# REGULATIONS AND CURRICULUM GOVERNING

# Post Graduate Diploma in Clinical Embryology

**Implemented in Academic Year : 2024**

**Revised in : 2025**

**Name of the Constituent Unit: Yenepoya School of Allied Health Sciences**

YENEPOYA
(DEEMED TO BE UNIVERSITY)

**Deralakatte, Mangalore, Karnataka.**

YENEPOYA
(DEEMED TO BE UNIVERSITY)

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# 1. Preamble

The healthcare sector has witnessed rapid growth in recent decades, with reproductive medicine emerging as one of its most specialized and technology-driven domains. Assisted Reproductive Technology (ART) has become an integral part of modern infertility management, creating a growing demand for highly skilled and formally trained clinical embryologists. The complex and sensitive nature of laboratory-based reproductive procedures necessitates professionals with a strong foundation in biological sciences, embryology, genetics, and laboratory technology.

Clinical Embryology plays a pivotal role in the success of assisted reproductive procedures such as In Vitro Fertilization (IVF), Intra cytoplasmic Sperm Injection (ICSI), cryopreservation, and preimplantation embryo assessment. The embryologist is responsible for handling human gametes and embryos, operating advanced laboratory equipment, maintaining stringent quality control standards, and ensuring compliance with ethical and regulatory guidelines. Therefore, a Clinical Embryologist must possess not only technical expertise but also a deep understanding of developmental biology, reproductive physiology, laboratory safety, and quality management systems.

The **Post Graduate Diploma in Clinical Embryology** is designed to provide advanced theoretical knowledge and hands-on training in assisted reproductive technologies. The programme aims to prepare competent professionals capable of effectively supporting reproductive medicine specialists and contributing to successful clinical outcomes. In alignment with the educational framework and guidelines of the **Ministry of Education (formerly MHRD), Government of India**, and the evolving standards of higher education, the **Choice Based Credit System (CBCS)** has been adopted from the academic year **2020–21 onwards** to promote flexibility and learner- centric education.

The **Choice Based Credit System (CBCS)** offers a flexible and outcome-oriented approach to learning. The salient features of CBCS include:

- Enabling students to progress at their own learning pace
- Providing opportunities to choose electives from a broad spectrum of courses offered by other departments or institutions
- Allowing students to earn additional credits beyond the prescribed minimum
- Encouraging interdisciplinary and intra-disciplinary learning approaches
- Facilitating effective utilization of faculty expertise across multiple disciplines
- Incorporating a continuous and comprehensive evaluation system that assesses analytical ability, practical competence, and professional skills in addition to theoretical knowledge

## 2. Definitions

**2.2 Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

**2.3 Semester System / Choice Based Credit System:** The semester system accelerates the teaching – learning process. The CBCS provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice -based credit system provides a cafeteria type approach in which the students can take courses of their choice, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

An academic year shall consist of two semesters:

| | |
|---|---|
| Odd Semester 1st, 3rd | September/October to February/March |
| Even semester 2nd, 4th | March/April to August/September |

**2.4 Course:** Usually referred to, as "papers" is a component of a programme. The courses shall define learning objectives and learning outcomes. A course shall comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these. The courses can be of the following types i.e. Core, Ability Enhancement, Skill enhancement, Value added courses, Multidisciplinary Electives and Internship.

**2.5 Credits:** Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20week schedule: One credit =1 hour of lecture per week/ two hours of Laboratory or practical/three hours of clinical rotation, field work/posting. All courses need not carry the same credits.

| | **Lecture (L)** | **Tutorial (T)** | **Practical (P)** | **Clinical Rotation (CR)** |
|---|---|---|---|---|
| 1 Credit | 1 Hour | 1 Hour | 2 Hours | 3-5 Hours |

**Credit Hours for different types of courses:** Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component. For example, a three-credit lecture course in a semester means three one-hour lectures per week with each one-hour lecture counted as one credit. In a semester of 15 weeks duration, a three-credit lecture course is equivalent to 45 hours of teaching.

One credit for tutorial work means one hour of engagement per week. In a semester of 15 weeks duration, a one-credit tutorial in a course is equivalent to 15 hours of engagement.

A one-credit course in practicum or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week. In a semester of 15 weeks duration, a one-credit practicum in a course is equivalent to 30 hours of engagement.

A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week. Accordingly, in a semester of 15 weeks duration, one credit in these courses is equivalent to 30 hours of engagement.

