

Reproductive Techniques

Code: 105062
ECTS Credits: 3

2024/2025

Degree	Type	Year
2500890 Genetics	OT	4

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Teachers

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

In order to guarantee the achievement of the learning objectives, it is a prerequisite to have passed the subject "Genetics and Reproduction" in the third year of the degree.

Objectives and Contextualisation

The subject of Reproductive Techniques aims to review the cellular and molecular mechanisms involved in mammalian reproduction, as well as the applications of gamete and embryo manipulation. Additionally, it will provide knowledge on assisted reproduction procedures in the realm of human and animal reproduction. In the final topics of the program, interventions on gametes and embryos related to new technologies will be addressed. The emerging new scenarios in this field, as well as the repercussions and impact of the resulting applications, will be explored.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Apply knowledge of theory to practice.
- Assume ethical commitment

- Define mutation and its types, and determine the levels of genic, chromosomal and genomic damage in the hereditary material of any species, both spontaneous and induced, and evaluate the consequences.
- Describe the genetic bases of the development and control of genic expression.
- Describe the organisation, evolution, inter-individual variation and expression of the human genome.
- Design experiments and interpret the results.
- Develop self-directed learning.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Measure and interpret the genetic variation in and between populations from a clinical, conservational and evolutionary perspective, and from that of the genetic improvement of animals and plants.
- Perform genetic diagnoses and assessments and consider the ethical and legal dilemmas.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Apply knowledge of theory to practice.
3. Apply the basic principles of bioethics.
4. Assess the implication of genetic anomalies as a cause of infertility.
5. Assume ethical commitment
6. Describe the basic genetic techniques for the study and prevention of sterility and infertility.
7. Describe the genetic bases of the determination and differentiation of human gender.
8. Describe the genetic basis and control of human gametogenesis.
9. Describe the structure and variation of the human genome from a functional and evolutionary perspective.
10. Design experiments and interpret the results.
11. Develop self-directed learning.
12. Explain cancer as an error in the control mechanisms of genic expression.
13. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
14. Perform pre-conceptual genetic assessment taking into account its ethical and legal implications.
15. Recognise the genetic anomalies of spermatogenesis and oogenesis related with a sterility phenotype.
16. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
17. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Content

Theory lessons

Topic 1. Fertilization and pre-implantation embryo development

Topic 2. Assisted reproduction techniques (ART) in humans

Topic 3. Assisted reproduction techniques (ART) in animals

Topic 4. Cryopreservation of gametes and embryos

Topic 5. Cloning

Topic 6. Genetic modification

Topic 7. Pluripotent cells and reproduction

Laboratory sessions

- In vitro culture and preimplantation embryo development
- Induction of oocyte maturation in vitro
- Embryo freezing
- Embryo manipulation: cloning by blastomere isolation
- Analysis of a semen sample
- Presentation and discussion of scientific articles

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Oral presentation of papers	2	0.08	2, 4, 5, 6, 11, 14, 15
Practice sessions	13	0.52	2, 6, 8, 10, 11, 15
Theoretical classes	15	0.6	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15
Type: Supervised			
Tutorship	2	0.08	4, 5, 6, 7, 8, 10, 14, 15
Type: Autonomous			
Preparation oral presentations	4	0.16	11
Study and self learning	32	1.28	2, 3, 4, 5, 6, 7, 8, 10, 11, 14, 15

The subject consists of theoretical classes, practical classes, and bibliographic seminars. The organization and teaching methodology followed in the training activities are described below.

Theory Classes

The content of the theory program will be explained by the teacher through lectures, supported by audiovisual aids, and with active student participation encouraged through reciprocal questions. The tables, figures, and graphs used in class will be available in PDF format on the Virtual Campus. Students can also access videos, animations, and links to websites related to the subject on the Virtual Campus. In order to consolidate and clarify the content explained in class, students should regularly consult the books and review articles selected by the professor. The articles will be available in PDF format on the virtual campus.

Laboratory Practices

The practical classes are designed to learn the basic methodologies used and complement the theoretical training.

Students will work in groups of 2 and, during the practical sessions, they will have to answer a questionnaire.

Attendance to all practical classes is mandatory in order to pass the subject.

Bibliographic Seminars

Students will have to present an article published in an international scientific journal in the field of reproductive technologies. These sessions aim to deepen the knowledge imparted in the lectures, introduce topics of special interest, and foster a critical view of research results.

