Name of the Degree: M.Sc. Clinical Embryology

Objectives of the programme -

1. Develop/ produce trained manpower with strong knowledge base in clinical embryology.
2. To impart knowledge of embryology**.**
3. To teach the basics of an ART center where they can work as clinical embryologists.
4. To impart knowledge on cryopreservation & practice of embryo freezing so that they can work in cryopreservation centers.
5. To give them the basic knowledge of genetics so that they can work in genetics lab.
6. To train students in micromanipulation of sperm and oocytes for carrying out ICSI and single- cell biopsies of embryos for preimpiantation genetic diagnosis.

Semester I									
Sr. No.	**Course type**	**COURSE CODE**	**COURSE NAME**	**LECRURES**	**PRACICALS**	**CREDIT**	**Marks**		
							Internal Assessment	**Semester Exam**	**Total**
1	MAJOR	MSCCE101	Relevant Gross Anatomy	4	0	4	30	70	100
2	MAJOR	MSCCE102	Histology	4	0	4	30	70	100
3	MAJOR	MSCCE103	Genetics and Reproductive Hormone	4	**0**	4	30	70	100
4	MAJOR	MSCCE104	General& Systemic Embryology	4	**0**	4	30	70	100
1	MINOR	MSCCE105	Relevant Gross Anatomy	0	2	2	20	30	50
2	MINOR	MSCCE106	Histology	0	2	2	20	30	50
3	MINOR	MSCCE107	Genetics and Reproductive Hormone	0	2	2	20	30	50
4	MINOR	MSCCE108	General& Systemic Embryology	**0**	2	2	20	30	50
			Total	16	8	24	200	400	600

Semester II									
SR.NO	**COURSE TYPE**	**COURSE CODE.**	**COURSE NAME**	**LECTURES**	**PRACTICALS**	**CREDIT**	**Marks**		
							Internal Assessment	**Semester Exam**	**Total**
	MAJOR	MSCCE201	Infertility & Ovulation induction methods	4	**0**	4	30	70	100
	MAJOR	MSCCE202	Quality assessment, statistics, handling data, ethics, legislation	4	**0**	4	30	70	100
	MAJOR	MSCCE203	IVF procedure	4	0	4	30	70	100
	MAJOR	MSCCE204	Research Methodology & Biostatistics(Core Course)	4	**0**	4	30	70	100
	MINOR	MSCCE205	Infertility & Ovulation induction methods	0	2	2	20	30	50
	MINOR	MSCCE206	Quality assessment, statistics, handling data, ethics, legislation	0	2	2	20	30	50
	MINOR	MSCCE207	IVF procedure	0	2	2	20	30	50
	MINOR	MSCCE208	Research Methodology & Biostatistics (Core Course)	0	2	2	20	30	50
			Total	16	8	24	200	400	600

Semester III									
Sr. No.	**COURSE TYPE**	**COURSE CODE.**	**COURSE NAME**	**LECTURE**	**PRACTICAL**	**CREDIT**	**Marks**		
							Internal Assessment	**Semester Exam**	**Total**
	MAJOR	CE 108 T	Introduction to IVF lab	4	0	4	30	70	100
	MAJOR	CE 109 T	Techniques used in IVF Lab	4	**0**	4	30	70	100
	Core Elective course**								
	MAJOR	CE 110 T	ICSI	4		4	30	70	100
	MAJOR	CE 111 T	Biochemistry including steroid metabolism						
	MAJOR	CE 112 T	Lab equipment						
	MAJOR	CE 113	Dissertation/Project Proposal*	0	4	4	30	70	100
	MINOR	CE 108 P	Introduction to IVF lab	0	2	2	20	30	50
	MINOR	CE 109 P	Techniques used in IVF Lab	0	**2**	2	20	30	50
	Core Elective practical								
	MINOR	CE 110 P	ICSI	0	2	2	20	30	50
	MINOR	CE 111 P	Biochemistry including steroid metabolism						
	MINOR	CE 112 P	Lab equipment						
	MINOR	CE 114	Seminar*	0	2	2	20	30	50
			Total	12	12	24	200	400	600

