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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Curriculum for

M.Sc. Clinical Embryology

Amended upto BOM-55/2018,Dated 27/11/2018

Amended History

1. Approved as per BOM - 29/2013, Resolution No. 13, Dated 15/06/2013.
2. As amended in BOM- 43/2015, [Resolution No. 3.6(b)], Dated 06/11/2015.
3. As amended in BOM-55/2018, [Resolution No.4.13]; Dated 27/11/2018
4. As amended in BOM-55/2018, [Resolution No.4.13]; Dated 27/11/2018.

M.Sc. Clinical Embryology
Syllabus

Eligibility: B.Sc. Life Sciences, B.Sc. Zoology, MBBS, BHMS, BAMS, BVSc, M.D., (Anatomy), MS-OBGY.

Objective :

1. To impart knowledge of embryology of general & systemic embryology
2. To teach the basics of an ART centre where they can work as clinical embryologists.
3. To impart knowledge on cryopreservation so that they can work in cryopreservation centers.
4. To give then the basic knowledge of stem cell and genetics so that they ca work in stem cell and genetics lab.
5. To give them the basic knowledge of embryology so that they can be of use as teaching faculty.

Q.R. Acad /

1205 - Biomed Sc.

28.2.13

Prof. Z. G. Badade
Registrar,
MGM Institute of Health Sciences
Kamothe, Navi Mumbai-401209

M.Sc. Medical Courses

M.Sc. Clinical Embryology

1. **Theory**
   Didactic Lectures + Seminars should be **120 Hours**
2. **Practicals**
   Experimental Laboratory +Tutorial+ Demonstration should be **80 Hours**

Examination Pattern

1. There should be two papers in Each Semester.
2. Module 1 & 2 should be covered in Paper I. Module 3 & 4 should be covered in Paper II.
3. Paper pattern should be the same as what was decided in the last Board of Studies meeting. Which is as follows:-

Existing Scheme: (This gives equal weightage to sec B and Sec C)

Question		Mark distribution	Marks allotted per section	Marks
Sec:A	MCQ	10X 1 M =10	10	10
Sec:B	SAQ	3/ 4 x 5 M =15	15	25
	LAQ	1/ 2 x 10 M =10	10	
Sec : C	SAQ	3/ 4 x 5 M =15	15	25
	LAQ	1/ 2 x 10 M =10	10	
				Total= 60 M

4. **Theory Marks Distribution**

A. Theory Marks -120 Marks

Paper I	60 Marks
Paper II	60 Marks
Total Marks	120 Marks

B. Theory Internal Assessment Marks- 20 Marks

Attendance (T+P)	10 Marks
Prefinal or Midterm (T+P)	5 Marks
Seminar	5 Marks
Total Marks	20 Marks

M.Sc. Clinical Embryology
(2 year Course)

Sr. No	Semester	Module	
1	Sem I- General Anatomy	Module 1	General Anatomy
		Module 2	Male Reporductive System
		Module 3	Female Reproductive System
		Module 4	Cytogenetics & General Embryology
2	Sem II- Research Methodology & Ethical issues	Module 1	Hormones Related With Female Reproduction
		Module 2	Research Methodology
		Module 3	Ethical and Legal issues/Introduction to Lab
		Module 4	Cytogenetics and Culture
3	Sem III - Cryopreservation & Introduction to lab equipment	Module 1	Systemic Embryology & Teratology
		Module 2	Cryopreservation
		Module 3	Lab Equipment for ART
		Module 4	Drugs of Infertility
4	Sem IV-Radiology & Hands on techniques in ART	Module 1	Radiology and ART
		Module 2	Ovulation Induction Methods
		Module 3	Hands on Techniques in ART
		Module 4	Project Paper Presentation & Stem Cell Research

M.Sc. Clinical Embryology
(2 year Course)

Semester 1:- General Anatomy & Cytogenetics

Module 1- General Anatomy

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Terminology	1	
2	Cell	2	
3	Tissues of Body	1	
4	Cardiovascular System	1	
5	Endocrine system	1	
6	Reproductive system	1	
Total		7	

Module 2- Male Reproductive System

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Introduction	1	
2	Urinary Bladder	1	1
3	Testes	1	1
4	Spermatic Cord	1	1
5	Epidydimis, Seminal vesicle and vas deference	1	1
6	Prostate	1	1
7	Hitology of Urinary Bladder	1	1
8	Histology of Epidydimis and Prostate	1	1
9	Histology of Testes	1	1
10	Male Hormones	2	
Total		11	8

Module 3- Female Reproductive System

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Introduction	1	
2	Mammary Gland	1	
3	Uterus	1	2
4	Ovaries & Varies & Fallopian Tube	1	
5	Extranal Genital Organs	1	
6	Histology of Uterus	1	1
7	Histology of Fallopian Tube	1	1
8	Histology of Ovary	1	1
9	Oogenisis	1	
10	Follicular Development	1	
11	Mentural Cycle	2	
Total		12	5

Module 4- Cytogenetics & General Embryology

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Fertilization	1	
2	Clevage, morula (Impaction)	1	
3	Blastocyst	1	
4	Gastulation and implantation	2	
5	Development of trophoblast and its derivatives	1	
6	Amniotic cavity and two germ layers	1	
7	Primitive streak and three germ layers	2	
8	Notochord	1	
9	Fate of derms and derivatives of derms	2	
10	Neural tube development	1	
11	Folding of embryo	2	
12	Development of placenta	2	
13	Twining	1	
Total		**18**	

