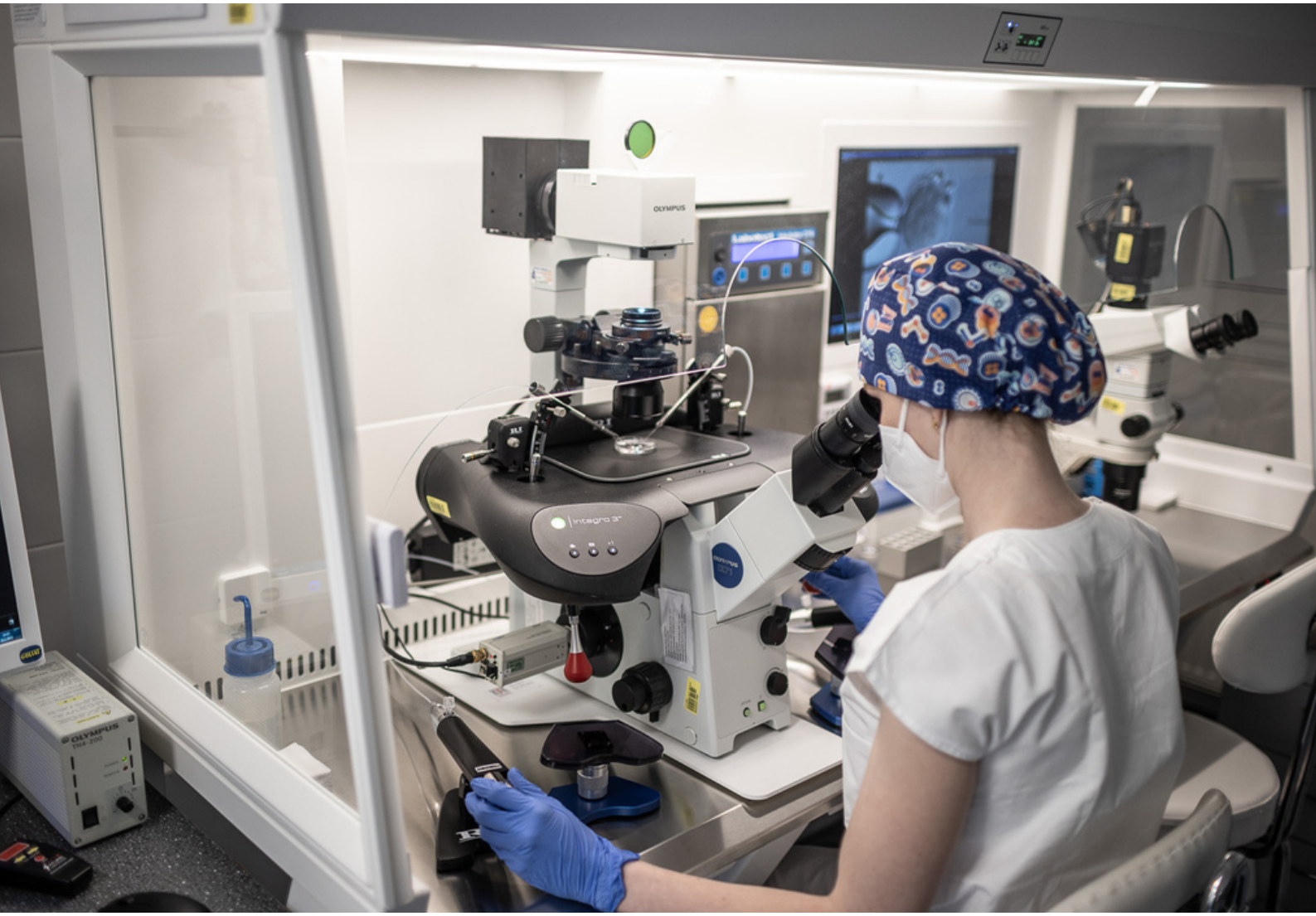
SCHOOL OF APPLIED SCIENCES

M.Sc.

in

CLINICAL EMBRYOLOGY & ASSISTED REPRODUCTIVE TECHNOLOGY



A TWO-YEAR PG PROGRAM BY :

REVA UNIVERSITY
Bengaluru, India

The two-year M.Sc. programme aims to provide graduate students, scientists and clinicians with highly advanced theoretical and practical understanding of human reproductive biology, embryology, infertility and assisted reproductive technology (ART) along with intensive **'hands-on'** practical training in essential laboratory skills, including the sophisticated micro-manipulation techniques associated with ART.