Semester IV									
Sr. No.	**COURSE TYPE**	**COURSE CODE.**	**COURSE NAME**	**LECTURES**	**PRACTICALS**	**CREDITS**	**Marks**		
							Internal Assessment	**Semester Exam**	**Total**
1		**	**General elective**						
	MAJOR	GE 001 T	Pursuit of Inner Self Excellence (POISE)	4	0	4	30	70	100
	MAJOR	GE 002 T	IPR & Bioethics ▲(Multidisciplinary/ Interdisciplinary)						
	MAJOR	GE 003 T	Disaster management and mitigation resources						
	MAJOR	GE 004 T	Human rights						
2	MAJOR	CE 113	Dissertation / Project*	0	18	18	50	450	450
1	**MINOR**	CE 115 P	Educational Tour / Field Work/Industrial Visit/Hospital Visit*	0	**2**	0	20	30-	50
			Total	4	20	24	100	500	600

*(a) ***Dissertation / Project*** **Course** commences in III Semester

(b) ***Educational Tours / Field Works*** Course may be carried out in any Semester or all Semesters but evaluated and Grade Points are to be added in 4th Semester.

(Elective): Any one subject is to be chosen from the following (Subjects offered may change from time to time depending on the availability of expertise)

**Elective courses may or may not have practical and/or field work.

▲ Multidisciplinary / Interdisciplinary

EDUCATIONAL/INDUSTRIAL TOUR:

Industrial visit has its own importance in building a career of a student which is pursuing a professional degree. Objections of industrial visit are to provide students an insight regarding internal working of reputed hospitals and labs. Industrial visits provides students an opportunity to learn practically thoughts interactions, working methods and employment practices as theoretical knowledge is not enough for making a competent and skilful professionals.

Semester I

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE101**
Name of the Course	**Relevant Gross Anatomy**

Unit	Topic	
1	Introduction to anatomy -	Introduction and terminology
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, blood supply, applied anatomy
		Seminal vesicle - structure, blood supply, applied anatomy
		Prostate - structure, capsule, blood supply, nerve supply, lymphatic drainage, applied anatomy
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
		Mammary gland - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy
4	Urinary system -	Urinary bladder - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy
5	Endocrine system -	Hypothalamus - structure, nuclei, blood supply, applied anatomy
		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

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE102**
Name of the Course	**Histology (Theory-45 hrs)**

Unit	Topic	
1	General	Introduction to histology
		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
		Histology of Epidydimis
		Histology of Vas deferens, seminal vesicle
		Histology of Prostate
3	Female reproductive system	Histology of ovary
		Histology of Fallopian tube
		Histology of uterus
		Histology of mammary gland
		Histology of placenta
4	Urinary system	Histology of urinary bladder
5	Endocrines	Histology of pituitary
		Histology of thyroid
		Histology of suprarenal

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE103**
Name of the Course	**Genetics and Reproductive Hormone**

Unit	Topic		
1. Genetics	i.	Introduction and Chromosomes	Introduction and branches of genetics
			Mendel's law of inheritance
			Chromosomes
			Chromosomal disorders
	ii.	Molecular genetics	Molecular genetics
			Modes of inheritance and gene disorders
	iii.	Developmental Genetics	Developmental Genetics
	iv.	Prenatal diagnosis and genetic counseling	Genetic counseling
			Prenatal diagnosis and treatment of genetic disease
			Preimplantation genetic diagnosis
	v.	Genetic techniques	Recombinant DNA Technology
			PCR
			FISH
	vi.	Genetics in infertility	Role of genetics in infertility
			Genes and recurrent pregnancy losses
			Chromosomal and genetic analysis in IVF
			Embryo biopsies
	vii.	Epigenetics	Epigenetics
	viii.	The Human genome project.	The Human genome project.
2. Physiology of reproductive hormones	i.	Pituitary and Thyroid hormones	Pituitary hormones (FSH, LH, Prolactin, Oxytocin)
	ii.		Thyroid hormones
	iii.	Male and female sex hormones	Ovarian hormones with placental hormones
			Testicular hormones

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE104**
Name of the Course	**General & Systemic Embryology (Theory-60 hrs)**

Unit	Topic	
1	Introduction	Introduction to embryology
		Cell division – mitosis, meiosis, cell cycle
		Gametogenesis – spermatogenesis, Oogenesis and ovarian cycle
		Menstrual cycle
2	1st week	Fertilization
		1st week of development with implantation
3	2nd week	2nd week of development – amniotic cavity, yolk sac, Bilaminar germ disc
4	3rd week	Gastrulation , Primitive streak and three germ layers
		Notochord
		Neural tube development
5	4th week	Fate of germ layers and derivatives of germ layers
		Folding of embryo
6	Trophoblast and twinning	Development of trophoblast and its derivatives
		Development of placenta
		Twinning
7	Urinary system	Development of Urinary system
8	MRS	Development of Male reproductive system
9	FRS	Development of Female reproductive system Female