Semester2:- General Anatomy & Cytogenetics

Module 1- Hormones Related With Female Reproduction

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Pituitary hormones (FSH, LH, Prolactine, Oxytocin)	2	
2	Thyroid hormone	1	
3	Ovarian hormones	2	
4	Testicular hormones	1	10
Total		**6**	**10**

Module 2- Research Methodology

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Introduction of biostatistics	1	
2	Types of variables and data	1	
3	Presentation of data	1	
4	Averages, measures of dispersion	1	
5	Normal distribution and normal curve	1	
6	Probability and Binomial distribution	1	
7	Test of significance- test of hypothesis	1	
8	Calculation of sample size	1	
9	Sampling techniques	1	
10	Non parametric statistics	1	
11	Correlation	1	
12	Linear regression	1	
13	Multiple correlation and Partial correlation	1	
14	Analysis of Variance (ANOVA)	1	
15	Vital statistics	1	
16	Preparation of thesis	3	
17	Practical		10
	Total	**18**	**10**

Module 3- Ethical and Legal issues/Introduction to Lab

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Stem cell ethical issues	1	
2	PNDT	2	
3	MTP act	1	
4	Artificial reproductive techniques	2	
5	Surrogacy	2	
6	ICMR guidlines	2	
7	Practical ART lab visit		20
	Total	**10**	**20**

Module 4- Cytogenetics and culture

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Introduction and branches of genetics	1	
2	Mendel's law of inheritance	2	
3	Chromosomes	1	
4	Molecular genetics	3	
5	Chromosomal disorders	1	
6	Modes of inheritance and gene disorders	2	
7	Haemoglobin disorders	1	
8	Immunogenetics	1	
9	Genetics of cancer	1	
10	Developmental Genetics	1	
11	Genetic counselling	1	
12	Prenatal diagnosis and treatment of genetic disease	1	
13	Recombinant DNA Technology	1	
14	DNA and PCR	1	
15	DNA Fingerprint	1	
16	The Human genome project.	1	
17	Genomics and Protromics	1	
Total		**21**	

Semester3:- Cryopreservation & Introduction to Lab Equipment

Module 1- Systemic Embryology & Teratology

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Development of Cardiovascular system	3	
2	Gastrointestinal tract	2	
3	Kidney	2	
4	Male	2	
5	Female	2	
6	Pharyngeal apparatus and face	2	
7	Fetal circulation	1	
8	CNS	2	
9	Developmental Genetics	8	
10	Physical	1	
11	Environmental	1	
12	Chemical	1	
13	Drug induced	1	
14	Maternal	1	
Total		**29**	

Module 2- Cryopreservation

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Sperm	1	10
2	Oocyte	1	
3	Embryo	1	
	Total	**3**	**10**

Module 3- Lab Equipment for ART

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Lab equipments for ART	10	20
	Total	**10**	**20**

Module 4- Drugs of Infertility

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Hormones	4	
2	Ovulation induction	4	
3	Acting on uterus	2	
4	Drugs during pregnancy	4	
5	Drugs during lactation	4	
	Total	**18**	

Semester4 :- Radiology & Hands on Techniques in ART

Module 1- Radiology and ART

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Introduction and basic principle of Ultrasonography	1	40
2	Evaluation of organs in infertility	1	
3	Follicular study	1	
4	Early diagnosis of pregnancy	1	
5	First trimester pregnancy	2	
6	Ectopic	1	
7	Triple or qudripal test	1	
8	Prediction of congenital anomalies in early pregnancy	1	
	Total	**9**	**40**

Module 2- Ovulation Induction Methods

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Principle and selection of patient	1	
2	Drugs and method	1	
3	Follicular study	1	20
4	Stimulation and hyper stimulation	1	
5	Ovum pick up	1	
	Total	**5**	**20**

Module 3- Hands on Techniques in ART

Contents:

Topic No.	Topics and Details	Theory	Practical
1	Hands on techniques in ART		30
Total			**30**

Module 4- Project Paper Presentation & Stem Cell Research

Contents:

Topic No.	Topics and Details	Theory	Practical
1	A Project paper presentation		
2	Stem cell research	**10**	
Total		**10**	

- Total A (Theory Marks) +B (Theory Internal Assessment Marks) = 140 Marks

i.e. Internal Assessment of Theory should be added to total Theory Paper Marks.

21 Practical Marks Distribution

C. Practical Experiments- 35 Marks

Experiment No.1	20 Marks
Experiment No.2 or Station Excercise	20 Marks
Viva	10 Marks(5+5)
Total	50 Marks

D. Practical Internal Assessment-15 Marks

Journal	5 Marks
Prefinal or Midterm	5 Marks
Total	10 Marks

- Total C (Practical Marks) +D (Practical Internal Assessment Marks) = 60 Mark

  i.e. Internal Assessment of Practical should be added to total Practical Paper Marks.

- **Grand Total:** A (Theory Marks) +B (Theory Internal Assessment Marks)+C (Practical Marks)+D (Practical Internal Assessment Marks) =200 Marks

- **EACH CANDIDATE APPEARS FOR 200 MARKS IN EACH SEMESTER.**

- **Passing Criteria : As per MGMIHS Rules.**

- **Infrastructure required :**
  1. Defined ART centre
  2. Embryology models
  3. Lecture Hall

- **Teaching staff from following departments**
  1. Anatomy
  2. Obs/Gyn
  3. ART
  4. PSM
  5. Radiology

- **Visiting Faculty needed.**

BOM 43/2015 dated 06.11.2015 Resolution No. 3.6(b): Resolved to accept the updated syllabus with project work and modified examinations pattern for M.Sc. Clinical Embryology (Annexure-XIV) for batch admitted from Academic year 2016-17 onwards.

