



**Gyanmanjari**  
Innovative University

Course Syllabus  
Gyanmanjari Science College  
Semester-1(M.Sc.)

**Subject:** Introduction to Andrology-MSCSEM11502

**Type of course:** Major

**Prerequisite:** Basic knowledge of Andrology

**Rationale:** A profound understanding of male reproductive health and disorders such as infertility and erectile dysfunction, Andrology contributes significantly to holistic patient care and quality of life, as well as ensuring equitable access to comprehensive male reproductive healthcare.

#### Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

*Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*

#### Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	<b>Survey of male/female infertility</b> Students have to survey about the factors related to male/female infertility and survey report will be upload on GMIU web Portal.	10
2	<b>Study of adverse effect of smoking and drinking</b> Students have to survey the effect of smoking and drinking addiction in male, which adversely affect the sperm development and submit report on GMIU web portal.	10
3	<b>Act out Sexual disorder and STIs</b> Students have to prepare detail chart of sexual disorder & STIs and need to upload on GMIU web Portal.	10





4	<b>Stress relief activity</b> Student need to perform activity which can reduce his/her stress leading healthy reproductive system and photo need to upload on GMIU web portal.	10
5	<b>Observing Semen sample</b> Student need to perform semen examination and photo or motility video need to upload on GMIU web Portal.	10
<b>Total</b>		<b>50</b>

**Course Content:**

Unit No	Course content	Hrs	% Weightage
1	<p><b>Examination of semen</b></p> <ol style="list-style-type: none"> <li>1. <u>Semen Collection and Handling</u> <ul style="list-style-type: none"> <li>• Methods of semen collection (masturbation, condom collection, TESA/PESA)</li> <li>• Pre-collection considerations (abstinence period, sample containers)</li> <li>• Handling and transportation of semen samples</li> <li>• Legal and ethical considerations</li> </ul> </li> <li>2. <u>Macroscopic Analysis</u> <ul style="list-style-type: none"> <li>• Volume measurement</li> <li>• pH determination</li> <li>• Appearance (color, viscosity)</li> </ul> </li> <li>3. <u>Microscopic Analysis</u> <ul style="list-style-type: none"> <li>• Sperm concentration and count</li> <li>• Sperm motility (progressive, non-progressive, and immotile sperm)</li> <li>• Sperm morphology (normal forms, abnormalities)</li> <li>• Sperm vitality (using eosin-nigrosin staining)</li> </ul> </li> <li>4. <u>Advanced Semen Tests*</u> <ul style="list-style-type: none"> <li>• Sperm DNA fragmentation (TUNEL assay, Comet assay, SCSA)</li> <li>• Reactive oxygen species (ROS) measurement - Sperm chromatin structure assay (SCSA)</li> <li>• Acrosome reaction tests - Sperm penetration assay (SPA)</li> <li>• Hypo-osmotic swelling test (HOST)</li> </ul> </li> <li>5. <u>Microbial Analysis</u> <ul style="list-style-type: none"> <li>• Screening for sexually transmitted infections (STIs)</li> <li>• Bacterial culture and sensitivity testing</li> </ul> </li> </ol>	15	25%



2	<p><b>Introduction to Semen Washing</b></p> <ol style="list-style-type: none"> <li><u>Overview of Semen Washing</u> <ul style="list-style-type: none"> <li>Importance of semen washing in ART.</li> <li>Principles of sperm preparation and sperm washing.</li> <li>Historical development and advancements in 'semen washing techniques.</li> </ul> </li> <li><u>Clinical Indications for Semen Washing</u> <ul style="list-style-type: none"> <li>Use of semen washing in intrauterine insemination (IUI) procedures.</li> <li>Preparation of sperm for in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI).</li> <li>Application in sperm cryopreservation and assisted reproductive techniques.</li> </ul> </li> <li><u>Quality Control in Semen Washing</u> <ul style="list-style-type: none"> <li>Quality management systems in semen processing.</li> <li>Standard operating procedures (SOPs) for semen washing.</li> <li>Maintenance of equipment and calibration procedures.</li> </ul> </li> </ol>	15	25%
3	<p><b>Semen Processing Techniques</b></p> <ol style="list-style-type: none"> <li><u>Density Gradient Centrifugation</u> <ul style="list-style-type: none"> <li>Principles and methodology of density gradient centrifugation.</li> <li>Gradient preparation: Discontinuous and continuous gradients.</li> <li>Selection of appropriate gradients based on sperm parameters.</li> </ul> </li> <li><u>Swim-up Technique</u> <ul style="list-style-type: none"> <li>Procedure for swim-up sperm preparation.</li> <li>Factors influencing swim-up efficiency and sperm recovery.</li> <li>Optimization of swim-up protocols for different clinical applications.</li> </ul> </li> <li><u>Washing and Resuspension Techniques</u> <ul style="list-style-type: none"> <li>Techniques for washing and resuspending sperm pellets.</li> <li>Buffer solutions and media for sperm washing.</li> <li>Removal of seminal plasma and contaminants during washing.</li> </ul> </li> <li><u>Assessment of Post-Wash Sperm Parameters</u> <ul style="list-style-type: none"> <li>Evaluation of sperm concentration and motility post-washing.</li> <li>Morphological assessment of washed sperm.</li> <li>Viability testing and functional assessments.</li> </ul> </li> <li><u>Critical samples processing</u> <ul style="list-style-type: none"> <li>Sample processing strategies in severe abnormal samples.</li> <li>Steps for processing testicular samples &amp; tissues.</li> <li>Appropriate reporting for critical samples.</li> </ul> </li> </ol>	15	25%





4	<p><b>Advanced Applications and Emerging Technologies</b></p> <p>1. <u>Advanced Semen Processing Techniques</u></p> <ul style="list-style-type: none"> <li>• Advances in sperm selection methods: Magnetic-activated cell sorting (MACS), microfluidics.</li> <li>• Application of sperm washing in cases of male factor infertility and infectious disease screening.</li> <li>• Future directions and innovations in semen washing technologies.</li> </ul>	15	25%
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**Suggested Specification table with Marks (Theory):60**

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Course Outcome:**

After learning the course, the students should be able to:	
CO1	Apply principles and applications of semen analysis and washing techniques in assisted reproductive technologies (ART).
CO2	Acquire practical skills in performing semen washing procedures for various clinical purposes.
CO3	Understand the principles and applications of various semen washing techniques and uses.
CO4	Get proficient in quality control and laboratory management in ART settings.

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.



Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

### Reference Books:

- [1] "WHO Laboratory Manual for the Examination and Processing of Human Semen"
- [2] "Clinical Andrology: EAU/ESAU Course Guidelines"
- [3] "Spermatogenesis: Methods and Protocols" edited by Rajasingh Johnson
- [4] "Male Infertility: A Comprehensive Guide to Clinical Evaluation and Management" edited by Craig Niederberger
- [5] Langman's Medical Embryology by T.W. Sadler
- [6] The Developing Human: Clinically Oriented Embryology by Keith L. Moore, T.V.N. Persaud, and Mark G. Torchia.
- [7] Human Embryology and Developmental Biology by Bruce M. Carlson.
- [8] Medical Embryology by Jan Langman.

