Master of Continuing Education in the Biotechnology of Human Assisted Reproduction and Embryology. 18.ª Edición.

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DATOS GENERALES

Curso académico	
Tipo de curso	Máster de Formación Permanente
Número de créditos	60,00 Créditos ECTS
Matrícula	6.700 euros (importe precio público)
Requisitos de acceso	Applicants are required to hold at least a Bachelor¿s Degree in a clinical or scientific field related to reproductive or clinical embryology. The acceptance process, in addition to the standard graduate studies application procedure, is contingent upon the University of Valencia's approval and the supervision of the Course Director. The general access requirements vary according to the type of program: * For UV-specific master¿s degree: - Possession of a Spanish or foreign university degree enabling access to official postgraduate programs. - Students in the process of completing up to 10% of a university degree are eligible, with the condition that the degree is finalized before the conclusion of the postgraduate course. *For Specialist Diploma: - A Spanish or foreign university degree granting access to official postgraduate programs. - Students with pending completion of up to 10% of a university degree can apply, with the requirement to finish the degree before the postgraduate course concludes. - Experienced professionals in the field are welcome. *For Expert Diploma: - A Spanish or foreign university degree granting access to official postgraduate programs. - Students with less than 10% remaining to complete their degree may be conditionally accepted, with the stipulation to obtain the title in the same academic year. - Experienced professionals in the field are encouraged to apply. *For Certificate: - Ability to access the University. - Experienced professionals in the field are eligible to apply.
Modalidad	On-line
Lugar de impartición	UV Virtual Classroom
Horario	Online

Dirección

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Plazos

Preinscripción al curso	Hasta 27/10/2024
Fecha inicio	Noviembre 2024
Fecha fin	Abril 2026

Más información

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PROGRAMA

Human Reproduction Physiology

1.1 Anatomy of the female reproductive organs.
1.2 Steroid and protein hormones of the reproductive axis
1.3 Ovarian rejuvenation
1.4 Uterine Factor and Implantation
1.5 Neuroendocrinology of the female reproductive system.
1.6 The menstrual cycle compared to other mammals
1.7 Endocrinology of the testicle and the effect of aging on the male reproductive system
1.8 Effect of age on the male reproductive system
1.9 Analysis of biochemical and ultrasound indicators for the control of the menstrual cycle. Hormonal action on the genital tract
1.10 Other endocrine axes and obesity (GH-IGF, thyroid, adrenal, etc.)
1.11 Effect of aging on the female reproductive system
1.12 The polycystic ovary

Oogenesis, Spermatogenesis and their Deficiencies

2.1 Gametogenesis: Biological relevance of meiosis.
2.2 Oogenesis; From oogonia to MII oocyte. Oogenesis stages
2.3 Oogenesis: Folliculogenesis
2.4 Ovulation induction
2.5 The testicle and the spermatogenesis
2.6 Markers of sperm quality
2.7 Factors affecting sperm quality
2.8 Markers of oocyte quality
2.9 Oocyte quality improvement
2.10 Oocyte in vitro maturation
2.11 In vitro gamete derivation from human embryonic stem cells
2.12 COVID-19 in Assisted Reproduction

Fertilization, embryo development and techniques to obtain in vivo produced embryos

3.1 Gamete transport
3.2 Gamete maturation
3.3 Fertilization in Humans
3.4 Gamete immunology
3.5 Fertilization: The role of the glycocalyx in fertilization
3.6 Fertilization: Oocyte molecular changes in response to the fertilizing sperm
3.7 Fertilization: Fertilization genomics
3.8 Uniparental Inheritance: Centrioles
3.9 Uniparental inheritance: Mitochondria
3.10 Fertilization abnormalities. Monopronuclear and Tripronuclear Zygotes
3.11 Fertilization correction mechanisms
3.12 Preimplantation embryo development
3.13 Blastomeric fate: polarization
3.14 Differentiations of cell linages I
3.15 Differentiations of cell linages II
3.16 Gastrulation
3.17 Transcriptomics of the preimplantation embryo development I
3.18 Transcriptomics of the preimplantation embryo development I
3.19 Morphological and functional embryology