ANNEXURE – XIV

Dr. Anjali Sabnis

Incharge – MSc Clinical Embryology

MGM University Department of Bio Medical Sciences

15/10/15

To,

The Registrar,

MGM University Department of Bio Medical Sciences,

Kamothe, Navi Mumbai.

(Through proper channel)

Sub :- modifications in Syllabus of MSc Clinical Embryology course

Respected Sir,

It was decided in the meeting of the Board of Studies of Bio Medical Sciences, held on 8th October, to call separate meeting for changes in syllabus of MSc Clinical Embryology.

So with the permission of the Dean Faculty, Dr. Ajit Shroff and the Director of Bio medical Sciences, Dr. Z. G. Badade, a separate meeting was called.

Corrections and changes in the syllabus of MSc Clinical Embryology were made. The final syllabus is herewith submitted for AC approval.

Kindly accept and do the needful.

Thanking you

15-10-15

Chairman, BOS (BMS)

Yours sincerely

Sabnis

Dr. A. Sabnis

Incharge of Clinical Embryology

MGM University Department of Bio Medical Sciences

MGM Institute Of Health Sciences
INWARD NO. 6746
DATE: 21/10/15

Received 04/02/16

Gen. 55/15

M.Sc. Clinical Embryology
Syllabus

The clinical embryologist must be knowledgeable in mammalian embryology, reproductive endocrinology, genetics, molecular biology, biochemistry, microbiology and in vitro culture techniques. The embryologist must also be familiar with ART. He / She must be either a medical graduate or have a postgraduate degree or a doctorate in an appropriate area of life sciences. (In the case of clinic in existence for at least one year before the promulgation of these rules, a person with a B.Sc. or B.V.Sc degree but with at least three years of first-hand, hands-on experience of the techniques mentioned below and of discharging the responsibilities listed below, would be acceptable for functioning as a clinical embryologist. Such persons would also be eligible to take a test to be designed and conducted by an appropriate designated authority.) He /She must be familiar with the following.

Eligibility: B.Sc. Life Sciences, B.Sc. Zoology, MBBS, BHMS, BAMS, BVSc, M.D.Anatomy, MS-OB GY.

Objectives :

1. To impart knowledge of embryology of general & systemic embryology
2. To teach the basics of an ART centre where they can work as clinical embryologists.
3. To impart knowledge on cryopreservation & practice of embryo freezing so that they can work in cryopreservation centers.
4. To give then the basic knowledge of stem cell and genetics so that they ca work in stem cell and genetics lab.
5. To give them the basic knowledge of embryology so that they can be of use as teaching faculty.
6. To train students in micromanipulation of sperm and oocytes for carrying out ICSI and single- cell biopsies of embryos for preimpiantation genetic diagnosis.

The course includes theory and practical classes. Students will give seminars and complete project work and submit dissertation in the 4th semester.

Jabini
15-10-15

Total weeks per sem=18

18 wk*6 days=756 hrs

756-63(2nd and 4th Saturday holiday)=693 hrs

Journal club=54 hrs (18wks*3)

Group discussion=54 hrs (18*3)

693-108=585 hrs

585 hrs are divided into theory practical and tutorial

585=160theory+160tut+265practical

We have to make 18 practical /module/sem

18 tuts/module/sem

5 lect/module/15 days

		Sem 1	Sem 2	Sem 3	Sem 4
Theory	160 hrs	205 hrs 145(L)+60(Evaluation and seminar)	215 hrs 155(L)+60(Evaluation and seminar)	177 hrs 122(L)+55(Evaluation and seminar)	65 hrs 40(L)+25(Evaluation and seminar)
Tutorial	160 hrs	162 hrs	160 hrs	136 hrs	30 hrs
Practical	265 hrs	210+30Evaluation) =240 hrs	220+30(Evaluation) =250 hrs	270+30(Evaluation) =300 hrs	550+15(Evaluation) =565 hrs
G.D	54 hrs	56 hrs	50 hrs	56 hrs	40 hrs
Journal Club	54 hrs	54 hrs	50 hrs	54 hrs	-
Total	693 hrs	717 hrs	725 hrs	723 hrs	700 hrs

M.Sc. Clinical Embryology
(2 year Course)
Syllabus for 2 years – 4 Semesters

Semester I	Semester II	Semester III	Semester IV
Module 1 – Relevant gross anatomy	Module 5 – Genetics and physiology of reproductive hormones	Module 9 – Radiology in ART + ICSI	Module 13 - Biosafety + Quality assurance, Accreditation
Module 2 – Embryology	Module 6 – Infertility	Module 10 – Lab equipment + lab set up	Project
Module 3 – Histology	Module 7- Introduction to laboratory +ethical and legal issues	Module 11 - Cryopreservation + culture media	
Module 4 – Biostatistics, research methodology and computer applications*	Module 8 – IVF procedure + ovulation induction methods	Module 12 -Hands on technique in ART	