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE105**
Name of the Course	**Relevant Gross Anatomy (Practical) (60 hrs)**

Unit	Topic	
Relevant gross anatomy (Study of organ systems though prosection and charts)	i. Male reproductive system	Testis, Epididymis, Spermatic cord, Vas deferens, Seminal vesicle, Prostate
	ii. Female reproductive system	Ovary, Fallopian tube, Uterus, Vagina
	iii. Urinary system	Urinary bladder
	iv. Endocrine system	Hypothalamus, Pituitary, Thyroid, Suprarenal

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE106**
Name of the Course	**Histology**

Unit	Topic	
Histology (slides and charts)	i. General	Cell, Epithelial tissue, Connective tissue, Muscle, Nervous tissue
	ii. MRS	Testis, Epididymis, Vas deferens, Prostate
	iii. F RS	Ovary, Fallopian tube, Uterus, mammary gland, placenta
	iv. Urinary system	Urinary bladder
	v. Endocrine	Hypothalamus, Pituitary, Thyroid, Suprarenal

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE107**
Name of the Course	**Genetics and Reproductive Hormone (Practical-60 hrs)**

Unit	Topic -	
Genetics (cytogenetic lab and charts , photographs and videos)	i. Disorders	Chromosomal disorders
		Modes of inheritance and gene disorders
	ii. 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

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE108**
Name of the Course	**General & Systemic Embryology (Practical-60 hrs)**

Unit	Topic	
General embryology (models and charts)	Introduction	Cell division, Gametogenesis, ovarian cycle, Sperm, ovum, Menstrual cycle
	1st week	Fertilization, implantation
	2nd week	amniotic cavity, yolk sac, Bilaminar germ disc
	3rd week	Primitive streak and three germ layers, Notochord, Neural tube
	4th week	Folding of embryo
	Trophoblast and twinning	Placenta, Twinning

Systemic embryology (models and charts)	Urinary system	Metanephricblastema, ureteric bud, ascent of kidneys
	MRS	Gonad, mesonephric duct, descent of testis
	FRS	Gonad, paramesonephric duct, descent of ovary

Semester II

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE201**
Name of the Course	**Infertility & Ovulation Induction Methods**

Unit	Topic	
1	Infertility	Introduction, physiological infertility, criteria for investigation
		Normal follicular genesis, ovulation, menstrual cycle, spermatogenesis, Hormonal control of human reproduction
2	Male infertility	Causes
		Investigations – semen analysis, (WHO criteria) Effective sperm count Sperm morphology assessment by Strict (Kruger) criteria Sperm penetration and survival test Testicular biopsy Chromosomal study Immunological and FISH level studies
		Management - Role of surgery, antibiotics, hormonal therapy and ART(basics)
3	Female infertility	Causes
		Investigations – history General examination Tubal patency Study normalcy of ovulation – basal body temperature, cytology, USG, Fern test, SpinnBarkeit test, endometrial biopsy, hormonal study
		Management – microsurgery, ART(basics)
4	Drugs of infertility	Hormones
		Ovulation induction drugs
		Drugs acting on uterus
		Drugs during pregnancy
		Drugs during lactation
5	Principle	Principle and selection of patient
6	Methods and protocols	Drugs and method
		Various stimulation protocols
7	Monitoring	Follicular study, Patient monitoring
8	Complications and OHSS	Hyper stimulation and OHSS (ovarian hyper stimulation syndrome) Complications of stimulation – Miscarriage, Ectopic pregnancy, Multiple gestation, Heterotrophic pregnancy
9	Ovum pick up	Ovum pick up

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE**202
Name of the Course	**Quality Assessment, Statistics, Handling Data, Ethics, Legislation**

Unit	Topic	
1	Patient data	Identity check, Confidentiality, Keeping records, Safety, Coding
2	Legislation	National legislation (what is allowed in your country), Ethical consideration, Code of practice
3	The EU- Directive	Examples of what the directive covers, Implementation in own country
4	Non – routine methods	Natural cycle/ modified natural cycle, Minimal stimulation cycle, IVM, PGS, LAH
5	Innovative techniques in human embryo viability assessment	Transcryptomics, Proteomics, Metabolomics, Time – lapse embryo development monitoring system
6	Risk in the IVF Laboratory	Contaminated samples, Processing and storage of sample known / suspected to be contaminated, With contagious agents
7	Staff protection	Hygiene, Rules and regulations, Protective measurements (gloves, masks etc) , Actions upon injury
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