Sterility

4.1 Effect of aging on the female reproductive tract
4.2 Recurrent miscarriage
4.3 Sterility
4.4 Endometriosis
4.5 Uterine and tubal sterility
4.6 Artificial insemination
4.7 In vitro fertilization
4.8 Ovarian and endometrial manipulation
4.9 Fertility preservation for oncological and non-oncological reasons
4.10 Egg Donation
4.11 Ovarian Hyperstimulation Syndrome: Physiopathology, Prevention and Management
4.12 Critical analysis of egg donation
4.13 Medical treatment of endometriosis: New perspectives

4.14 Fundamentals of ultrasound imaging in patients with infertility problems
4.15 Health of children conceived by assisted reproduction techniques
4.16 ART biosurveillance system. SIRHA assisted human reproduction information system
4.17 The importance of the luteal phase in assisted reproduction

Basic Research in Assisted Reproduction

5.1 Basic research in Human Reproduction
5.2 Isolation techniques and study of nucleic acids.
5.3 Isolation and protein study techniques. Protein Identification
5.4 Morphological location Immunohistochemistry Confocal and electronic microscopy. Applications in Reproductive Medicine
5.5 Cell culture. Human endometrial stromal and epithelial cell culture.
5.6 In vivo studies on animal models. Model for endometriosis studies
5.7 Omics as a non-invasive diagnostic tool
5.8 Massive sequencing applied to reproductive medicine
5.9 Mitochondrial DNA, the energy of the preimplantation embryo
5.10 Introduction to statistics I
5.11 Introduction to statistics II
5.12 Introduction to statistics III
5.13 Introduction to research and Good Clinical Practices
5.14 Developing a research project
5.15 Functions and responsibilities of the participants in a clinical trial
5.16 Drug development process
5.17 Classification of research projects
5.18 Use of research results: publication of results
5.19 How to write a manuscript
5.20 Ethics within publications

Basic Techniques in Assisted Reproduction

6.1 Structure of an assisted reproduction unit
6.2 History of assisted reproduction techniques
6.3 Low complexity procedures: artificial insemination and sperm freezing
6.4 Gamete donation
6.5 Diagnostic procedures in the clinical analysis laboratory
6.6 High complexity procedures
6.7 Applied molecular biology techniques
6.8 Research in Assisted Reproduction
6.9 Risk management
6.10 Treatment of sanitary waste
6.11 ISO Management System and Quality Management
6.12 Artificial intelligence in Assisted Reproduction

The Andrology Laboratory

7. 1 The testicle and spermatogenesis
7.2 Basic semen analysis. Spermiogram Special situations and additional tests
7.3 Sperm preparation techniques for homologous artificial insemination, indications and outcomes
7.4 Oxidative Stress and its effect on gametes and embryos
7.5 Sperm freezing techniques
7.6 Selection, control and use of sperm donors
7.7 Management and control of the Sperm Bank
7.8 Sperm washing in seropositive males for HIV, hepatitis B and hepatitis C
7.9 Flow cytometry: cell sorting, applications on sperm and sperm separation
7.10 Sperm DNA fragmentation and male fertility
7.11 Methods for an objective selection of competent sperm
7.12 Microarrays technology in sperm diagnosis
7.13 Other molecular markers of sperm quality
7.14 Automated Semen Analysis I
7.15 Automated Semen Analysis II; ISAS

In Vitro Fertilization Laboratory

8.1 The clinical embryology laboratory: a cleanroom
8.2 Getting to know laboratory environment
8.3 Environmental contamination and the In Vitro Fertilization laboratory
8.4 The in vitro fertilization (IVF) laboratory: Structure, equipment and maintenance
8.5 Oocyte retrieval, capacitation and sperm retrieval protocols. Conventional insemination
8.6 Sperm selection for ICSI
8.7 Use of testicular sperm in In Vitro Fertilization
8.8 Micromanipulation techniques, assisted fertilization: SUZI, PZD, ICSI and associated techniques
8.9 Evaluation of fertilization. Pronuclear Score and Reproductive Outcomes
8.10 Oocyte dysmorphisms and clinical repercussion
8.11 Standard Embryo Culture: Selection Criteria for Embryos for Transfer and Freezing

8.12 Embryo transfer
8.13 Cryopreservation of oocytes and embryos
8.14 The role of the IVF laboratory in preserving fertility
8.15 Rescue of immature oocytes in In Vitro Fertilization
8.16 Quality management of a clinical embryology laboratory
8.17 Key performance indicators in IVF
8.18 Traceability in the IVF laboratory