The course is administered by the School of Applied Sciences at REVA University and the purpose-built MOMSOON Academy alongside MOMSOON Fertility & IVF Centre.

M.Sc. in Clinical Embryology & Assisted Reproductive Technology

Clinical embryology is a relatively young branch of reproductive science that has undergone enormous expansion over the last twenty years. Louise Brown, the world's first 'test tube' baby, was born in 1978 as a result of pioneering research carried out by a team of British clinicians led by Patrick Steptoe and Robert Edwards. Since then, infertility treatment has undergone phenomenal development and become a highly specialised field involving a multitude of interventions known collectively Assisted Reproductive Technology (ART). Worldwide, approximately one million ART treatments are now performed each year and over five million ART babies have been born. However, a major concern is that there are too few appropriately trained clinical embryologists, both within India and throughout the rest of the world, to maintain this pattern of growth.

In addition, the field of clinical embryology is becoming ever more closely regulated, with greater emphasis on quality assurance. Meticulous training of new personnel in theoretical knowledge and practical skills is therefore critical to future advancement and ensuring patients consistently receive the best care. In response to these concerns, the REVA University has developed an intensive, two-year M.Sc. in Clinical Embryology & Assisted Reproductive Technology. Our intention is to inspire, motivate and train a network of future leaders in clinical embryology throughout the world. The course includes the very latest developments in ART including legislation, ethics, and quality management.

Significant emphasis is placed upon continuing professional development and acquiring valuable transferable skills. To this end, our M.Sc. programme will include a considerable practical component. Students will learn skills and techniques directly relevant to ART, as well as a range of '**traditional**' and '**cutting edge**' scientific techniques and procedures. A particular strength of our programme is the fact that each of our students will be individually trained in gamete manipulation / injection and embryo biopsy. For this purpose, students will use gametes and embryos acquired from mouse. The M.Sc. programme will prepare students for active employment within the clinical embryology / ART sector and / or a research career in reproductive science. As the course was designed in response to identified employment needs, our graduates are likely to be highly sought after. In particular, we expect our graduates to possess sufficient knowledge and skills to allow them to make a significant contribution to the design and establishment of new in vitro fertilisation (IVF) units, which need to incorporate the latest techniques and conform strictly to current legislation. Once enrolled to the M.Sc. programme, they will be allocated a Mentor, who will be a senior member of the clinical, scientific or research staff. The Mentor will provide individual support and guidance throughout the course and will meet regularly to discuss coursework and assessment. This level of individual support is a prominent and highly acclaimed feature of this program and will provide the support necessary for students to achieve maximum benefit from studies.