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE203**
Name of the Course	**IVF procedure**

Unit	Topic	
1	Embryo development and metabolism	Normal and abnormal embryo development
		Metabolism of embryo
2	Sperm preparation	Sperm preparation for IVF
		Sperm preparation for IUI
		Sperm preparation for IUI – classical, standard and density gradient method
3	Grading of gamete and embryo	Grading of oocyte
		Grading of sperm
		Grading of embryo
		Selection of embryo
4	Embryo culture and transfer techniques	Blastocyst culture technique
		Embryo transfer technique
		USG guided embryo transfer
		ZIFT, GIFT
		Embryo reduction
5	Complications and counselling	Complications of IVF
		Anaesthesia
		Patient counseling

Name of the Programme	**M. SC MEDICAL BIOTECHNOLOGY**
Course Code	**MSCCE204**
Name of the Course	**RESEARCH METHODOLOGY & BIOSTATISTICS (CORE COURSE)**

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, analyse 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.	**Topics**
A	**Research Methodology:**
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, Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report
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, Panel Studies.
3	Sampling Designs: Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs (Probability sampling and non probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.
4	Measurement in research: Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques, Possible sources of error in measurement, Tests of sound measurement
5	Methods of Data Collection: Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data

6	Sampling Fundamentals : Need and importance for Sampling, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating the Population Mean Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level.
B	**Biostatistics**
7	Data Presentation: Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs
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).
9	Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Normal distribution, data transformation Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance, Testing the Equality of Variances of Two Normal Populations.
10	Chi-square Test: Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency.
11	Measures of Relationship: Need and meaning, Correlation and Simple Regression Analysis
12	Analysis of Variance and Covariance: Analysis of Variance (ANOVA):Concept and technique of ANOVA, One-way ANOVA, Two-way ANOVA, ANOVA in Latin-Square Design Analysis of Co-variance (ANOCOVA), ANOCOVA Technique.
13	Nonparametric or Distribution-free Tests: Important Nonparametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test Kruskal Walli's test, Friedman's test, and Spearman Correlation test.
14	Vital Health Statistics: Measurement of Population: rate, crude rate, specific rate, Measurement of fertility: specific fertility rate, Total fertility rate, Reproduction rate, Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR), Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity.
15	Computer Application Use of Computer in data analysis and research, Use of Software and Statistical package. Introduction to SPSS. Importing data from excel, access, tab and comma separated files. Entering data, labeling a variable, coding and recoding a categorical and continuous variable. Converting data from string to numeric variables, sorting & filtering, merging, appending data sets. Frequencies, descriptive statistics, cross tabulations. Diagrammatic presentation include histogram, bar chart, pie chart, scatter diagram, box plot, line chart. Parametric test of hypothesis-one sample, Independent and paired sample t test, one way ANOVA& post HOC test. Testing for normality, Chi-square test with measures of association. Pearson correlation. Non parametric test.

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE205**
Name of the Course	**Infertility & Ovulation Induction Methods**

Infertility (in IVF lab)	i. Male infertility	Causes of Male infertility
		Investigation of Male infertility
		Management of Male infertility
	ii. Female infertility	Causes of Female infertility
		Investigation of Female infertility
		Management of Female infertility
	iii. Drugs of infertility	Use of various drugs of infertility
Ovulation induction methods	i. Methods and protocols	Drugs and method
		Various stimulation protocols
	ii. Monitoring	Follicular study
		Patient monitoring and complications
	iii. Ovum pick up	Ovum pick up

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE206**
Name of the Course	**Quality Assessment, Statistics, Handling Data, Ethics, Legislation**

Unit	**Topic**
1	Problems related to Confidentiality
2	Safety
3	PNDT Cases
4	MTP Act related Rules
5	Stem cell related Cases
6	Surrogacy related cases
7	Study Design

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE207**
Name of the Course	**IVF Procedure**