The articles will be distributed at the beginning of the teaching period for the subject. Each pair or group will present the assigned article for 5-8 minutes (depending on the number of enrolled students and the availability of time). The objective of this presentation is to provide an understandable summary of the objectives and results of the research article, draw conclusions, and encourage critical discussion.

Tutoring

Tutorials will be conducted upon request by students to address doubts regarding the theory and practical content.

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

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of laboratory sessions	40	3	0.12	1, 2, 4, 10, 11, 13, 15, 16, 17
Examination of theoretical sessions	50	2	0.08	1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17
Oral presentation of papers	10	2	0.08	1, 3, 4, 5, 13, 14, 15, 16, 17

To pass the subject, it will be necessary to obtain a final grade equal to or higher than 5 points (out of 10), considering the different proposed evaluation activities detailed below. It should be noted that this course do not follow a unique evaluation system.

Theory Content Exam

It will account for 50% of the final grade of the course. The entire content taught in the theory classes will be evaluated. It will consist of a multiple-choice test.

To include the grade obtained in the calculation of the final grade, a minimum score of 4 out of 10 must be achieved on this exam.

Practical Sessions Evaluation

It will account for 40% of the final grade of the course. The attendance to the practical lessons is mandatory.

The laboratory practices will be evaluated during their execution, based on the responses provided in the corresponding questionnaires, to determine if the competencies and learning objectives have been achieved. The student's attitude and aptitude will also be taken into consideration.

Oral Presentations Evaluation

It will account for 10% of the final grade of the course.

The presented work and the oral defense will be evaluated.

Recovery Exam

There will be a recovery exam for students who did not pass the evaluation exam for the theoretical content. To include the grade obtained in the calculation of the final grade, a minimum score of 4 out of 10 must be achieved on this exam.

The methodology of the exam may differ from that used in the previous evaluations.

To participate in the recovery, students must have previously been evaluated in a set of activities whose weight accounts for at least two-thirds of the total course grade. Therefore, students will receive the grade of "Not Evaluable" when the weight of the evaluation activities performed is less than 67% of the final grade.

Exam Reviews

Exam reviews will be conducted on the dates proposed by the professors.

Bibliography

General information of the topics could be found in the following textbooks

Bajo JM, B. Coroleu B. (Eds.) Fundamentos de Reproducción. Editorial Panamericana. Madrid. 2009.

Elder K., Dale B. *In vitro* fertilization. (3rd edition). Cambridge University Press. New York. 2011.

Fauser B.C.J.M. (Ed.). Molecular Biology in Reproductive Medicine. The Parthenon Publishing Group. New York. 1999

Gardner D.K. et al. (Eds.). Textbook of assisted Reproductive Techniques. Martin Dunitz Pub. Hampshire. 2001.

Gupta S.K. et al. (Eds.) Gamete Biology. Emerging frontiers in Fertility and Contraceptive Development. Nottingham University Press. Nottingham. 2007.

Hafez B. and Hafez E.S.E. (Eds.). Reproduction in farm animals. 7th edition. Lippincott Williams and Wilkins. USA. 2000.

Harper J. (Ed.) Preimplantation Genetic Diagnosis. (2nd Edition). Cambridge University Press. New York (USA). 2009.

Johnson M.H. and Everitt B.J. (Eds.) Essential Reproduction. 5th Edition. Blackwell Science. Oxford. 2005.

Lanza R. Et al. (Eds.) Handbook of Stem Cells. Vol 1 i 2. Elsevier Academic Press. Amsterdam. 2004.

Matorras R, Hernández J. (Eds.). Estudio y tratamiento de la pareja estéril. Adalia. Madrid. 2007.

Nadal J. (Ed.). Donación de ovocitos. Momento Médico Iberoamericana. Madrid. 2010.

Remohí J., Pellicer A., Simón C., Navarro J. (Eds.). Reproducción Humana. 2ª Edición. McGraw Hill-Interamericana. Madrid. 2002.

Wolf D.P. and Zelinski-Wooten M. (Eds.). Assisted fertilization and nuclear transfer in mammals. Humana Press. New Jersey, USA. 2001.

During the course, specific bibliography will be recommended for the preparation of sections of the syllabus by the students.

Reviews and updated papers will be also recommended.
Web links containing rigorous and up-to-date information will be suggested.

Software

Not applicable

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	641	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	642	Catalan/Spanish	second semester	afternoon
(TE) Theory	64	Catalan/Spanish	second semester	morning-mixed