COURSE OUTLINE

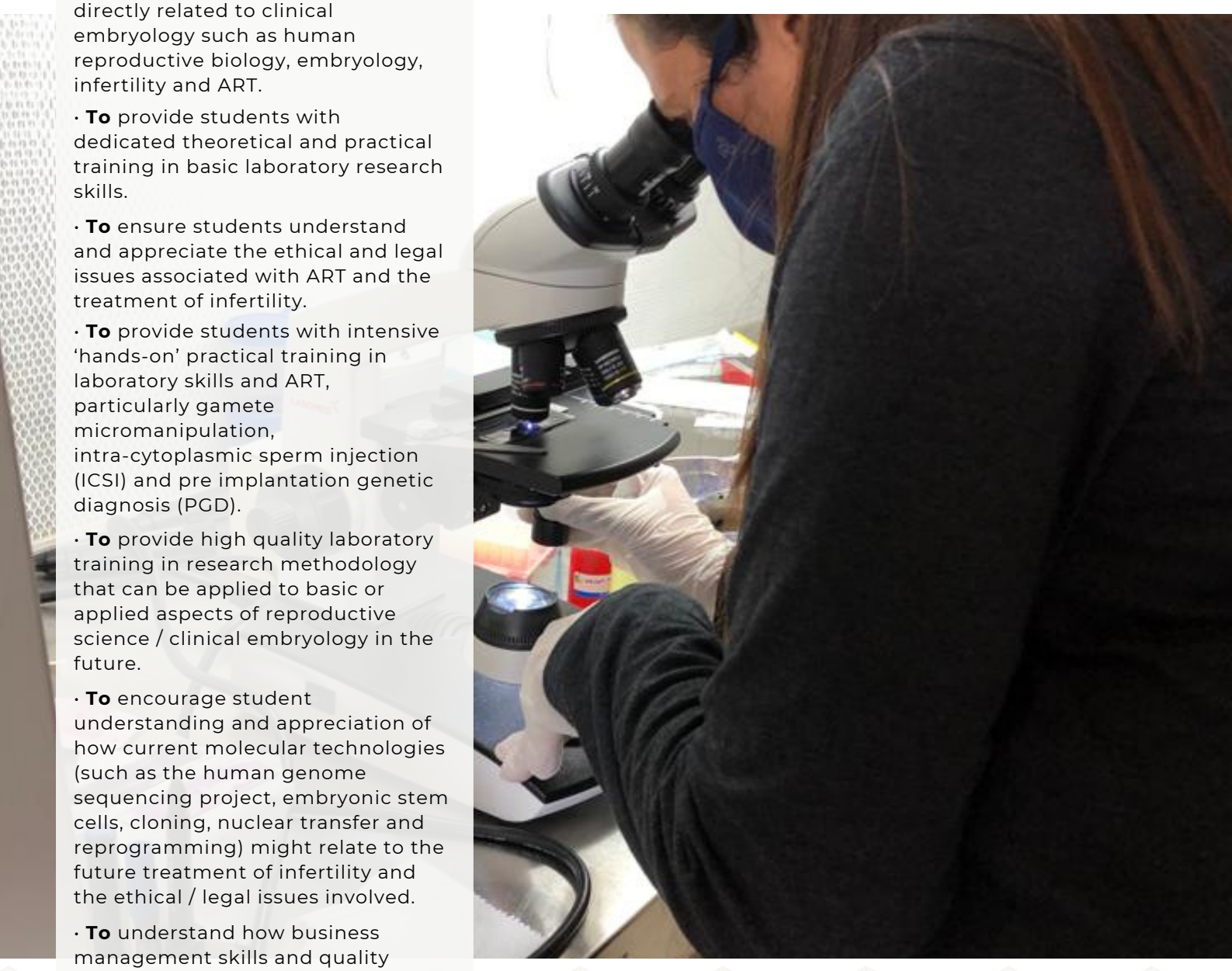
The course runs over a period of two years, incorporating four semesters with eight discrete units including practical courses in each semester.

Fundamental reproductive science and andrology laboratory methods are taught in the first semester.
Applied and clinical aspects of embryology and cryobiology are delivered in the second semester.
Micromanipulation and advanced ART techniques such as laser hatching and embryo biopsy are covered in the third semester. The fourth semester is designed to allow sufficient time for a high quality laboratory research project.

COURSE AIMS

Specific aims of M.Sc. in Clinical Embryology are:

- **To** deliver intensive teaching for students in both fundamental and applied aspects of subject areas directly related to clinical embryology such as human reproductive biology, embryology, infertility and ART.
- **To** provide students with dedicated theoretical and practical training in basic laboratory research skills.
- **To** ensure students understand and appreciate the ethical and legal issues associated with ART and the treatment of infertility.
- **To** provide students with intensive 'hands-on' practical training in laboratory skills and ART, particularly gamete micromanipulation, intra-cytoplasmic sperm injection (ICSI) and pre implantation genetic diagnosis (PGD).
- **To** provide high quality laboratory training in research methodology that can be applied to basic or applied aspects of reproductive science / clinical embryology in the future.
- **To** encourage student understanding and appreciation of how current molecular technologies (such as the human genome sequencing project, embryonic stem cells, cloning, nuclear transfer and reprogramming) might relate to the future treatment of infertility and the ethical / legal issues involved.
- **To** understand how business management skills and quality management procedures are vital in the ART clinic.
- **To** provide training in professional development and transferable skills.
- **To** build a network of potential leaders in clinical embryology for the future.