INTRODUCTION TO THE CURRICULUM

SEMESTER-I		Lecturers (Hrs)	Tutorials 1 = 2 hrs	Practicals (Hrs)
Module-1	Relevant gross anatomy	30	20	30
Module-2	Embryology	45	23	40
Module-3	Histology	30	18	40
Module-4	Biostatistics, research methodology and computer applications*	40	20	100 (20+80*)
	Evaluation	30		30
	Seminars, assignments	30		
	Group discussion, self study			56
	Journal club			54
	Semester total hours	**205 + 162 + 350 = 717**		

SEMESTER-II		Lecturers (Hrs)	Tutorials 1 = 2 hrs	Practicals (Hrs)
Module-5	Genetics and physiology of reproductive hormones*	30 + 7*	21 + 2*	36 + 4*
Module-6	Infertility	43	22	40
Module-7	Introduction to laboratory + ethical and legal issues	35	15	60
Module-8	IVF procedure + ovulation induction methods	40	20	80
	Evaluation	30		30
	Seminars , assignments	30		
	Group discussion, self study			50
	Journal club			50
	Semester total hours	**215 + 160 + 350 =725**		

SEMESTER-III		Lecturers (Hrs)	Tutorials 1 = 2 hrs	Practicals (Hrs)
Module-9	Radiology in ART + ICSI	40	20	60
Module-10	Lab equipment + lab set up	40	20	60
Module-11	Cryopreservation + culture media	42	20	50
Module-12	Hands on technique in ART	--	8	100
	Evaluation	30		30
	Seminars, assignments	25		
	Group discussion, self study			56
	Journal club			54
	Semester total hours	**177 + 136 + 410 = 723**		

SEMESTER-IV		Lecturers (Hrs)	Tutorials 1 = 2 hrs	Practicals (Hrs)
Module-13	Bio-safety + Quality assurance, Accreditation	40	15	
Module-14	Project			550
	Evaluation	15		15
	Seminars, assignments	10		
	Group discussion, Self study			40
	Semester total hours	**65 + 30 + 605 = 700**		

Semester I

Module 1- Relevant gross anatomy - Theory

Unit	Topic with hours	
1	Introduction to anatomy - 2	Introduction and terminology
2	Male reproductive system - 4	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 - 10	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 – 2	Urinary bladder - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy
5	Endocrine system - 7	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
6	Cardio vascular system - 5	Heart – structure, blood supply, nerve supply, lymphatic drainage, applied anatomy
		Arch of aorta - structure, blood supply, nerve supply, lymphatic drainage, applied anatomy
	Total hrs. - 30	

Module 1- Relevant gross anatomy – Practicals

Unit	Topic - hours		
1	Study of organ systems though prosection and charts	Male reproductive system	6
		Female reproductive system	10
		Urinary system	4
		Endocrine system	4
		Cardio vascular system	6
	Total hrs.- 30		

Module 1- Relevant gross anatomy – Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Male reproductive system	4
	Female reproductive system	6
	Urinary system	2
	Endocrine system	4
	Cardio vascular system	4
	Total hrs. - 40	

Semester I

Module 2- Embryology - Theory

Unit	Topic - hours	
1	General embryology - 25	Introduction to embryology
		Cell division – mitosis, meiosis, cell cycle
		Gametogenesis – spermatogenesis, Oogenesis and ovarian cycle
		Menstrual cycle
		Fertilization
		1st week of development with implantation
		2nd week of development – amniotic cavity, yolk sac, Bilaminar germ disc
		Gastrulation , Primitive streak and three germ layers
		Notochord
		Fate of germ layers and derivatives of germ layers
		Neural tube development
		Folding of embryo
		Development of trophoblast and its derivatives
		Development of placenta
		Twinning
2	Systemic embryology – 20	Development of Cardiovascular system
		Fetal circulation
		Development of Urinary system
		Development of Male reproductive system
		Development of Female reproductive system Female
		Development of Gastrointestinal tract
		Development of Pharyngeal apparatus and face
		Development of CNS
		Teratogenesis
	Total hrs - 45	

Module 2- Embryology - Practicals

Unit	Topic - hours		
1	Practicals in embryology through models and charts	General embryology	22
2		Systemic embryology	18
	Total hrs - 40		

Module 2- Embryology - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	General embryology	14
2	Systemic embryology	9
	Total hrs - 46	

Semester I

Module 3 – Histology

Unit	Topic	
1	General - 8	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 - 5	Histology of Testes + anatomy of sperm
		Histology of Epidydimis
		Histology of Vas deferens, seminal vesicle
		Histology of Prostate
3	Female reproductive system - 10	Histology of ovary
		Histology of Fallopian tube
		Histology of uterus
		Histology of mammary gland
		Histology of placenta
4	Urinary system-1	Histology of urinary bladder
5	Endocrines - 6	Histology of pituitary
		Histology of thyroid
		Histology of suprarenal
	Total hrs - 30	

Module 3- Histology - Practicals

Unit	Topic - hours		
1	Practicals in histology through slides and charts	General	10
		Male reproductive system	8
		Female reproductive system	10
		Urinary system	6
		Endocrines	6
	Total hrs - 40		

Module 3- Histology - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	General	4
	Male reproductive system	4
	Female reproductive system	5
	Urinary system	2
	Endocrines	3
	Total hrs - 36	