A course can have a combination of lecture credits, tutorial credits, and practicum credits. For example, a 4–credit course with three credits assigned for lectures and one credit for practicum shall have three 1-hour lectures per week and one 2-hour duration field-based learning/project or lab work, or workshop activities. In a semester of 15 weeks duration, a 4-credit course is equivalent to 45 hours of lectures and 30 hours of practicum. Similarly, a 4 –credit course with 3- credits assigned for lectures and one credit for tutorial shall have three 1-hour lectures per week and one 1-hour tutorial per week. In a semester of 15 weeks duration, a four-credit course is equivalent to 45 hours of lectures and 15 hours of tutorials.

Experiential learning credit is equal to 3-hour duration per week. For example, 1 credit for experiential learning will mean 45 hours of learning. The credits assigned to the course is indicated as L:T:P format. For example, for a 4credit course format could be: 4:0:0 or 1:2:1 or 3:1:0 or 0:0:4etc.

**2.6 Programme:** An educational program leading to award of a degree, diploma or certificate. The following types of courses/activities constitute the programmes of study. Each of them will require a specific number of hours of teaching/guidance and laboratory/studio/workshop activities, field-based learning/projects, internships, and community engagement and service.

a. **Lecture courses:** Courses involving lectures relating to a field or discipline by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

b. **Tutorial courses:** Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning, work/vocation, or professional practice.

c. **Practicum or Laboratory work:** A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an expert or qualified individual in the field of learning, work/vocation or professional practice.

d. **Seminar:** A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

e. **Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

**f. Studio activities:** Studio activities involve the engagement of students in creative or artistic activities. Every student is engaged in performing a creative activity to obtain a specific outcome. Studio-based activities involve visual- or aesthetic focused experiential work.

**g. Field practice/projects:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity.

**h. Community engagement and service:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity. The curricular component of 'community engagement and service' will involve activities that would expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems.

**i. Experiential learning activities:** Field project work / Day out learning activities etc are considered as experiential activities.

**2.7 Grade Point:** It is a numerical weight allotted to each letter grade on a 10-point scale.

**2.8 Credit Point:** It is the product of grade point and number of credits for a course.

**2.9 Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters: O, A+, A, B+, B, C, P, F, AB.

**2.10 Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

**2.11 Semester Grade Point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

**2.12 Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester.

**2.13 Academic Bank Account:** Means an individual account with the Academic Bank of Credits opened and operated by a student, to which all academic credits earned by the student from course(s) of study are deposited, recognized, maintained, accumulated, transferred, validated or redeemed for the purposes of the award of degree/diploma/certificates etc. by an awarding institution.

**2.14 Academic Bank of Credits:** Means the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses or Programmes in Disciplines of study leading to Degree or Diploma or Post Graduate Diploma or Certificate of Study offering multiple entry and multiple exit facilities, while removing rigid curricular boundaries and creating new possibilities of life-long learning.

**2.15 Credit Accumulation:** Means the facility created by Academic Bank of Credits in the Academic Bank Account opened by students in order to transfer and consolidate the credits earned by them by undergoing Courses.

**2.16 Credit Redemption:** Means the process of commuting the accrued credits in the Academic Bank Account of the students maintained in ABC for the purpose of fulfilling the credits requirements for the award of Degrees or Diplomas or Certificates or Course work for Ph.D. programme etc., by the registered degree-awarding Higher Educational Institutions.

2.17 **Credit Transfer:** Means the mechanism by which the Registered Higher Educational Institutions are able to receive or provide prescribed credits to individual Academic Bank Accounts in adherence to the University Grants Commission credit norms for the 'course/s' undertaken by students enrolled in any Registered Higher Education Institution within India.

## 1.1 Curricular components of the Post Graduate Diploma in Clinical Embryology Programme:

Courses in the programme may be of the following types:

a. Core Course
b. Skill Enhancement Courses (SEC)

**a. Core Course (CC):** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. This is the course which is the major disciple/subject having main focus and degree will be awarded in this discipline. This core course provides opportunity for our student to pursue in depth study of a particular subject or discipline hence, it is compulsorily studied by a student as a core requirement to complete the program of study in a said discipline. Every Core course shall be restricted to a minimum of 4 credits.

**b. Skill Enhancement Course (SEC):** SEC courses are aimed at imparting practical skills, hands- on training, competencies etc to enhance the skill-based knowledge and thus the employability of the students

## ✓ Eligibility for Admissions:

To be eligible for admission in PG-Diploma in Clinical Embryology, a candidate should have passed- Post Graduate Degree examination in Life sciences/Medicine or its equivalent as recognized by the Yenepoya (Deemed to be) University .