Unit	Topic	
In IVF laboratory	i. Embryo development and metabolism	Normal and abnormal embryo development
	ii. Sperm preparation	Sperm preparation for IVF, IUI, various methods
	iii. Grading of gamete and embryo	Grading of oocyte, sperm, embryo and Selection of embryo
	iv. Embryo culture and transfer techniques	Blastocyst culture technique
		Embryo transfer technique
		USG guided embryo transfer
		ZIFT, GIFT
		Embryo reduction
	v. Complications and counselling	Complications of IVF
		Anesthesia
		Patient counseling

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE208**
Name of the Course	**Research Methodology & Biostatistics**

Sr. No.	**Topics**
A	**Research Methodology**
1	Sampling Designs
2	Measurement in research
3	Methods of Data Collection
4	Sampling Fundamentals
B	**Biostatistics**
5	Data Presentation
6	Measures of Central Tendency and Dispersion
7	Testing of Hypotheses
8	Chi-square Test
9	Measures of Relationship
10	Analysis of Variance and Covariance
11	Nonparametric or Distribution-free Tests
12	Vital Health Statistics: Measurement of Population
13	Computer Application Using Statistical Software

Semester III

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE301**
Name of the Course	**Introduction to IVF Lab**

Unit	Topic	
1	Introduction	Introduction to lab
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
		Designing of IVF lab and its location in the clinic
		Precision of IVF procedure
4	Records and maintenance	Record keeping
		Lab maintenance protocol
		Roster of work
5	Quality improvement	Quality improvement techniques
		Review of national and international guide lines

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE** 302
Name of the Course	**Techniques used in IVF Lab**

Unit	Topic	
1 Cryopreservation	i. Introduction	Introduction and history
	ii. Cryo protectant	Physiology of cryobiology
		Role of cryo protectant
	iii. Cryopreservation of various samples	Semen cryopreservation – neat and processed sample
		Embryo-freezing
		Vitrifiation of gamete, embryo, blastocyst and cleaving embryos
		Gonadal cryopreservation
	iv. Freezing and Retrieval techniques	Slow freezing technique
		Retrieval of vitrified embryos
	v. Recent development	Recent development in cryobiology
		Cord blood and tissue banking
2 Culture media	i. Introduction	Introduction to culture media
	ii. Handling of culture media	Handling of culture media
		Preparation of culture media and buffer
	iii. Various culture media techniques	Culture techniques
		Sequential culture media
		Blastocyst culture technique
	iv. Co-culture	Co-culture

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE305**
Name of the Course	**Introduction to IVF Lab(Practical 60 hrs)**

Unit	Topic
1	IVF lab set-up
2	Details of Lab - set up for andrology
3	Details of Lab – set up for cryopreservation
4	Precision of IVF procedure
5	Record keeping
6	Lab maintenance protocol

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE306**
Name of the Course	**Techniques used in IVF Lab**
Unit	**Topic**
1. Cryopreservation of various samples	Semen cryopreservation – neat and processed sample
	Embryo-freezing
	Vitrifiation of gamete, embryo, blastocyst and cleaving embryos
	Gonadal cryopreservation
2. Freezing and Retrieval techniques	Slow freezing technique
	Retrieval of vitrified embryos
3. Handling of culture media	Handling of culture media
	Preparation of culture media and buffer
4. Various culture media techniques	Culture techniques
	Sequential culture media
	Blastocyst culture technique
5. Co-culture	Co-culture

Core Elective Course

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE3031**
Name of the Course	**ICSI (Intra cytoplasmic sperm injection)**

Unit	Topic	
1	Introduction	History and philosophy of ICSI
2	Indications and contraindications	Indications and contraindications of ICSI
		Obstructive azoospermia and ICSI
3	Techniques	PESA, TESA, TESE and ICSI
4	Micromanipulator	Micromanipulator
		Physics of micromanipulation
5	Equipment	Equipment for ICSI
6	Pre procedure	Sperm immobilization
		Sperm selection
		Sperm separation from testicular biopsies
		Sperm preparation for ICSI from ejaculates and testicular biopsies
		ICSI medias
		Denuding of oocyte
		Micropipette handling
7	Procedure	ICSI procedure
8	Risk of anomalies	Risk of anomalies in ICSI
9	IMSI	IMSI - intra cytoplasmic morphologically selected sperm injection
10	Microscopy	Identification of – abnormal sperms, immature sperms, Spermatids, spermatocytes and other cells
11	Assessment and counselling	Ferti-check – assessment of fertilization
		Patient counselling

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE3032**
Name of the Course	**Biochemistry Including Steroid Metabolism**