Semester I

Module 4 - Biostatistics and research methodology - Theory

Unit	Topic	
1	Biostatistics - 20	Introduction of biostatistics
		Types of variables and data
		Presentation of data
		Averages, measures of dispersion
		Normal distribution and normal curve
		Probability and Binomial distribution
		Test of significance- test of hypothesis
		Calculation of sample size
		Sampling techniques
		Non parametric statistics
		Correlation
		Linear regression
		Multiple correlation and Partial correlation
		Analysis of Variance (ANOVA)
		Vital statistics
2	Research methodology - 12	Introduction to research methodology
		Choosing and narrowing a subject into topic
		Managing project time efficiently
		Researching the material and summarizing the research material
		Documentation style
		How to write research paper
3	Computer applications - 8	Introduction to Windows; MS office (Word, Excel, PowerPoint etc)
		Introduction to Medical Informatics & use of Statistical Package
		Introduction to DBMS, database design.
		Use of computer networking- LAN, WAN, MODEM,INTERNET, WWW, NICNET, ERNET, VSNL
	Total hrs - 40	

Module 4 - Biostatistics and research methodology - Practical

Unit	Topic – hrs.		
1	Biostatistics – 20	Problem solving in biostatistics	8
		Usage of statistics for data analysis	12
2	Computer applications – 80	Use of INTERNET and WWW	10
		Medline, Medline Search	20
		Creation of Data Base	15
		Slide Presentation MS power point	15
		MS word and Excel	15
		Computer Aided Learning -	5
	Total hrs – 100		

Module 4 - Biostatistics and research methodology - Tutorial

Unit	Topic – each tutorial = 2 hrs	
1	Biostatistics	12
2	Computer applications	8
	Total hrs – 40	

Semester II

Module 5 - Genetics and physiology of reproductive hormones - Theory

Unit	Topic - hours	
1	Genetics - 30	Introduction and branches of genetics
		Mendel's law of inheritance
		Chromosomes
		Molecular genetics
		Chromosomal disorders
		Modes of inheritance and gene disorders
		Developmental Genetics
		Genetic counseling
		Prenatal diagnosis and treatment of genetic disease
		Preimplantation genetic diagnosis
		Recombinant DNA Technology
		DNA and PCR
		FISH
		Role of genetics in infertility
		Genes and recurrent pregnancy losses
		Chromosomal and genetic analysis in IVF
		Embryo biopsies
		Epigenetics
		The Human genome project.
2	Physiology of reproductive hormones - 7	Pituitary hormones (FSH, LH, Prolactin, Oxytocin)
		Thyroid hormones
		Ovarian hormones with placental hormones
		Testicular hormones
	Total hrs – 37	

Module 5 - Genetics and physiology of reproductive hormones - Practicals

Unit	Topic – hours		
1	Genetics – 36	Study of cytogenetic techniques in cytogenetic lab	26
		Study of various genetic disorders through charts and photographs	10
2	Physiology of reproductive hormones – 4	Study of various endocrine disorders through charts and photographs	4
	Total hrs – 40		

Module 5 - Genetics and physiology of reproductive hormones - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Genetics	21
2	Physiology of reproductive hormones	2
	Total hrs – 46	

Semester II

Module 6- Infertility - Theory

Unit	Topic - hours	
1	Infertility - 2	Introduction, physiological infertility, criteria for investigation
		Normal follicular genesis, ovulation, menstrual cycle, spermatogenesis, Hormonal control of human reproduction
2	Male infertility - 15	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 FSH level studies
		Management - Role of surgery, antibiotics, hormonal therapy and ART(basics)
3	Female infertility - 16	Causes
		Investigations – history General examination Tubal patency Study normalcy of ovulation – basal body temperature, cytology, USG, Fern test, Spinn Barkeit test, endometrial biopsy, hormonal study
		Management – microsurgery, ART(basics)
4	Drugs of infertility - 10	Hormones
		Ovulation induction drugs
		Drugs acting on uterus
		Drugs during pregnancy
		Drugs during lactation
	Total hrs – 43	

Module 6- Infertility - Practicals

Unit	Topic – hours		
1	Male infertility	Study of patient examination, investigations and diagnosis of infertility in IVF lab	20
	Female infertility	Study of patient examination, investigations and diagnosis of infertility in IVF lab	20
	Total hrs – 40		

Module 6- Infertility - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Male infertility	10
	Female infertility	12
	Total hrs - 44	

Semester II

Module 7- Introduction to laboratory + ethical and legal issues - Theory

Unit	Topic - hours	
1	Introduction to laboratory - 10	Introduction to the laboratory
		Lab - set up for andrology
		Lab – set up for cryopreservation
		Introduction to aseptic precautions and methods
		Introduction to various instruments in the laboratory
		Techniques of handling various instruments
		Introduction to micro-manipulator, micropipette and other equipments of ICSI
		Introduction to patient counseling
2	Ethical and legal issues - 25	Lab ethics
		Current legislation and regulation in ART, India
		Importance of licensing, accrediting and approving ART clinics
		National guidelines for accreditation of ART clinics in India
		Ethics considerations and policies
		Ethical frameworks and principles
		Relevant regulatory bodies
		ISAR- Indian society for assisted reproduction
		Role of ethics in health care and patient care
		Patient consent
		Stem cell ethical issues
		PNDT
		MTP act
		Surrogacy – ethical and legal issues
		Oocyte donation programme
		Donor sperm programme
		ICMR guidelines
	Total hrs – 35	

Module 7- Introduction to laboratory + ethical and legal issues - Practicals

Unit	Topic - hours		
1	IVF lab	Practical ART lab visit	60
	Total hrs - 60		

Module 7- Introduction to laboratory + ethical and legal issues - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Ethical and legal issues	15
	Total hrs - 30	