Sex Determination Techniques

9.1 Importance of preconception and preimplantation sexing in animals
9.2 Analysis of the sperm DNA content: bases of the X/Y separation
9.3 Legislation on sex determination
9.4 Molecular and Cellular Bases of sex
9.5 Sexual differentiation in mammals
9.6 Sex determination and differentiation in humans and associated alterations
9.7 Advantages of sexual reproduction
9.8 Clinical relevance of preconception and preimplantation sex selection in humans
9.9 Alternative sexing methods
9.10 Variations in the sex ratio. Effect of external factors
9.11 Sex Reassignment and Assisted Reproduction
9.12 Assisted Reproduction in patients with sexual disorders

In Vitro production of embryo. Embryo culture.

10.1 Cell culture
10.2 Culture media
10.3 Types of prolonged culture
10.4 How to obtain blastocyst stage embryos
10.5 Application of coculture to research. History
10.6 Application of coculture to research. New technologies
10. 7 Embryo development: From fertilization to blastocyst
10.8 Correlation between morphology and aneuploidies: from gamete to blastocyst
10.9 The blastocyst: types and morphology

Cryobiology. Preservation of maternal and paternal inheritance. Embryo preservation

11. 1 Biophysical Principles of Cell Cryopreservation
11.2 Cryoprotectants: Permeable Agents; Non-Permeable Agents
11.3 Cryopreservation Methods: Slow Freezing
11.4 Cryopreservation Methods: Vitrification
11.5 Oocyte Cryopreservation. History. Main Factors Affecting the Cryopreservation of the Female Gamete
11.6 Vitrification of Oocytes and Embryos in Assisted Reproduction
11.7 Cryo-room: Equipment and Requirements
11.8 Crypreservation Laboratory: Equipment and transfer of samples
11.9 Maintenance of Storage Tanks and Transport Containers
11.10 Cryo-management
11.11 Factors Affecting the Oocyte Vitrification Program
11.12 Subcellular Effects of Vitrification I: Oxidative Stress
11.13 Subcellular Effects of Vitrification II: Epigenetics
11.14 Ovarian Tissue Cryopreservation

Embryo Quality Improvement

12.1 Embryo health: morphological indicators of embryo quality
12.2 Embryo health: introduction to non-morphological indicators of embryo quality
12.3 Embryo health: introduction to non-morphological indicators of embryo quality. Respirometry
12.4 Factors affecting embryo quality. Intrinsic factors: infertility causes
12.5 Factors affecting embryo quality. Intrinsic factors: effect of the spermatozoon
12.6 Factors affecting embryo quality. Intrinsic factors: effect of the oocyte
12.7 Factors affecting embryo quality. Intrinsic factors: effect of progesterone on oocyte quality
12.8 Factors affecting embryo quality. Extrinsic factors: response to ovarian stimulation
12.9 Factors affecting embryo quality. Extrinsic factors: types of ex vivo culture
12.10 Factors affecting embryo quality. Extrinsic factors: effect of humidity during culture on embryo quality
12. 11 Factors affecting embryo quality. Extrinsic factors: effect of oxygen tension on embryo quality and livebirth rate
12.12 Factors affecting the outcomes of vitrified blastocysts. How to improve survival rate and clinical outcome
12.13 Strategies to improve embryo quality: Cytoplasm transfer
12.14 Strategies to improve embryo quality: Nuclear transfer
12. 15 Mitochondrial content during the preimplantation development and its relationship with embryo quality.
12. 16 Strategies to improve embryo quality: Assisted hatching and fragment removal

Multiplication of embryos and gametes

Pluripotency and totipotency basic concepts
Telomeric protection and pluripotentiality
Embryonic stem cell
Collection of embryonic stem cells in the blastocyst
13.1 Functional genomics and transcriptional signature of blastomeres, Inner Cell Mass (ICM) and Trophectoderm (TE). In vivo and in vitro transcriptomic pluripotency profiling (stem cells)
13.2 Establishment and Culture of embryonic and trophoblastic stem cells
13.3 Technical aspects of the nuclear transplant
13.4 Dynamics of nuclear reprogramming
13.4 Use of polar bodies in nuclear transplantation
13.5 Technical aspects of transplantation for meiotic use
13.6 Blastomeric splitting as a cloning method without reprogramming
13.7 Primordial germ cells in the adult ovary
13.8 Obtaining oocytes in vitro
13.9 Testicular stem cells
13.10 Obtaining spermatozoa in vitro
13.11 Model embryos: present and future