Candidate needs to secure 40% or above marks in the qualifying examination to be eligible for admission. For SC/ST/OBC candidates minimum marks required in the qualifying exam is 35% marks.

## ✓ Duration of the Program

The duration of the programme shall extend over 2 semesters (1 academic year ) each semester comprising minimum of 15 weeks with the minimum of 90 actual working days of instruction in each semester. The successful completion of the Post Graduate diploma program, applicable will lead to Post Graduate Diploma in Clinical Embryology.

## ✓ Maximum Period for Completion of Programme:

A candidate shall complete two semesters (1 Year) programme within 1 year from the date of admission. Hence, the maximum period for completion of the programme is two years.

| | **Broad category of course** | **Hours / Credits** | **Course (Title)** |
|---|---|---|---|
| **1.** | **Discipline-Specific Courses** | | |
| a) | Theory | **I Semester** | |
| | | 60 Hours / 4 Credits | Andrology |
| | | 60 Hours / 4 Credits | Research Methodology and Biostatistics |
| | | **II Semester** | |
| | | 60 Hours / 4 Credits | Assisted Reproductive Technology |
| | | 60 Hours / 4 Credits | |
| | | 60 Hours / 4 Credits | |
| b) | Practical (SEC)* | - | - |
| c) | Simulation-based (SEC)* | - | - |

## ✓ Attendance:

- Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

- There shall be no provision for condonation of shortage of attendance.

- The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

## ✓ Scheme of Examination

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.

The marks for CIA shall be 50% and SEE shall be 50%. The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

There shall be examinations at the end of each semester ordinarily during February/March for odd semesters and during August/September for even semesters.

The SEE duration shall be 60 minutes for 25 marks paper and 120 minutes for 50 marks paper.

The various Formative assessment method include Assignments, reports, quizzes

### .1 Examination Structure

The examination structure shall vary dep ending on the course, however, broadly divided as follows:

| **Examination / Assessment** | **Core / SEC** |
|---|---|
| Continuous Internal Assessment | 50 Marks |
| Semester End Examination | 50 Marks |
| Total | 100 Marks |

### .2 Parameters for Continuous Internal Assessment (CIA)

| Internal Assessment Components | Core / SEC |
|---|---|
| Internal Assessment tests | 20 |
| Assignment | 10 |
| Continuous and comprehensive assessment | 20 |
| **Total Marks** | **50** |

## 10 Eligibility to appear for University Examination

Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

There shall be no provision for condonation of shortage of attendance.

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality. The marks for CIA shall be 50% and SEE shall be 50%.

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The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

## 11 Criteria for Passing

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

A candidate shall be declared to have passed the UG programme if he/she secures at least CGPA of 5.0 (Course Alpha-Sign Grade P) in the aggregate of both Internal Continuous Assessment and Semester End Examination.

The results of the candidates who have passed the sixth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

## 12 Grading and Classifications

The results of successful candidates at the end of each semester shall be declared in terms of Grade Point Average (GPA) and Alpha-Sign Grade. The results at the end of the sixth semester shall be classified on the basis of the Cumulative Grade Point Average (CGPA) obtained in all the six semesters and the corresponding overall alpha sign grade.

**a. Letter Grades and Grade Points:**

i. The Deemed to be University would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

ii. The UGC recommended 10-point grading system with the following letter grades are given below:

| Letter Grade | Marks | Grade Point |
|---|---|---|
| O (Outstanding) | 90-100 | 10 |
| A+ (Excellent) | 80-89 | 9 |
| A (Very Good) | 70-79 | 8 |
| B+ (Good) | 60-69 | 7 |
| B(Above Average) | 55-59 | 6 |
| P (Pass) | 50-55 | 5 |
| F (Fail)/ RA (Reappear) | Below 50 | 0 |
| Ab (Absent) | | 0 |

*The Marks with 0.5 shall be rounded up to the next whole number.

iii. A student obtaining Grade RA/ Ab shall be considered failed and will be required to reappear in the end semester examination.

**b. The Semester Grade Point Average (SGPA)**

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a student has a F or ABS grade in program 4, the SGPA shall then be computed as:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4 * ZERO + C5G5}{C1 + C2 + C3 + C4 + C5}$$

**c. Cumulative Grade Point Average (CGPA)**

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the program(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1 + C2S2 + C3S3 + C4S4 + C5S5 + C6S6}{C1 + C2 + C3 + C4 + C5 + C6}$$

where C1, C2, C3,…. is the total number of credits for semester I,II,III,…. and S1, S2, S3….is the SGPA of semester I,II,III,…..

