UAB
Universitat Autònoma de Barcelona

Reproduction-associated Technology

2026/2027

Code: 42946
Credits: 12

Degree programme	Type	Course
Cytogenetics and Reproductive Biology	OP	1

Contact lecturer

Name : Ester Anton Martorell
Email : ester.anton@uab.cat

Teaching staff

Maria Carme Pons Gatell
Maria Teresa Paramio Nieto
Elena Ibañez De Sans
Maria Teresa Mogas Amoros
Jordi Ribas Maynou
Joan Blanco Rodriguez
Maria Oliver Bonet
Marta Martin Flix
Ignasi Roig Navarro
Zaida Sarrate Navas

Teaching staff (external to UAB)

Carles Giménez
Mark Grossmann
Cristina Camprubí
Aïda Pujol
Mireia Florensa

Group languages

You can consult this information at the end of the document.

Prerequisites

The prerequisites for taking the Reproduction-Associated Technology module are common to the admission requirements for being admitted to the Official Master's Degree in Cytogenetics and Reproductive Biology.

PROVISIONAL

In addition, since most scientific information sources are in English, it is advisable to have a good grounding in this language.

Objectives

The module *Technology Associated with Reproduction* is an elective course in the Master's program in Cytogenetics and Reproductive Biology, but it is mandatory for the specialization in Reproductive Biology. It provides further insights into the most common methodologies used in the assisted reproduction area.

The contents of this course are organized in three main blocks:

- Submodule 1. Genetic diagnostic methods in human gametes and embryos. This section describes the currently available cytogenetic and molecular methods for analyzing human gametes and embryos. The usefulness of these techniques will be discussed, together with their limitations and diagnostic goals. A glimpse into the future prospects in this area will also be included.
- Submodule 2. Immunological causes of human infertility. This section describes the factors that determine the appearance of immunological processes of human infertility.
- Submodule 3. Human and animal reproduction-associated technologies. This section includes a description of the most commonly used techniques in both human and animal reproduction, as well as their ethical and legal aspects.

Learning outcomes

- CA18 (Propose an adequate diagnosis and prognosis in infertile individuals with genetic alterations in the karyotype.) Propose an adequate diagnosis and prognosis in infertile individuals with genetic alterations in the karyotype.
- CA19 (Integrate knowledge and skills to develop and defend their own work based on published results in the area of reproductive biology.) Integrate knowledge and skills to develop and defend their own work based on published results in the area of reproductive biology.
- KA22 (Explain the cellular and molecular foundations that underpin the assisted reproduction technologies applied to humans and other mammals of biomedical or productive relevance.) Explain the cellular and molecular foundations that underpin the assisted reproduction technologies applied to humans and other mammals of biomedical or productive relevance.
- KA23 (Identify the fundamental biological processes involved in the origin of human infertility associated with genetic abnormalities.) Identify the fundamental biological processes involved in the origin of human infertility associated with genetic abnormalities.
- KA24 (Identify the genetic and immunological origin of infertility in humans.) Identify the genetic and immunological origin of infertility in humans.
- KA25 (Describe the socio-economic impact of technologies applied to human and animal reproduction, the ethical and legal implications, and their contribution to genetic improvement and reproductive management in domestic species.) Describe the socio-economic impact of technologies applied to human and animal reproduction, the ethical and legal implications, and their contribution to genetic improvement and reproductive management in domestic species.
- SA26 (Apply current legislation and regulatory principles in the field of human reproductive biology when carrying out the scientific and professional activity .) Apply current legislation and regulatory principles in the field of human reproductive biology when carrying out the scientific and professional activity .
- SA27 (Interpret the possible ethical dilemmas associated with scientific and clinical practice in the field of human reproductive biology.) Interpret the possible ethical dilemmas associated with scientific and clinical practice in the field of human reproductive biology.
- SA28 (Demonstrate oral communication skills for the presentation of published scientific results in the field of human and animal reproductive biology.) Demonstrate oral communication skills for the presentation of published scientific results in the field of human and animal reproductive biology.