Preimplantation Genetic Testing Laboratory

14.1 Introduction to genetics and medical genomics
14.2 Meiosis, oogenesis and spermatogenesis
14.3 Post-fertilization mitotic divisions, and embryonic mosaicism
14.4 Embryo biopsy: update
14.5 PGT for monogenic disorders and carrier screening
14.6 PGT for chromosome abnormalities and chromosome rearrangements
14.7 The PGT-A controversy
14.8 Future directions for the molecular assessment and diagnosis of embryos
14.9 Genetic counseling in the infertile / sterile couple
14.10 Reproductive Genomics: basics, consortia, databases and genomic datasets
14.11 Techniques for genomic analysis: preliminary, exploratory and functional
14.12 Techniques for systems genomic analysis: network modelling
14.13 Genomic tools of computational prediction and clinical application
14.14 Genetic diagnosis of endometrial factor: controversies
14.15 Analysis of genome variants: prioritization of clinical biomarkers and gene panels in diagnosis
14.16 Systems Reproduction Medicine: the big data era

Stem Cells

15.1 Stem cells. Therapeutic possibilities. Regenerative Medicine
15.2 Pluripotent Stem Cells: types and general aspects
15.3 New Technologies in Reproductive Medicine: Organoids and Microfluidics
15.4 Multipotent Cells: Umbilical Cord
15.5 Perinatal stem cells: umbilical cord tissue
15.6 Gamete generation from stem cells: reprogramming and transdifferentiation
15.7 Adult Stem Cells in Human Testicles
15.8 Adult stem cells in Myometrium and Fibroids
15.9 Adult Stem Cells in the Human Endometrium
15.10 Fertility Preservation
15.11 Ovarian Rejuvenation and Stem Cells: Applications and Future Perspectives
15.12 Uterus Transplantation

Legal and ethical considerations of Assisted Human Reproduction

16. 1Initial Concepts
16.2 Law 14/2006 on Assisted Reproduction Techniques
16.3 Europe
16. 4 Wider Worlds

Master's Final Project

Elaboration of the Master¿s Degree Final Project.

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OBJETIVOS

Las salidas profesionales que tiene el curso son:

The postgraduate program equips students with essential training to seamlessly transition into assisted human reproduction laboratories and research centers within the field. While the most common professional path for graduates leads to roles as clinical embryologists or specialists in human reproduction laboratories, the opportunities extend beyond these roles. Graduates may find employment in research, scientific endeavors, or even engage in commercial activities within the field. The program opens doors to a diverse range of career possibilities in these dynamic circumstances.

This master's program is designed to instill in students a profound understanding of fertility mechanisms, the causes of infertility, and the techniques employed in assisted reproduction. Additionally, it emphasizes research techniques applicable to diverse situations in the study and treatment of human infertility.

Over 50 experts, hailing from the renowned Valencian Institute of Infertility (IVIRMA), contribute to this program. Drawing upon their extensive clinical, teaching, and research experience of over 25 years, and with a backdrop of more than 50,000 annual assisted reproduction treatments, these experts share their knowledge to provide students with the most current and valuable teaching materials. The program caters to recent graduates with biomedical degrees as well as professionals in the field seeking to update their knowledge. The goal is to empower these individuals to offer the best possible service to their patients.

The postgraduate curriculum delivers essential training for students to seamlessly integrate into assisted human reproduction laboratories and research centers within the field.

METODOLOGÍA

1. Theoretical Lecture: Comprehensive material explanation through virtual attendance.
2. Case Studies: Acquisition of knowledge through the analysis of real or simulated cases.
3. Problem-Solving Techniques: Application and implementation of prior knowledge to self-upgrade content in the field.

4. Project-Centric Knowledge: Development of projects applying acquired competences, including the authoring of bibliographic research papers contributing to comprehensive training.
The program includes tutoring initiatives for personalized attention, aimed at resolving queries and facilitating significant learning in acquired competences. Professors function as academic guides, fostering autonomous learning among students.