Semester II

Module 8 - IVF procedure + ovulation induction methods - Theory

Unit	Topic - hours	
1	IVF procedure - 26	Normal and abnormal embryo development
		Metabolism of embryo
		Grading of oocyte
		Grading of sperm
		Sperm preparation for IVF
		Sperm preparation for IUI
		Sperm preparation for IUI – classical, standard and density gradient method
		Grading of embryo
		Selection of embryo
		Blastocyst culture technique
		Embryo transfer technique
		USG guided embryo transfer
		ZIFT, GIFT
		Embryo reduction
		Complications of IVF
		Anaesthesia
		Patient counseling
		Cryobiology – history
		Introduction to Cryoprotectant
2	Ovulation induction methods - 14	Principle and selection of patient
		Drugs and method
		Follicular study
		Various stimulation protocols
		Hyper stimulation and OHSS (ovarian hyper stimulation syndrome)
		Patient monitoring
		Complications of stimulation - Miscarriage Ectopic pregnancy Multiple gestation Heterotrophic pregnancy
		Ovum pick up
	Total hrs – 40	

Module 8 - IVF procedure + ovulation induction methods - Practicals

Unit	Topic – hours	
1	Study of IVF procedure and ovulation induction methods in IVF lab	80
	Total hrs – 80	

Module 8 - IVF procedure + ovulation induction methods - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	IVF procedure	12
	Ovulation induction methods	8
	Total hrs – 40	

Semester III

Module 9 - Radiology in ART + ICSI - Theory

Unit	Topic - hours	
1	Radiology in ART - 14	Introduction and basic principle of Ultrasonography
		Follicular study
		Early diagnosis of pregnancy
		First trimester pregnancy
		Ectopic pregnancy
		Triple or quadruple test
		Prediction of congenital anomalies in early pregnancy
2	ICSI – Intra cytoplasmic sperm injection - 26	history and philosophy of ICSI
		Indications and contraindications of ICSI
		Obstructive azoospermia and ICSI
		PESA, TESA, TESE and ICSI
		Micromanipulator
		Physics of micromanipulation
		Equipment for ICSI
		Sperm immobilization
		Sperm selection
		Sperm preparation for ICSI from ejaculates and testicular biopsies
		ICSI medias
		Denuding of oocyte
		Micropipette handling
		ICSI procedure
		Risk of anomalies in ICSI
		IMSI - intra cytoplasmic morphologically selected sperm injection
		Identification of – abnormal sperms, immature sperms, Spermatids, spermatocytes and other cells
		Sperm separation from testicular biopsies
		Ferti-check – assessment of fertilization
		Patient counseling
	Total hrs – 40	

Module 9 - Radiology in Art + ICSI - Practicals

Unit	Topic - hours	
1	Radiology - observation of USG technique	20
2	Study of ICSI – Intra cytoplasmic sperm injection technique and procedure	40
	Total hrs – 60	

Module 9 - Radiology in Art + ICSI - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Radiology	8
2	Intra cytoplasmic sperm injection	12
	Total hrs – 40	

Semester III

Module 10 - Lab equipment + lab set up - Theory

Unit	Topic - hours	
1	Lab equipment - 16	Details of various instruments in the laboratory
		Details of micro-manipulator, micropipette and other equipments of ICSI
		Techniques of handling various instruments
		Maintenance of all the instruments in the lab
		Calibration of all the instruments in the lab
		Trouble shooting and problem solving
2	Lab set up - 24	IVF lab set-up
		Details of Lab - set up for andrology
		Details of Lab – set up for cryopreservation
		How to establish and equip IVF lab
		Precision of IVF procedure
		Designing of IVF lab and its location in the clinic
		Record keeping
		Lab maintenance protocol
		Roster of work
		Quality improvement techniques
		Review of national and international guide lines
	Total hrs – 40	

Module 10 - Lab equipment + lab set up - Practical

Unit	Topic – hrs.	
1	Study of Lab equipment and Lab set up in IVF lab	60
	Total hrs – 60	

Module 10 - Lab equipment + lab set up - Tutorial

Unit	Topic – each tutorial = 2 hrs	
1	Lab equipment	10
	Lab set up - IVF lab	10
	Total hrs – 40	

Semester III

Module 11 - Cryopreservation + culture media

Unit	Topic – hours	
1	Cryopreservation - 27	Physiology of cryobiology
		Role of cryo protectant
		Semen cryopreservation – neat and processed sample
		Embryo-freezing
		Slow freezing technique
		Vitrifiation of gamete, embryo, blastocyst and cleaving embryos
		Retrieval of vitrified embryos
		Gonadal cryopreservation
		Recent development in cryobiology
		Cord blood and tissue banking
2	Culture media - 15	Introduction to culture media
		Handling of culture media
		Preparation of culture media and buffer
		Culture techniques
		Sequential culture media
		Blastocyst culture technique
		Co-culture
	Total hrs – 42	

Module 11 - Cryopreservation + culture media

Unit	Topic - hrs	
1	Study ofCryopreservation technique in IVF lab	35
2	Culture media	15
	Total hrs - 50	

Module 11 - Cryopreservation + culture media

Unit	Topic – each tutorial = 2 hrs	
1	Cryopreservation	14
2	Culture media	6
	Total hrs - 40	

Semester III

Module 12 - Hands on technique in ART

Unit	Topic - hours	
1	Hands on techniques in ART	Practical training in Hands on techniques in ART
	Total hrs – 100	

Module 12 - Hands on technique in ART - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Hands on techniques in ART	8
	Total hrs - 16	