Contents

PROVISIONAL

The contents of this module will include the following points:

1. GENETIC DIAGNOSTIC METHODS IN HUMAN GAMETES AND EMBRYOS - SUBMODULE 1

1.1- Cytogenetic and molecular methodologies for human gametes analysis

1.1.1- Cytogenetic and molecular methods for the analysis of spermatocytes and testicular biopsies. Diagnostic utility and limitations.

- Classical approaches

- Immunofluorescence studies

- Fluorescence *in situ* hybridization (FISH) studies

1.1.2- Cytogenetic and molecular methods for the analysis of sperm. Diagnostic utility and limitations.

- Sperm DNA Fragmentation

- Sperm FISH studies

  - FISH studies in reorganization carriers
  - FISH studies in carriers of numerical anomalies
  - FISH studies in infertile individuals with normal karyotype

1.1.3- Cytogenetic and molecular methods for the analysis of oocytes. Diagnostic utility and limitations

- Ovarian reserve assessment

- Studies of structural and numerical anomalies in oocytes

1.2- Cytogenetic and molecular methods for embryo analysis.

- General aspects of Preimplantation Genetic Diagnosis (PGD)

- PGD techniques: PGT-SR, PGT-M, PGT-A, and non-invasive diagnosis

1.3- New developments and future perspectives in the analysis of human gametes and embryos

- Exome studies

- Transcriptome studies

- Methylome studies

- Metabolome studies

- Microbiome studies

2. IMMUNOLOGICAL CAUSES OF HUMAN INFERTILITY- SUBMODULE 2

2.1- Experimental techniques associated with the study of the reproductive immunology. Advances in reproductive immunology research.

3. HUMAN AND ANIMAL REPRODUCTION-ASSOCIATED TECHNOLOGIES - SUBMODULE 3

3.1- Human reproduction-associated Technologies

- Basic semen analysis

- Embryo transfer

PROVISIONAL

- *In vitro* fertilization (IVF)

- Intracytoplasmic sperm injection (ICSI)

- Embryo assessment

3.2- Freezing technologies

- Gonadal tissue freezing

- Gamete freezing

- Embryo freezing

3.3- Risks associated to Assisted Reproductive Technology (ART)

- Genetic risks in ART

- Epigenetic risks in ART

3.4- Animal reproduction-associated Technologies

- Artificial insemination

- Embryo transfer

- *In vitro* embryo production

- *In vivo* embryo production

- Gamete and embryo Freezing

- Embryo commercialization

- Transgenesis

- Cloning: embryo splitting and nuclear transfer

3.5- Ethical and legal aspects of Assisted Reproductive Technology

- Legal aspects of the use of human embryos for research

- Ethical aspects of the use of human embryos for research

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Individual study	216	8.64	CA18, KA22, KA23, KA24, KA25, SA26, SA27
Theoretical classes	60	2.4	CA18, KA22, KA23, KA24, KA25, SA26, SA27
Seminars	4	0.16	CA19, KA24, SA28
Scientific papers assessment for oral presentation	16	0.64	CA19, KA24, SA28

The content of this program will be taught mainly in the form of formal lectures with audio-visual support. Lecturers will be teachers from the Autonomous University of Barcelona but also external collaborators with high expertise in the topics of the theory program.

PROVISIONAL

Teachers will make supplementary audio-visual material available to the students through the Moodle classroom of the subject, to help them follow the lectures.

In relation to some specific contents, students will be asked to actively participate in the class execution. These activities may consist in the elaboration of oral presentations based on specific research papers, the organization of debates to discuss particular aspects of the contents, the resolution of practical exercises, ...

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Partial test related to the contents of Submodule 3	35%	2	0.08	KA22, KA25, SA26, SA27
Class attendance and participation	20%	0	0	CA18, KA22, KA25, SA27
Partial test related to the contents of Submodule 1	35%	2	0.08	CA18, KA23, KA24
Presentation of scientific papers related to the contents of Submodule 2	10%	0	0	CA19, KA24, SA28

The assessment of the module will be based on two criteria:

1-Class attendance

Attendance at the theory classes of this module is compulsory and accounts for 20% of the final grade.