COURSE STRUCTURE

Semester 1

The first semester is planned to ensure that students gain core knowledge in the fundamental principles of reproductive science and the application of essential laboratory techniques.

It comprises the following units :
- Cell Biology and Histopathology
- Clinical Biochemistry
- Developmental biology
- Andrology Laboratory Techniques
- Reproductive Biology

Practical Courses :
- Clinical Biochemistry
- Andrology Laboratory Techniques
- Cell Biology, Histopathology and Developmental Biology

Semester 2

The second term aims to provide students with advanced theoretical and practical knowledge of embryology and cryobiology.

It comprises the following units :
- Molecular Biology
- Immunology
- Cryobiology
- Clinical Embryology
- Infertility and Reproductive Disorders

Practical Courses :
- Molecular Biology, Immunology Laboratory
- Clinical Embryology
- Cryopreservation techniques

Semester 3

During this semester, students will learn micromanipulation / injection / biopsy techniques using animal gametes. Students will also choose a laboratory research project to begin in the fourth semester.

It comprises the following units :
- Assisted Reproductive Technology
- Clinical Management of Infertility
- Pre-implantation Genetic Screening
- Ethics and Regulations in ART
- Research Methodology and Biostatistics
- Good Laboratory Practices in ART

Practical Courses :
- Assisted Reproductive Technology Techniques
- Pre-implantation Genetic Screening
- Advanced ART Techniques

Semester 4

The fourth semester is predominantly devoted to a laboratory research project which is expected to involve experimental work.

Results are to be written up and submitted as a dissertation. Students will present the results of their research project to a departmental audience by way of a short talk and will prepare a poster presentation which will form the basis an examination.

Projects are predominantly provided within MOMSOON Fertility & IVF Centre. Additional projects may be available in several collaborating University departments or ART Clinics.

PRACTICAL SKILLS

The M.Sc. programme places significant emphasis on practical skills and techniques, particularly those relevant to clinical embryology and reproductive science.
Students will learn a wide array of 'hands on' practical techniques, these include :

- Safety, liquid handling, aseptic techniques, waste management
- Preparation of media and buffers
- Sperm counting and morphological analysis
- Oocyte and embryo grading
- Cryopreservation of gametes and embryos
- Vitrification protocols
- In vitro maturation of oocytes
- Micromanipulation of gametes (mice model)



- Intra-cytoplasmic sperm injection (mice model)
- Sperm DNA fragmentation analysis
- Embryo biopsy techniques
- Pre-implantation genetic diagnosis (PGD)
- Computer assisted sperm analysis
- Laser-assisted embryo biopsy
- Oral and written presentation skills
- Statistics, experimental design, interpretation and analysis

Emphasis is placed directly on our students acquiring '**hands-on**' **experience**, facilitated by experienced scientific and clinical instructors. Our teaching laboratory has been purposefully designed to provide a stimulating learning environment.

PROFESSIONAL DEVELOPMENT

Significant emphasis will be placed on professional development and the acquisition of transferable skills. Our M.Sc. students will receive regular professional development seminars and workshops delivered by internal and external staff.

Areas covered include:

- **Information technology**
- **Business and management skills**
- **Laboratory safety / health and safety in a clinical environment**
- **Patents, intellectual property and technology transfer**
- **Bioethics and medical ethics**
- **Quality management and accreditation for ART clinics**
- **Data protection**
- **Experimental design, interpretation and analysis**
- **Getting research published**
- **Literature searches / online databases**
- **Clinical embryology – career options and recruitment / selection procedures**

TEACHING AND LEARNING METHODOLOGY

The course will be taught by the faculty at REVA University and also by the clinicians and embryologists at MOMSOON Fertility unit.