**Calculation of GPA & CGPA: An example (1st semester)**

| Program Code | Course | Credits (a) | Grade Obtained | Credit Value (b) | Grade Points (axb) |
|---|---|---|---|---|---|
| | Course 1 | 4 | B | 8 | 32 |
| | Course 2 | 4 | B | 8 | 32 |
| | Course 3 | 4 | O | 10 | 40 |
| | Course 4 | 2 | C | 7 | 14 |
| | Course 5 | 2 | A | 9 | 18 |
| | **Total** | **16** | **-** | **-** | **136** |

1st Semester GPA = Total Grade Points / Total Credits = 136 / 16 = 8.5

2nd Semester GPA = 7 with respect to 18 Credits

Then 1st Year CGPA = (8.5 x 16) + (7 x 18) / 16 + 18 = 7.7

## 13 **Any other Information** (Progression Criteria, Re-entry after break of the study, Evaluation of Answer Scripts, Internship)

### 14.1 Re-Entry after Break of the study:

Candidates admitted to a program abstaining for more than 3 months must seek readmission into the appropriate semester.

The candidate shall follow the syllabus in vogue (currently approved/is being followed) for the program.

All re-admissions of candidates are subject to the approval of the University.

### 14.2 Evaluation of Answer Scripts

a. Each theory examination shall have single evaluation. There shall be provision for re-evaluation on a payment of a fee. An external examiner shall value the paper, if the difference is more than 15% of previous marks the answer script shall be sent for third evaluation. In such an event, the average of the best two out of the three scores will be taken as the final score.

b. Practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner.

- **Components of Exit Exam**

| Sl. No. | Components | Marks |
|---|---|---|
| 1 | Spotters | 30 |
| 2 | Case scenario/Stations | 30 |
| 3 | Viva Voice | 40 |
| Total Marks | | 100 |

**Particulars of Practical, Viva-Voce**

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as an Optometrist.
- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 3 stations.

# Programme Structure

| Semester 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Type | Course Title | Hours per Week | | | Max. Marks | | Credits |
| | | Lecture | Tutorial | Practical | CIA | SEE | |
| CC | Andrology | 4 | - | - | 50 | 50 | 4 |
| CC | Embryology | 4 | - | - | 50 | 50 | 4 |
| CC | Research Methodology and Biostatistics | 3 | - | - | 50 | 50 | 3 |
| SEC | Practical 1 - Andrology | - | - | 14 | 50 | 50 | 7 |
| SEC | Practical II - Embryology | - | - | 12 | 50 | 50 | 6 |
| Total | | | | | 400 | | 24 |

| Semester 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Type | Course Title | Hours per Week | | | Max. Marks | | Credits |
| | | Lecture | Tutorial | Practical | CIA | SEE | |
| CC | Assisted Reproductive Technology | 4 | - | - | 50 | 50 | 4 |
| SEC | Practical III - ART | - | - | 16 | 50 | 50 | 8 |
| RP | Dissertation | - | - | - | 50 | 50 | 12 |
| Total | | | | | 300 | | 24 |

# SEMESTER -I

**Course: Core (Andrology)**

**Credits: 04** **Number of hours: 60**

**Course Objectives:**

- To understand the clinical diagnosis and management of male infertility, including the interpretation of laboratory tests and imaging studies, and the design of treatment plans.
- To understand the semen collection and preparation techniques.
- To understand the semen analysis and sperm function tests.
- To gain knowledge on advanced sperm analysis techniques.
-