Unjustified* absences will be penalized according to the following criteria:

- Absence of 4 to 6 hours: reduction of 5% of the attendance grade.

- Absence of more than 6 and up to 12 hours: reduction of 25% of the attendance grade.

- Absence of more than 12 and up to 16 hours: reduction of 50% of the attendance grade.

- Absence of more than 16 hours (equivalent to more than 25% of the sessions): failure of the module, regardless of the remaining assessments.

* ONLY the following will be considered as justified absences: illness, death of first-degree relatives, and accident UPON PRESENTATION OF PROOF.

2- Theory contents

The contents of the three submodules will be evaluated separately. The contribution of each of the marks obtained to the final grade for the module will be proportional to the weight of the contents: submodule 1 accounts for 35%, submodule 2 accounts for 10%, and submodule 3 accounts for 35%.

The contents of Submodule 1 (*Genetic diagnostic methods in human gametes and embryos*) and Submodule 3 (*Human and animal reproduction-associated technologies*) will be evaluated by two separate interim tests. Each of these tests will consist of a set of questions about the respective contents, which students will have to

PROVISIONAL

answer individually on completing the corresponding submodule. The objective of these tests is not only to evaluate the acquisition of the corresponding concepts by the students but also their ability to interrelate and integrate them.

The contents of Submodule 2 (*Immunological causes of human infertility*) will be evaluated through oral presentation and discussion of certain specific scientific papers. This set of papers will be provided to the students by the teachers responsible for the corresponding submodule.

Students will have to obtain a minimum mark of ≥4 points (out of 10) as a weighted mean of the several evaluations performed in the three Submodules in order to include them mark in the final grade for the module (that is, to add it to the mark obtained for class attendance). In the event of not achieving ≥4 points (out of 10) as a weighted mean of the several evaluations performed in the three Submodules, students will be able to take a recovery exam that will include contents related to the corresponding evaluable parts. To be eligible for this process, students must have been previously evaluated in a set of activities that make up at least two thirds of the final mark for the course or module.

To sum up, in order to pass the module, it is necessary to attend >75% of the classes, to get ≥4 as a weighted average mark for the three evaluable parts with regard to theory, and finally, an overall mark of ≥5 points out of 10 for all evaluations received.

OTHER ASPECTS TO CONSIDER:

This subject does not allow for a single assessment system.

Students will be considered "not assessable" if the combined weight of all the evaluation activities they have done is less than 67% of the final mark.

In this course, the use of artificial intelligence (AI) technologies is permitted exclusively as a support tool, for example, for literature searches or the linguistic revision of texts. The use of AI to generate content for any assessed activity is not permitted. Any work that includes AI-generated content beyond the authorized uses will be considered a breach of academic integrity and may result in a partial or total penalty in the grading of the activity.

Any irregularity in an assessment activity (academic fraud, plagiarism, or misuse of AI) that may lead to a significant change in the grade will result in a mark of 0 for that activity. In cases of repeated offences, those involved will fail the course. In addition, disciplinary proceedings may be initiated against any student who engages in such irregularities.

In cases of justified absence from an interim test (ONLY the following will be considered as justified absences: illness, death of first-degree relatives, and accident UPON PRESENTATION OF PROOF), students will be entitled to take the test on an alternative date. This change will be organized by the master's degree Coordination and the module coordinator.

Recording images, audio, or any other type of content from teaching sessions is not permitted without the express authorization of the teaching staff. This measure aims to protect image rights, the intellectual property of the content delivered, and the privacy of all participants. Any unauthorized recording may lead to the application of disciplinary measures established in the current university regulations, including those set out in Article 14.4 of the LCU, which may involve the loss of the right to the ordinary assessment sitting of the course and temporary expulsion from the university for up to one month, among other sanctions depending on the severity of the events.

Bibliography

Bibliography related to specific contents of the module will be provided by the corresponding teachers upon request.

PROVISIONAL

Software

-

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	1	Catalan/Spanish	first semester	morning-mixed
(SEMm) Seminars (master)	1	Catalan	first semester	morning-mixed

PROVISIONAL