific findings in the area of urban planning and design.

Course Outcomes: After completion of this course, students will be able to
a student should be able to:

1. Explain and apply techniques for scientific writing and research methodology to prepare the writing of a scientific report.
2. Perform investigation using methods, explain and take position on the results as well as summarize related work
3. Apply the knowledge in scientific writing and research methodology and use the knowledge to write a scientific report.

PRACTICALS

1. Methods of data collection
2. measures of average and location Measures of dispersion - Range, quartile deviation, mean deviation and standard deviation
3. Methods of sampling Probability: Basics concepts and theorems of probability
Standard error, estimation and testing the statistical significance
4. Test of significance: Normal deviate test (Z test)
5. Student's t-tests; Chi-Squared tests
6. F - Test and one-way analysis of variance and multiple range tests;

Reference Books:

1. Research methodology and scientific writing by George Thomas
2. Research methodology by CR Kothari and Gaurav Garg