Unit	Topic	
1	Genetics	Basic genetics of the cell, DNA Chromatin Chromosomes, Concept of a gene, Mutations, Epigenetics
2	Basic gene regulation	Translation, Transcription, Expression, Imprinting
3	Basic Genetics	Genotype. Phenotype, Basic Mendelian inheritance patterns, Monogenic diseases, Chromosomal abnormalities: numerical, structural, Interpretation of a pedigree
4	Genetic analysis	How and Why, Basic methods: Cytogenetics (karyotyping, FISH,), Molecular genetics, (PCR,...)
5	Stem Cell Therapy	Immunology concerning reproductive tract: Embryo & endometrial dialogue
6	Endocrinology concerning reproductive system	Pharmacology: Basic, Pharmacology related to the Reproductive System including the Hormones

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE3033**
Name of the Course	**Lab equipment**

Unit	Topic	
1	Introduction	Introduction to lab equipment
2	Instruments	Various instruments in the laboratory
		Details of micro-manipulator, micropipette other equipment of ICSI
3	Microscopes	Microscopes
4	Instruments handling	Techniques of handling various instruments
5	Maintenance	Maintenance of all the instruments in the lab
6	Calibration	Calibration of all the instruments in the lab
7	Trouble shooting	Trouble shooting and problem solving

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE**304
Name of the Course	**DISSERTATION / PROJECT PROPOSAL**

****The Dissertation work will begin from 3rd Semester, and will continue through the 4th Semester.**

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE3071**
Name of the Course	**ICSI PRACTICALS**

Unit	Topic	
ICSI	i. Techniques	PESA, TESA, TESE and ICSI
	ii. Equipment	Micromanipulator, Equipment for ICSI
	iii. Procedure	Sperm immobilization, selection, separation from testicular biopsies Sperm preparation for ICSI from ejaculates and testicular biopsies ICSI medias Denuding of oocyte, Micropipette handling ICSI procedure
	iv. Assessment and counselling	Ferti-check – assessment of fertilization, Patient counselling
	v. IMSI	IMSI

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE**3072
Name of the Course	**Biochemistry Including Steroid Metabolism (Practical 30hrs.)**

Unit	Topic
1	Hormones – definition, essential of hormones, role in human body, importance of hormones and its function
2	Summary and explanation of hormones Different types of hormones
3	Preparation of reagents, Principle of Hormones (Assay),
4	Different hormones test and specimen collection and handling
5	Different hormone calibration, Procedure of different hormones
6	Specificity and sensitivity of different hormones
7	Instrument – types of chemiluninescence

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE3073**
Name of the Course	**Lab Equipment (Practical 30hrs.)**

Unit	Topic	
1	Instruments	micro-manipulator
		micropipette
		other equipment of ICSI
	Microscopes	Various microscopes
	Calibration	Calibration of all the instruments in the lab
2	Hands on technique	Hands on technique
3	Equipment	Centrifugation, swim –up, swim- out, etc, Functional
		When to use What, Why , differences
		Straws/ ampoules

CE 114:Seminars

Unit	Topic	
1	Introduction to lab + lab set up	From the corresponding modules topics will be selected
2	Cryopreservation + culture media	
3	ICSI	
4	Radiology in ART	
5	Lab equipment	

ACADEMIC SYLLABUS FOR SEMESTER - IV

ELECTIVE COURSE

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE4011**
Name of the Course	**PURSUIT OF INNER SELF EXCELLENCE (POISE)**

Course Objective	1. To inculcate moral values in students – Self-Discipline , Time Management, Develop attitude of Service with humility, Empathy, Compassion, brotherhood, Respect for teachers, colleagues & society members. 2. Develop Effective means of communication & presentation skills in students 3. To develop wisdom in students for deciding their career based on their areas of interest and inner skills. 4. Introduce techniques for Relaxation, Meditation & Connecting with innerself. 5. Rejuvenation Techniques which can be used by students to distress themselves 6. To improve performance of students during various assignments, projects, elocutions, events, quiz, interviews.
Course Outcomes	1. Students will become self dependent, more decisive and develop intuitive ability for their study and career related matter. 2. Students ability to present their ideas will be developed. 3. Enhanced communication skills, public speaking & improved Presentation ability. 4. Students will be able to explore their inner potential and inner ability to become a successful researcher or technician & hence become more focused. 5. Students will observe significant reduction in stress level. 6. With the development of personal attributes like Empathy, Compassion, Service, Love &brotherhood , students will serve the society and industry in better way with teamwork and thus grow professionally.