| UNIT | NO. OF HOURS | CONTENT | MUST KNOW | GOODTO KNOW | DESIRABLE TOKNOW | WEIGHTAGE % | TYPE OF QUESTIONS |
|---|---|---|---|---|---|---|---|
| Unit 1: | **9** | Functional anatomy of Male reproductive system.<br><br>Physiology and functions of all male reproductive organs.<br><br>Functions of Hormones involved in spermatogenesis.<br><br>Ultrastructure of sperm, semen and its components. | ✓ | | | **20** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Unit II | **9** | Evaluation of Infertile male: Pre testicular, Testicular, Post testicular reasons for Infertility, Hormonal evaluation,<br><br>Treatment plans for Male Infertility. | | ↘ | | **10** | |
| Unit III | **10** | Sample collection methods, sample collection for diagnostic or research purposes, a sterile collection of semen for assisted reproduction and microbiological analysis, Sample collection at home, collection of semen by a condom, Safe handling of the specimen.<br><br>**Semen Analysis:** Initial Macroscopic examination: liquefaction, semen viscosity, semen appearance, semen volume and PH. | ↘ | | | **30** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Unit IV | **12** | **Initial microscopic examination:** make wet preparation, Aggregation and agglutination.<br><br>**Sperm concentration estimations**: types of counting chambers.<br><br>**Sperm Motility estimations:** Types of sperm motility.<br><br>**Sperm morphology assessment:** preparation of sperm smear, assessment of sperm morphology. | ↘ | | | **30** | |
| Unit V | **10** | **Sperm vitality test:** using eosin-nigrosin, eosin alone and hypo-osmotic swelling test<br><br>Assessment of immature germ cells in semen, Assessment of non-sperm cells (WBC/RBC), DNA Fragmentation Index. | ↘ | | | **10** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Unit IV | **10** | Semen processing: Rationale for sperm Processing<br><br>Different types of sperm processing techniques<br><br>Composition of semen processing media<br><br>Advanced sperm processing techniques for IUI,<br><br>Introduction to AIH (Artificial Insemination with Husband sample), AID (Artificial Insemination with donor sample)<br><br>Consent forms to be filled for IUI-AID/AIH procedure<br><br>IUI Stimulation protocols<br><br>Setting up of IUI laboratory | ↘ | | | **20** | |

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# Embryology

**Course: Core (Embryology)**

**Credits:** **Number of hours:**

**Course Objectives:**

• To provide an overview of the fundamental concepts and principles of embryology, including the development of the human embryo from fertilization to birth.
• To understand the mechanisms of cell differentiation, tissue formation, and organogenesis during embryonic development.
• To learn the various stages of human embryonic development and their associated morphological changes.
• To gain an understanding of the genetic and environmental factors that affect embryonic development

| UNIT | NO. OF HOURS | CONTENT | MUST KNOW | GOODTO KNOW | DESIRABLE TOKNOW | WEIGHTAGE % | TYPE OF QUESTIONS |
|---|---|---|---|---|---|---|---|
| **Unit I** | **10** | Physiology and functions of all female reproductive organs<br>● Oogenesis and Folliculogenesis<br>● Menstrual cycle- Ovulatory Phase, Luteal Phase,<br>● Cervical and vaginal changes during Ovulation,<br>● Physiology of ovulation and tests for ovulation, | ✓ | | | **20** | **LA/SA** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Unit II** | **10** | Evaluation of Infertile Female: Medical History, Surgical History, Drug History, Occupational exposure, physical examination, Endocrine Examination, tests conducted. | | ↘ | | **15** | **LA/SA** |
| **Unit III** | **10** | Introduction to Fertilization.<br>● Capacitation of sperm, Uterine, vaginal and cervical secretions aiding sperm capacitation.<br>● Hyperactivated sperm motility. | | ↘ | | **15** | **SA** |
| **Unit IV** | **10** | Molecular basis of capacitation.<br>●Mechanism of Fertilization- Penetration through the Cumulus Oophorus.<br>●Penetration through Zona Pellucida, Functions of Zona Pellucida.<br>●Acrosome Reaction, Fusion of cell membranes. | | ↘ | | **10** | **SA** |

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|---|---|---|---|---|---|---|---|
| **Unit V** | **10** | Cortical reaction, Oocyte Activation. ●Formation of Female Pronucleus, Formation of Male Pronucleus. Fusion of Pronuclei, Syngamy. | ↘ | | | **15** | **LA/SA** |
| **Unit VI** | **10** | Grading of oocyte cumulus oophorus Oocyte scoring, Zygote grading Cleavage stage embryo grading Blastocyst stage embryo grading | ↘ | | | **25** | **LA** |

**References:**


- Dunstan GR 1990. The human embryo :Aristotle and the Arabic and European traditions Univ Exeter Press
- Human fertilization and fertilization authority U.K 1994. Third annual report
- Symposium report no20-1983 the control of follicle development and ovulation J.Repord . Fert 69,325-409
- Tesarik J et al-2005, Improvement of delivery and live birth rates in women aged >40 years by ovarian co stimulation with growth hormone human protection :20,2536-2541
- Kim SS et al-2009. Long term ovarian function and fertility after hetorotopicautotransplantation of cryobanked human ovarian tissue 8 years experience in cancer patients FertlSteril,91,2349.
- Middleburg , KJ, et al 2008.Nerimotor cognitive , language and behavioral outcome in children born following IVF or ICSI a systematic review human reproduction update,march-2008.
- Peter Hollands 2009 changing the responsibilities of the clinical embryologists IVF the new direct I may 2009.