A variety of teaching methods will be employed to enhance and optimise student learning, e.g. class lectures, group tutorials, laboratory practical classes, and in-house demonstrations by visiting companies. Students will also receive regular lectures from many visiting scientists who are world experts in their field.
Our course places special emphasis on the development of practical laboratory skills, especially those that are applicable to ART and the routine duties of a clinical embryologist.

Self-directed learning strategies allow students to study topics of interest on an individual basis without formal facilitation and subsequently present their findings to the rest of the class, aided by course teaching staff.

Students will also gain significant benefit from watching and discussing live clinical procedures occurring within the MOMSOON Fertility Unit laboratories.

STUDENT RESOURCES

Mentors

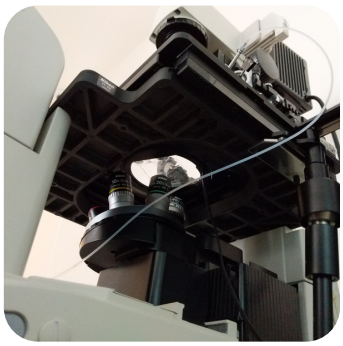
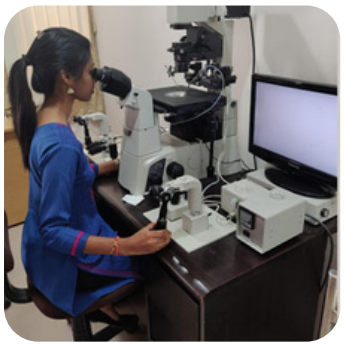
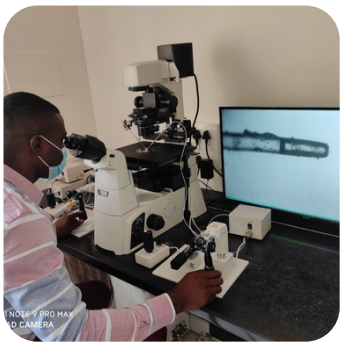
Each student will be allocated a mentor for the duration of their M.Sc. programme. Mentors are members of senior academic, clinical or research staff. Students will meet regularly with their mentor to discuss progress. The mentor will read and appraise first drafts of essays and laboratory reports, ensure that essays are marked and discussed, and will be available to offer help and advice throughout the course. The mentor will additionally provide one-on-one feedback to the students.



IT resources

Our M.Sc. students are provided with dedicated office space and teaching facilities within MOMSOON Academy. The student office is equipped with a variety of IT equipment including personal computers, printer and scanner. Computers are connected to the Academy network and possess all the necessary software required for the M.Sc. course in terms of word processing, presentation preparation and data analysis. Photocopying facilities are also available.

The M.Sc. programme in Clinical Embryology utilises the Academy's virtual learning environment and web-based support network. This electronic facility allows students to access lecture overheads, support material and other learning resources directly from the internet. It also provides an excellent means of providing course teaching staff with valuable feedback at regular intervals throughout the course.

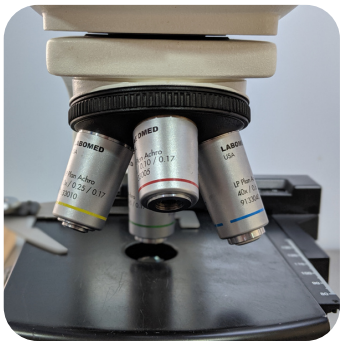
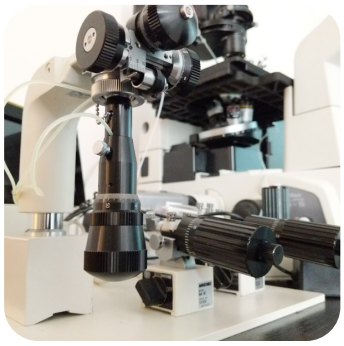




Library

The University has one of the best library collections. Our students can access all the required academic journals and textbooks needed for the course.