Unit no.	Topics
1	**Spiritual Values for human excellence :** The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali'sAshtanga Yoga ,Vedic education - The role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddism, etc.; Why spirituality? Concept – significance ; Thought culture
2	**Ways and Means :** Correlation between the values and the subjects ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values - Role of the living Master
3	**Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny
4	**Experiencing through the heart for self-transformation (Heartfulness Meditation):** Who am I? ; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of *egregore effect;*

Reference Books:

1. www.pdfdrive.net
2. www.khanacademy.org
3. www.acadeicearths.org
4. www.edx.org
5. www.open2study.com
6. www.academicjournals.org

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE4012**
Name of the Course	**BIOETHICS, BIOSAFETY, IPR & TECHNOLOGY TRANSFER**

Course objective	The students will gain structural knowledge on: 1. To list the routes of exposure for a pathogen to a human being . 2. To demonstrate and assess the proper use of PPE, best practices,biological containment, and be prepared to safely conduct research 3. To identify the role of the Biosafety Professional inBiomedical Research Laboratories 4. To appreciate the importance of assertion in interpersonal communication and beintroduced to some key assertion strategies 5. To understand the interpersonal nature of giving feedback, receiving criticism and resolving conflicts. 6. To establish attentive listening as an assertion strategy
Course outcomes	Students will learn to: 1. Effectively manage the health and safety aspects of a biological laboratory. 2. Give reliable, professional and informed advice and information to colleagues and managers. 3. Help to ensure that their institution complies with relevant legislation, liaise effectively with enforcing authorities and be aware of the penalties for failing to comply. 4. Build a context of understanding through communication. 5. Mediate between other conflicting parties. 6. Exhibit de-escalatory behaviors in situations of conflict. 7. Demonstrate acknowledgment and validation of the feelings, opinions, andcontributions of others.

Unit no.	Topics
1	**Ethics***:* Benefits of Ethics, ELSI of Bioscience, recombinant therapeutic products for human health care, genetic modifications and food consumption, release of genetically engineered organisms, applications of human genetic rDNA research, human embryonic stem cell research.
2	**Patenting:** Patent and Trademark, Bioscience products and processes, Intellectual property rights, Plant breeders rights, trademarks, industrial designs, copyright biotechnology in developing countries. Biosafety and its implementation, Quality *control in* Biotechnology.
	Introduction to quality assurance, accreditation & SOP writing : Concept of ISO standards and certification *,* National regulatory body for accreditation*,* Quality parameters*,* GMP & GLP*,* Standard operating procedures*,* Application of QA in field of genetics*,* Data management of clinical and testing laboratory
3	**Funding of biotech business** (Financing alternatives, funding, funding for Bioscience/ Medical Health Sector in India, Exit strategy, licensing strategies, valuation), support mechanisms for entrepreneurship (Bio-entrepreneurship efforts in India, difficulties in India experienced, organizations supporting growth, areas of scope, funding agencies in India, policy initiatives), Role of knowledge centers and R&D (knowledge centers like universities and research institutions, role of technology and up gradation)

Reference Books:

1. www.pdfdrive.net
2. www.khanacademy.org
3. www.acadeicearths.org
4. www.edx.org
5. www.open2study.com
6. www.academicjournals.org

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE4013**
Name of the Course	**DISASTER MANAGEMENT AND MITIGATION RESOURCES**

Course objective	The course will uplift about: 1. Understand and appreciate the specific contributions of the Red Cross/Red Crescent movement to the practice and conceptual understanding of disaster management and humanitarian response and their significance in the current context. 2. Recognize issues, debates and challenges arising from the nexus between paradigm of development and disasters. 3. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. 4. Respond to disaster risk reduction initiatives and disasters in an effective, humane and sustainable manner.
Course outcomes	At the successful completion of course the student will gain: 1. knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences. 2. Knowledge and understanding of the International Strategy for Disaster Reduction (UN-ISDR) and to increase skills and abilities for implementing the Disaster Risk Reduction (DRR) Strategy. 3. Ensure skills and abilities to analyse potential effects of disasters and of the strategies and methods to deliver public health response to avert these effects.