# Research Methodology and Biostatistics

**Course: Core (Research Methodology and Biostatistics)** **Credit: 60**

**Course Outcomes:**

At the end of the Course, the students will be able to

- To define the Statistical Terms.
- To Possess Knowledge and Skill in the use of Basic Statistical and Research Methodology.
- Able to distinguish different data types, variables and scales of measurement
- Able to organize, tabulate and present data through tables and graphs. Compute and
- interpret descriptive statistics
- Able to compute and interpret sensitivity, specificity, PPV, NPV and ROC Analysis.
- Able to determine sample size and use of random sampling methods.
- Able to interpret Power of a test, Level of significance, p value and confidence
- interval. Use of t-test, ANOVA and multiple comparison.
- To interpret the commonly used parametric and nonparametric tests and how to report
- the findings.
- Carryout correlation analysis and interpret the results
- Perform regression analysis and draw conclusions of the analysis. Use the regression model for prediction.

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## Biostatistics

| UNIT | NO. OF HOURS | CONTENT | MUST KNOW | GOODTO KNOW | DESIRABLE TOKNOW | WEIGHTAGE % | TYPE OF QUESTIONS |
|---|---|---|---|---|---|---|---|
| **Unit I** | **6** | Introduction to biostatistics &research methodology, types of variables & scales of measurements, measure of central tendency & dispersion, rate, ratio, proportion, incidence & prevalence | ↘ | | | **10%** | **LA/SA** |
| **Unit II Sampling** | **3** | Population & Sample, Sampling and non-sampling errors and methods of minimizing these errors, Random and non random sampling, different sampling techniques – simple random, stratified, systematic, cluster& multistage | ↘ | | | **10%** | **LA/SA** |

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|---|---|---|---|---|---|---|---|
| **Unit 3:** Sampling distributions | | Parameter and Statistic. Standard error. Basic probability distributions - Normal, poisson, binomial distributions with their applications in biological sciences. | ↘ | | | **5%** | **SA** |
| Unit 4: Tests of significance | **6** | Basics if testing of hypothesis – Null & Alternative hypothesis, type 1 and type II errors, level of significance (parametric) & power of the tests, p value, Confidence interval. Tests of significance – T test (paired & un paired), Chi square test & Test of proportion, One way analysis of variance. Repeated measures analysis of variance. Tests of significance (non parametric) – Mann – Whitney U Test, Wilcoxon Test, Kruskal – Wallis Analysis of variance, Friedmann's Analysis of variance | ↘ | | | **20%** | **LA/SA** |

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|---|---|---|---|---|---|---|---|
| **Unit 5:** Correlation and regression | **3** | Linear correlation by Karl Pearson and rank order correlation due to Spearman, Testing the significance of correlation co efficient, simple linear regression – estimation & testing, residual plots, multiple linear regression. | | ↘ | | **10%** | **SA** |
| Unit 6: Sample size determination | **2** | General concept. Sample size for estimating means and proportion, testing of difference in means and proportions of two groups. | | ↘ | | **10%** | **SA** |
| Unit 7: Study designs | **2** | Descriptive epidemiological methods – case series analysis and prevalence studies. Analytical epidemiological methods – case control and cohort studies. Clinical trials / intervention studies, odds ratio and relative risk, stratified analysis | ↘ | | | **10%** | **LA/SA** |

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|---|---|---|---|---|---|---|---|
| Unit 8: Multivariate analysis | **3** | Concept of multivariate analysis, introduction to logistic regression and survival analysis | | ↘ | | **5%** | **SA** |
| Unit 9 | **1** | Reliability and validity of diagnostic tests Sensitivity, Specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), ROC curve. | | ↘ | | **5%** | **SA** |
| Unit 10: Format of scientific documentations | **1** | Structure of research protocols, structure of thesis/research report, formats of reporting in scientific journals. Systematic review and meta-analysis | | ↘ | | **10%** | **SA** |

**Reference Books:**

1. Rao NSN : Applied statistics in health sciences, JP publishers
2. Mahajan B.K: Methods of biostatistics, Kothari book depot, A.D Marg, Bombay
3. Potti L.R : A text book of statistics, Yamuna publications, Sreekanteshwaram,
4. Trivandrum.
5. Lancaster H.O: Introduction to medical statistics, Johnwiley & sons, New York.
6. Leius A.E : Biostatistics, Reinhold publishing Co, New York.
7. Cotton T : Statistics in medicine, Little Brown & Co, Boston.
8. Hill A.B : Principles of medical statistics, Oxford University press, New York