Laboratory equipments

The dedicated M.Sc. teaching facility at MOMSOON Academy is equipped with the very latest laboratory equipment, as well as several sophisticated micromanipulation workstations. A sufficient number of equipments set-ups are provided to ensure that each student is guaranteed to have hands-on practical experience in all the laboratory sessions.

The MOMSOON Fertility Unit

The research activities of the students have been enormously enhanced as a result of a close partnership with MOMSOON Fertility & IVF Centre, a fertility treatment unit founded in 2009. The MOMSOON Fertility's mission is 'to provide efficient and cost-effective fertility treatment in a caring and professional environment, and to foster research and development in the field of reproductive medicine'. The Unit offers a wide range of treatments including intra-uterine insemination, in vitro fertilisation, intracytoplasmic sperm injection, surgical sperm extraction, donor insemination, IVF with donor sperm / egg, sperm and embryo storage, oocyte in vitro maturation (IVM) and pre-implantation genetic diagnosis. MOMSOON Fertility & IVF Centre is ranked among the Best ART Clinics as per the survey conducted by the Times Group in 2022. The Unit is situated in purpose-built premises, with dedicated teaching and research facilities. For more information, visit the website: www.momsoonivf.com



REVA University

REVA University is empowered by University Grants Commission (UGC) to award degrees in any branch of knowledge under Sec.22 of the UGC Act. The University is a Member of Association of Indian Universities, New Delhi. REVA University has a sprawling green campus spread over 45 acres of land and equipped with state-of-the-art infrastructure to provide conducive environment for higher learning and research. The REVA campus has well equipped laboratories, custom-built teaching facilities, fully air-conditioned library and central computer center, well-planned sports facility with cricket ground, running track & variety of indoor and outdoor sports activities, facilities for cultural programs. The unique feature of REVA campus is the largest residential facility for students, faculty members and supportive staff.

REVA is consistently ranked as one of the top universities in various categories because of the diverse community of international students and its teaching excellence in both theoretical and technical education in the fields of Engineering, Management, Law, Science, Commerce, Arts, Performing Arts, and Research Studies. REVA offers 28 Undergraduate Programmes, 22 Full-time and 2 Part-time Postgraduate Programmes, 18 Ph. D Programmes, and other Certificate / Diploma / Postgraduate Diploma Programmes in various disciplines. The curriculum of each Programme is designed with a keen eye for detail by giving emphasis on hands-on training, industry relevance, social significance, and practical applications. The University offers world-class facilities and education that meets global standards.

For further information about M.Sc. in Clinical Embryology,
visit: ***https://www.reva.edu.in/course/msc-clinical-embryology-and-assisted-reproductive-technology***

For further details about REVA University,
visit: ***www.reva.edu.in***

ELIGIBILITY

Graduates in Biological Sciences / Life Sciences / Veterinary Sciences /
Medical Sciences / Dental Sciences / Pharmacy
B.Sc. / B.V.Sc. / B. Pharma / MBBS / BDS / BAMS / BHMS

FEE

Rs. 2,00,000/- per semester *for Indian applicants*
Rs. 3,00,000/- per semester for applicants ***from Srilanka, Bhutan, Nepal and Bangladesh***
3650 USD per semester for international applicants (***except Srilanka, Bhutan, Nepal and Bangladesh***

The application procedure for M.Sc. in Clinical Embryology is as follows:

- **Apply online**.
  The link to apply online is
  (https://www.reva.edu.in/course/msc-clinical-embryology-and-assisted-reproductive-technology)

- Mail scanned copies of certificates for verification to
  info@momsoonacademy.com
  (along with a short essay (no more than 500 words) describing why they wish to study for the M.Sc. and how they think our programme might influence their future career.
  (once verified, you will receive an invitation to proceed further))

- Pay 50% of the course fee and share the transaction details
  (**you will receive an admission confirmation letter**)

Further details can be obtained from:

The Course Co-ordinator,
M.Sc. in Clinical Embryology & Assisted Reproductive Technology,
Call or WhatsApp: ***+91 98864 47093***
Email: ***info@momsoonacademy.com***
Website: ***www.momsoonacademy.com***, ***www.reva.edu.in***