Semester IV

Module 13 - Bio-safety + Quality assurance, Accreditation

Unit	Topic	
1	Bio-safety - 18	Introduction; Historical Backround
		Introduction to Biological Safety Cabinets
		Primary Containment for Biohazards
		Recommended Biosafety Levels
		Biosafety guidelines - Government of India
2	Quality assurance, Accreditation - 22	Concept of ISO standards and certification
		National regulatory body for accreditation
		Quality parameters
		Writing Standard operating procedures
		QC and QA for IVF lab
		QC and QA practices
		Quality improvement techniques
	Total hours – 40	

Module 13 - Bio-safety + Quality assurance, Accreditation - Tutorials

Unit	Topic – each tutorial = 2 hrs	
1	Hands on techniques in ART	15
	Total hrs - 30	

Semester IV

Module 14: Dissertation: Guide-lines (550 hrs.)

The M.Sc. student is required to register for Research work that will be compiled into a dissertation. The dissertation must be supervised by the person appointed by the Faculty of Medicine upon the recommendation by Head of the Department or Course Director.

Progress in research and thesis work will be evaluated by Head of the department /Course Director as satisfactory or unsatisfactory.

At the end of his/her study, the student must defend his/her thesis in an oral examination administered by the board of examiners, consists of at least four members, appointed by the examination committee of the MGM University of Health Sciences, Navi Mumbai.

List of books for MSc Clinical Embryology

1. Anatomy Vol. II – Vishram Singh- 2nd edition
2. Human Anatomy Vol. II – B. D. Chaurasia – 6th edition
3. Textbook of Histology - I.B.Singh - 6th edition
4. Textbook of Human Histology – Krishna Garg - 4th edition
5. Human Embryology - I.B.Singh – 7th edition
6. Langman's Medical Embryology- T. W. Sandler – 12th edition
7. Methods in Biostatistics - B. K. Mahajan
8. Research methodology – Kothari
9. Textbook of Medical Physiology – Guyton and Hall – 12th ed.
10. The Mosby Physiology Monograph Series, Endocrine Physiology. – Susan P. Porterfield – 2nd ed.
11. Medical Genetics – G.P.Pal
12. Human Genetics -S .D.Gangane - 3rd ed.
13. In vitro fertilization – Kay Alder, Brian Dale
14. Atlas of ART and clinical embryology – Pankaj Talwar
15. Step by step protocol of clinical embryology - Pankaj Talwar
16. Contemporary perspective on ART – Rubina Merchant

List of books for MSc Clinical Embryology

Reference books

1. Functional Histology a text & colour Atlas - Paul R. Wheater – 2nd edition
2. The Developing Human - Moore Persaud – 6th ed.
3. Medical Genetics - Jorde, Carey, Bamshad
4. Principle of ART techniques – Springer
5. IVF : problem solving and trouble shooting – Kay Alder and Thomas Eliot
6. Atlas of sperm morphology – Marylin Marx, Adelman and Eileen M.
7. WHO lab manual for examination and processing of human sperm – 5th edition

M.Sc. Clinical Embryology

Examination Pattern

1. There should be 4 papers in each Semester, except semester IV, for final university examination.
2. Internal examination will be conducted at departmental level, for calculation of internal assessment marks.
3. In semester IV there will be 1 paper and 1 project / dissertation presentation.
4. Each module will be one paper.
5. **Marks scheme –**
   - **Marks for each paper in final examination will be 150 (theory 80 + practical 70)**
6. **Each theory paper will be of 60 marks**
   - **Section A – 10 MCQs**
   - **Section B and C will be LAQs + SAQs.**
7. **University paper pattern will be as follows:-**

   a) **Theory exam per paper – 60 marks**

Section	Question type	Number of questions compulsory	Marks / question	Total marks
A	MCQ	10 /10	1	10
B	SAQ	6 / 7	5	30
C	LAQ	2 / 3	10	20
Total				60 Marks

   b) **Theory Internal Assessment Marks- 20 Marks**

No.	Category	Marks
1	Prefinal or Midterm (T)	10
2	Attendance	5
3	Seminar/ Assignment	5
	Total	20 Marks

   c) **Total theory marks per paper –**

Examination marks 60 (a) + internal assessment marks 20 (b) = **Total 80** (c)

8. **Practical Marks Distribution**

d) **Practical Examination - 50 Marks**

No.	Category	Marks
1	Practical Exercise 1	20
2	Practical Exercise 2	20
3	Viva	10
	Total	50 Marks

e) **Practical Internal Assessment-10 Marks**

No.	Category	Marks
1	Prefinal or Midterm (P)	10
2	Attendance	5
3	Journal / Assignment	5
	Total	20 Marks

f) **Total practical marks per paper –**

- Examination marks 50 (d) + internal assessment marks 20 (e) = **Total 70** (f)
- **Internal assessment marks should be submitted by corresponding department to the university, at least 15 days prior to the university examination.**
- **Calculation of marks for attendance –**

Attendance %	Marks
< 75	Zero
75	2.5
76 – 80	3.0
81 – 85	3.5
86 – 90	4.0
91 – 95	4.5
96 - 100	5.0

9. **Grand total**

- Total marks / paper = 150
- Total theory (c) + total practical (f) = 80 + 70
- Theory exam 70(a) + Theory internal assessment 20(b) + Practical exam 50(d) + Practical internal assessment 10 (e)
- Each candidate appears for **600 marks** in each semester for 1st 3 semesters.