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# Research methodology

| UNIT | NO. OF HOURS | CONTENT | MUST KNOW | GOODTO KNOW | DESIRABLE TOKNOW | WEIGHTAGE % | TYPE OF QUESTIONS |
|---|---|---|---|---|---|---|---|
| Unit I: Introduction | **2** | Need for research<br><br>Types of research<br><br>Outlining the research process | ✓ | | | **20%** | **LA/SA** |
| Unit II: Review of Literature | **2** | Importance, sources & steps<br>Critical appraisal of research article | | ✓ | | **15%** | **LA** |
| Unit III: Research Design | **2** | Types of research – Qualitative & Quantitative Experimental & Non Experimental, Survey – advantages & disadvantages | | ✓ | | **15%** | **SA** |

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| Unit IV: Research Process | **2** | Framing a research question<br>● Research title<br>●Aim & Objectives, Assumptions, Limitations & Delimitations, Variables<br>●Hypothesis – formation & testing | ↘ | | | **10%** | **LA** |
| Unit V: Data collection & analysis | **2** | Data sources, technique of data collection, tools<br>● Reliability & validity<br>● Process of data collection<br>● Pilot study – method, need | ↘ | | | **10%** | **SA** |
| Unit VI: Interpretation & presentation of data | **2** | Qualitative & quantitative analysis<br>●Graphical representation of data<br>●Conclusion & discussion | ↘ | | | **10%** | **SA** |
| Unit VII: | **2** | Discussion, Conclusion and References | ↘ | | | **5%** | **SA** |

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| Unit VIII | **2** | Essentials of writing a research paper along with process of publication | ↘ | | | **10%** | **LA** |

**Course Outcome:**

At the end of the Course, the students will be able to

1. Able to distinguish different data types, variables and scales of measurement
2. Able to organize, tabulate and present data through tables and graphs. Compute and interpret descriptive statistics
3. Able to compute and interpret sensitivity, specificity, PPV, NPV and ROC Analysis.
4. Able to determine sample size and use of random sampling methods.
5. Able to interpret Power of a test, Level of significance, p value and confidence interval. Use of t-test, ANOVA and multiple comparison.
6. To interpret the commonly used parametric and nonparametric tests and how to report the findings.
7. Carryout correlation analysis and interpret the results
8. Perform regression analysis and draw conclusions of the analysis. Use the regression model for prediction.

## Practical Examination

**Andrology Practical I**

- Sperm analysis WHO criteria- Macroscopic semen analysis
- Sperm analysis WHO criteria- Microscopic semen analysis
- Sperm processing - swim up and gradients methods
- Cryopreservation of sperm
- Examination of non-sperm cells in semen
- Sperm vitality tests
- Fructose test
- Assessment of sperm chromatin- SCD test
- Measurement of Reactive oxygen species
- Preparation of Infected (HIV/HBV) samples

**Embryology Practicals II**

- Oocyte pickup from the follicular fluid, washing and cleaning of OCC
- Grading of OCC
- Denudation methods
- Maturity checking and grading of the denuded oocytes
- Dish Preparation for IVF/ ICSI
- Pronuclear grading
- Cleavage stage grading
- Blastocyst grading and blastocyst culture pros and cons

# Semester 2

## Assisted Reproductive Technology

**Course Objectives:**

- To understanding of the principles and techniques of ART, including in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and cryopreservation.
- To develop skills in clinical diagnosis and management of infertility, including the interpretation of laboratory tests and imaging studies, and the design of treatment plans using ART.

| UNIT | NO. OF HOURS | CONTENT | MUST KNOW | GOODTO KNOW | DESIRABLE TOKNOW | WEIGHTAGE % | TYPE OF QUESTIONS |
|---|---|---|---|---|---|---|---|
| **Unit I** | **10** | • Priming of Endometrium and the action of Pinopods<br>• Invasive Implantation – The Attachment Phase<br>• Uterine - Blastocyst conversations and the control of Implantation<br>• The Endocrine Dependence of Implantation<br>• The Human Placenta | ✓ | | | **20** | |

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|---|---|---|---|---|---|---|---|
| **Unit II** | **10** | • Laparoscopic and Transvaginal Oocyte Retrieval<br>• Embryo Transfer- Endometrial preparation, Embryo loading and Embryo Transfer<br>• IVF Needle alignment for ICSI | | ↘ | | **15** | |
| **Unit III** | **10** | • GnRH Analogues<br>• GnRH Antagonist<br>• Human Menopausal Gonadotrophins<br>• Human Chronic Gonadotrophins<br>• Long Protocols, Short Protocols<br>• Controlled Hyperstimulation with Gonadotrophins<br>• Luteal Support | | ↘ | | **15** | |