Unit no.	Topics
1	**Introduction:** Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.
2	**Natural Disaster and Manmade disasters:**Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.
3	**Disaster Management, Policy and Administration:**Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flowchart showing the entire process.
4	**Financing Relief Measures:**Ways to raise finance for relief expenditure, role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events.
5	**Preventive and Mitigation Measures:**Pre-disaster, during disaster and post-disaster measures in some events in general structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans. Do's and don'ts in case of disasters and effective implementation of relief aids.

Reference Books:

1. ShailendraK.Singh : Safety & Risk Management, Mittal Publishers
2. J.H.Diwan : Safety, Security & Risk Management,APH
3. Stephen Ayers &Garmvik: Text Book of Critical Care, Holbook and Shoemaker
4. www.pdfdrive.net
5. www.khanacademy.org
6. www.acadeicearths.org
7. www.edx.org
8. www.open2study.com
9. www.academicjournals.org

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE4014**
Name of the Course	**HUMAN RIGHTS**

Course objective	Students will comprehend on: 1. A branch of public international law, and relevant juridical mechanisms at global as well as regional levels, 2. Human rights as an object of study in history, philosophy and the social sciences, as well as a practical reality in national and international politics. 3. Different forms of promoting and implementing human rights, domestically as well as on the international level. 4. The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development. 5. Cholarly values such as transparency, impartiality, clarity, reliance and the importance of sound reasoning and empirical inference.
Course outcomes	Student will be able to virtue: 1. identify, contextualise and use information about the human rights situation in a given country 2. critically appraise source material, including cases from human rights committees and tribunals and reports and summary records from treaty bodies 3. analyses a country's situation or an international situation in terms of human rights and formulate human rights-based initiatives and policies 4. Promote human rights through legal as well as non-legal means. 5. Participate in legal, political and other debates involving human rights in a knowledgeable and constructive way

Unit no.	Topics
1	*Background*: Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights
2	*Human rights at various level*: Human Rights at Global Level UNO, Human Rights – UDHR 1948 – UN Conventions on Human Rights: International Covenant on civil and Political Rights 1966, International Convent on Economic, Social and Cultural Right, Racial Discrimination -1966 International, Instruments: U.N. Commission for Human Rights, European Convention on Human Rights.
3	*Human rights in India* : Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman
4	*Human Rights Violations*: Human Rights Violations against Women, Human Rights Violations against Children, 35 Human Rights Violations against Minorities SC/ST and Trans-genders, Preventive Measures.
5	*Political issues*: Political Economic and Health Issues, Poverty, Unemployment, Corruption and Human Rights, Terrorism and Human Rights, Environment and Human Rights, Health and Human Rights

Reference Books:

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
2. Ram Ahuja: Violence Against Women Rawat Publications JewaharNager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE402**
Name of the Course	**DISSERTATION / PROJECT WORK**

1. Dissertation/Project work should be carried out as an individual Dissertation and actual bench work.

2. The students will carry independent project work under the supervision of the staff of Department on an advanced topic assigned to him/her. Inhouse projects are encouraged. Students may be allowed to carry out the project work in other Departmental laboratories /Research institutes /Industries as per the availability of Infrastructure.

3. Co guides from the other institutions may be allowed.

4. The Dissertation/Project work will begin from 3rd Semester, and will continue through the 4th Semester.

5. The Dissertation/Project report (also work book shall be presented at the time of presentation and viva voce) will be submitted at the end of the 4th Semester and evaluated.

6. Five copies of the project report shall be submitted to the Director, SBS.

7. For the conduct of the End Semester Examination and evaluation of Dissertation/Project work the University will appoint External Examiners.

8. Since the dissertation is by research, Dissertation/Project work carries a total of 450 marks and evaluation will be carried out by both internal and external evaluators.

9. The student has to defend his/her Dissertation/Project Work in a seminar which will be evaluated by a internal and external experts appointed by the University.

10. The assignment of marks for Project/Dissertation is as follows:

    Part I-

    Topic Selection, Review of Literature, Novelty of works-50 marks

    Part-II-

    a. Continuous Internal Assessment, Novelty, Overall Lab Work Culture - 100 Marks

    b. Dissertation/Project work book: 100 Marks

    c. Viva-Voce: 100 Marks

d. However, a student in 4th semester will have to opt for general elective course from other related disciplines in addition to his Dissertation/Project work in the parent department.

Name of the Programme	**M. Sc. Clinical Embryology**
Course Code	**MSCCE**403
Name of the Course	**EDUCATIONAL TOUR/FIELD WORK/INDUSTRIAL VISIT/HOSPITAL VISIT**