10. **For semester IV**

a) **Theory – 1 paper – module 13**– 60 marks

b) Theory internal assessment – 20 marks as per pattern for previous semester.

c) **Total marks for this paper –80 (a+b)**

d) **Dissertation presentation** – 100 marks for university examination.

- Student should submit a suitable dissertation topic forwarded by the guide by 16th September in SemesterIII of the course.
- Following approval of Ethics and scientific committee, work should be carried out.
- Complete dissertation should be submitted by 31st March in the Semester IV, to the university.

11. **Eligibility criteria-**

More than 40% in internal assessment is considered as eligible for appearing for examination

Attendance-75% in theory and 80% in practical is mandatory for appearing for examination

11. **Passing criteria** –

- Passing is separate for each paper
- Student has to secure 50% marks in theory and practical separately.
- >/= 75% marks will be considered as **distinction**.

Resolution No. 3.6(b): Resolved to accept the updated syllabus with project work and modified examinations pattern for M.Sc. Clinical Embryology **(Annexure-XIV)** for batch admitted from Academic year 2016-17 onwards.

Resolution No. 3.6(c): Resolved to postpone the First semester examination of M.Sc. Courses for 2015-16 batch by one month as it needs to be conducted in January 2016 instead of December 2015 in order to get sufficient time for completing syllabus.

3.7 **Physiotherapy :**

Resolution No. 3.7(a): Since there are two (02) Colleges for Physiotherapy, one under MUHS and the other under MGM Institute, hence for better coordination it is resolved to follow the same BPT. Syllabus based on MUHS pattern with immediate effect from Academic Year 2015-16.

3.8 **Nursing :**

Resolution No. 3.8(a): Resolved to incorporate the Compulsory Environmental Study Course in different subjects of B.Sc. Nursing programme like Sociology, Community Health Nursing, Nutrition and Genetics within the prescribed units without assigning any extra hours from the academic year 2015-2016. Field experience may be assigned as project work, group work, arrangement of exhibition in the community and visits to various natural assets like river/forests/grassland/hill/mountains etc. during the community posting. **(Annexure-XV)**

Resolution No. 3.8(b): Resolved to implement the shifting of following subjects in B.Sc. Nursing curriculum from the academic year 2015-2016 **(Annexure-XVI) :**

(i) Research to be shifted to third year along with practical hours. (45 hrs theory + 45 hours practical) from fourth year B.Sc. Nursing.

(ii) Midwifery and obstetric nursing to be shifted from third year to fourth year and 180 hours of practical can be covered in internship.

It was resolved to make necessary changes in the examinations of third and fourth year B.Sc. Nursing course.

Resolution No. 3.8(c): Resolved that the marks of Introduction to Nursing Research and Statistics (theory and project work) to be included in the grand total of second year Post basic B.Sc. Nursing University examination. **(Annexure-XVII)**

Resolution No. 3.6(l): It was resolved to accept Post Graduate Journal **[Annexure - XXI of BOM-45/2016]** & log book **[Annexure - XXII of BOM-45/2016]** for M.Sc. Medical Genetics to be implemented from 2016-17 new Batch onwards and as well as for Students who have taken admission in 2015-16 and will be entering into their 2nd year in 2016-17.

Resolution No. 3.6(m): It was resolved to accept Post Graduate Journal **[Annexure - XXIII of BOM-45/2016]** & log book **[Annexure - XXIV of BOM-45/2016]** for M.Sc. Clinical Embryology to be implemented from 2016-17 new Batch onwards and as well as for Students who have taken admission in 2015-16 and will be entering into their 2nd year in 2016-17.

Resolution No. 3.6(n): It was resolved to accept Academic Calendar for B.Sc. Paramedical Sciences (3 years courses) & M.Sc. Medical (2 & 3 year courses) for 2016-17. **[Annexure V of BOM-45/2016]**

Resolution No. 3.7(a): Resolved to approve the BPT Academic calendar 2016-17 [for both syllabi (new & old)] & MPT Academic calendar 2016-17. **[Annexure – V of BOM-45/2016]**

Resolution No. 3.7(d): It was resolved to schedule the MPT university theory examination (Regular batch) in the month of July every year with effect from year 2017 onwards. It was also resolved to make the necessary changes in the academic calendar **[Annexure - XXVI of BOM-45/2016]** so as the course can commence every year in August.

Resolution No. 3.7(e): It was resolved to change the MPT theory paper pattern as follows with effect from MPT exam scheduled in the year 2017 onwards:

Question No.	Question pattern	Marks per question	Total Marks
Q 1	Three LAQs	20	60
Q2	Four SAQs	10	40
		Total	100

Resolution No. 3.8(a): It is resolved to include following minor corrections in the existing B.Sc. Nursing curriculum with immediate effect (April 2016): **[Annexure - XXVII of BOM-45/2016]**

1. Traditional procedures needs to be continued as part of teaching and demonstration as traditional procedures are still practiced in community field.
2. Specifications in the biochemistry practical hours *(Enclosed)*
3. Home visit and bag technique to be included as an objective and 5 hours to be allotted for demonstration of bag technique in unit II of Community Health Nursing – I *(Enclosed)*
4. Process recording to include in Mental Health Nursing - Unit III *(Enclosed)*

(P.T.O)

Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-

(i) Slow learners must be re-designated as potential learners.

(ii) Students scoring less than 35% marks in a particular subjects/course in the 1st formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.

(iii) Students scoring more than 75% marks in a particular subjects/course in the 1st formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

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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