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|---|---|---|---|---|---|---|---|
| **Unit IV** | **10** | • Vitrification and thawing media and composition<br>• Vitrification devices, oocyte and embryo Vitrification<br>• Settings and equilibration of thawing media. | | | | **10** | |
| **Unit V** | **10** | • Intra Cytoplasmic Sperm Injection (ICSI)<br>• Dish preparation, micro tool alignment, gamete micro manipulation. | | | | **15** | |

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|---|---|---|---|---|---|---|---|
| **Unit VI** Advanced Techniques in ART | **10** | • Intracytoplasmic morphologically selected sperm injection (IMSI),<br>• Physiological selection of sperm and intracytoplasmic sperm injection,<br>• spindle view (poloscope).<br>• Micro Fluidics and Time Lapse Imaging.<br>• | ↘ | | | **25** | **LA** |

**References:**


- Angell, RR et al. 1986 chjager,S el at 1975 Romosome studies in human in vitro fertilization. Human Genetics 72,333-339
- Danforth RA et al 1987. Heigh purity water: an important component for success in in vitro fertilization American biotechnology laboratory 5,58-60
- Edward RG and brody SA 1995, human fertilization in laboratory. In princi[ples and practise of Assisted human reproduction. WB Saunders and Co, philedelphia, pennsylviniaPp 351-413
- Plachot at al. 1987, multicentriccentre of chromosome analysis in human oocytes and embryos in ivf programme, Human Reproduction 2-29
- Qunin P, ET Al 1987, culture factor effecting the success rate if in vitro fertilization and embryo transfer. Annals of Newyork academy of science 412-195
- Staessen C, VandenAbbeel E, Carle M, Khan I, Devroey P and VenSteirteghen AC. 1990, comparision between human serum abdAlbumanar -20-tm supplement for In Vitro Fertilization, Human Reproduction 5,336-341
- Bradue PR and Bolton VN, 1984, the preparation of spermatozoa for in vitro fertilization by Buoyant Density Centrifugation. In recent process of human in vitro fertilization – feihtinger, W.Kemeter 8

**Assisted Reproductive Technology Practicals III**

- Alignment of needles for micromanipulation
- Immobilization of sperm
- ICSI
- Embryo loading techniques
- Dish Preparation and aseptic techniques
- Preparation of embryo transfer and loading of embryos in to catheter
- Embryo Culture Techniques
- Vitrification of Embryos
- Thawing of Embryos
- Demonstration of Day 3 and Day 5 Embryo biopsy.

## DISSERTATION

**Course type: Research Project** **Credits: 12**

**Course Outcomes:**

At the end of the course, students will be able to:

1. Demonstrate the ability to conduct independent research, critically evaluate literature, collect and analyze data, and draw meaningful conclusions.
2. Apply critical thinking skills to assess existing knowledge, identify research gaps, and contribute new insights to their area of specialization.
3. Deepen their understanding and expertise in their chosen area of specialization through the dissertation, showcasing mastery of the subject matter.

**Guidelines:**

•Each candidate is required to carry out a dissertation on a selected topic under the guidance of an recognized post graduate guide.
•The topic for the dissertation should be chosen based on the area of specialization. The data for the study will be collected in the area posted.
•Students shall use scientific methods of research, it could be - quantitative/qualitative/mixed methods. A student selects the tentative research topic in the second semester, in consultation with the guide.
•The synopsis shall be presented to the scientific review board (SRB) for approval following which ethics approval will have to be taken from the centre for ethics.
•No change in the dissertation topic or change of guide shall be made without prior approval of the University.
•The candidate should start collecting data only after getting Scientific Review Board (SRB) and Institutional Ethics Committee (IEC) Approval.

The dissertation should be structured under the following suggested headings:

- Title
- Abstract
- Introduction
- Review of literature
- Rationale /Need of the study
- Research question/Hypothesis
- Aim/Objectives of the study
- Methodology
- Results/Findings
- Discussion

- Conclusion
- Limitations of the study
- Recommendations
- Summary
- References/Bibliography
- Annexure

The written text of the dissertation should be neatly typed in double line spacing on one side of paper (A4 size) and should be bound, Spiral binding should be avoided, should be typed in recommended paper and font

A declaration by the candidate that the work was done by him/her shall be included. The co-guide (where ever applicable), guide, head of the department and head of the institution shall certify the bonafide of the dissertation.

Two copies of the dissertation shall be submitted to the university through proper channel along with a soft copy (CD).

Acceptance of the dissertation is a pre-requisite for a candidate to be eligible to appear in the final examination.