

**1. General information****Course:** CELL CULTURE AND TISSUE ENGINEERING**Type:** ELECTIVE**Degree:** 341 - UNDERGRADUATE DEGREE PROGRAMME IN BIOCHEMISTRY**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 13344**ECTS credits:** 4.5**Academic year:** 2021-22**Group(s):** 40**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** RAUL CALERO OLIVER - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
ICAM/Despacho 31	QUÍMICA INORG., ORG., Y BIOQ.	5440	Raul.Calero@uclm.es	Tuesdays and thursdays from 10-13h. Make an appointment in advance by email

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

Not established

4. Degree competences achieved in this course**Course competences**

Code	Description
E01	Express themselves correctly in basic biological, physical, chemical, mathematical and computer terms.
E09	Be familiar with the different cell types (prokaryotes and eukaryotes) at the level of structure, physiology and biochemistry and be able to critically explain how their properties are adapted to their biological function.
E32	Know how to design and carry out a study and/or project in the area of Biochemistry and Molecular Biology, be able to critically analyse the results obtained and write a report containing these results.
G01	To possess and understand the knowledge in the area of Biochemistry and Molecular Biology at a level that, based on advanced textbooks, also includes cutting-edge aspects of relevance in the discipline
G03	Be able to collect and interpret relevant data, information and results, draw conclusions and issue reasoned reports on relevant social, scientific or ethical issues in connection with advances in Biochemistry and Molecular Biology.
G04	To know how to transmit information, ideas, problems and solutions in the field of Biochemistry and Molecular Biology to a specialized and non-specialized public.
G05	Develop those strategies and learning skills necessary to undertake further studies in the area of Biochemistry and Molecular Biology and other related areas with a high degree of autonomy.
G06	Acquire skills in the handling of computer programs including access to bibliographic, structural or any other type of databases useful in Biochemistry and Molecular Biology.
T01	Proficiency in a second foreign language, preferably English, at level B1 of the Common European Framework of Reference for Languages
T03	A correct oral and written communication
T04	Ethical commitment and professional deontology
T05	Organizational and planning skills
T06	Capacity for design, analysis and synthesis
T10	Ability to self-learn and to obtain and manage bibliographic information, including Internet resources

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

The professional profile "molecular biomedicine" includes the application of biochemistry in the health sector, so that the student receives a strong biomedical and clinical orientation and also acquires the skills to carry out a professional activity in the field of teaching and research.

In the professional profile "biotechnology", the student is oriented towards professional activity in the business and pharmaceutical fields; he or she also acquires skills to carry out a professional activity in the field of teaching and research.

Additional outcomes**6. Units / Contents**

Unit 1: Introduction: History of cell cultures. Cell and tissue culture techniques as an alternative to animal experimentation. Limitations of cell cultures. Laboratory equipment. Microscopy and flow cytometry basics.

Unit 2: Maintenance of cell cultures: Physical-chemical requirements of cell cultures (temperature, osmolarity, pH). Culture media (composition, supplements, sera, serum-free media). Substrates. Cryopreservation. Cell banks. Cell culture contaminants.

Unit 3: Animal cell culture: Types of cultures. Differentiation and transformation. Cell characterization. Immortalization techniques. Organotypic and 3D cultures.

Unit 4: Tissue biotechnology: Stem cells vs. specialized cultures. Cell isolation and culture technology. Cell differentiation techniques.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E01 E09 E32 G01 G03 G05 G06 T03 T04 T05 T06 T10	0.48	12	Y	Y	Conducting practices is mandatory to pass the course. Failure to do so is not recoverable.
Class Attendance (theory) [ON-SITE]	Lectures	E01 E09 G01 G05 T01 T03 T04 T05 T06	1.2	30	N		Master classes whose content and / or exposure may be taught in English.
Final test [ON-SITE]	Assessment tests	E01 E09 G01 G03 T03 T04 T06	0.12	3	Y	Y	Some questions on the exam could be in English.
Study and Exam Preparation [OFF-SITE]	Self-study	E01 E09 E32 G01 G03 G05 G06 T01 T03 T04 T05 T06 T10	1.2	30	N		self learning
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	E01 E32 G03 G04 G05 T03	0.72	18	Y	Y	Written reports will be submitted to the teacher at the end of the practices
Writing of reports or projects [OFF-SITE]	Group Work	E01 E09 E32 G05 G06 T03 T04 T05 T06	0.78	19.5	Y	N	Seminars proposed by the teacher and based on the analysis of a scientific publication. This activity will not be recoverable.
Total:			4.5	112.5			
Total credits of in-class work: 1.8			Total class time hours: 45				
Total credits of out of class work: 2.7			Total hours of out of class work: 67.5				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	70.00%	85.00%	Multiple choice test
Practicum and practical activities reports assessment	15.00%	15.00%	Practices' report will be conducted jointly with the practice partner. A minimum grade of 4 will be required to pass the practices. THE DEADLINE FOR SUBMISSION OF THE PRACTICE REPORT WILL BE ESTABLISHED ACCORDING TO THE ACADEMIC CALENDAR. To recover the practices, the student will have to prepare the practice report again and achieve the minimum grade of 4.
Oral presentations assessment	15.00%	0.00%	The response to questions raised during the seminars will be evaluated. This activity will not be recoverable.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

It is compulsory to pass the laboratory sessions (compulsory attendance + lab book > 4/10) to pass the course.

It is mandatory to obtain a score > 4 over 10 in the final test to add all other evaluable parts (labs and seminars)

Non-continuous evaluation:

It is compulsory to pass the laboratory sessions (compulsory attendance + lab book > 4/10) to pass the course. It is mandatory to obtain a score > 4 over 10 in the final test to add all other evaluable parts (lab book)

Specifications for the resit/retake exam:

The marks from the laboratory sessions and seminars are maintained until the Make-up Exam.

It is compulsory to pass the laboratory sessions (compulsory attendance + lab book > 4/10) to pass the course. It is mandatory to obtain a score > 4 over 10 in the final test to add all other evaluable parts (labs and seminars)

Specifications for the second resit / retake exam:

It will consist in a final test that will constitute 100% of the grade for the course. It is compulsory to obtain a minimum of 4/10 in the laboratory sessions to pass the course.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Freshney, R. Ian	Culture of animal cells : a manual of basic technique and sp	Wiley-Blackwell,		978-0-470-52812-9	2010	

Robert Lanza, Anthony Atala	Essentials of stem cell biology	Elsevier	978-0-12-409503-8	2014
García-Olmo, Damián	Cell therapy	McGraw-Hill/Interamericana	978-84-481-6702-8	2007
Robert P. Lanza, Robert Langer, Joseph Vacanti.	Principles of tissue engineering	Elsevier	978-0-12-398358-9	2014
	www.phe-culturecollections.org.uk https://www.phe-culturecollections.org.uk/ ATCC Learning Center http://www.lgcstandards-atcc.org/en/Documents/Learning_Center.aspx www.thermofisher.com http://www.thermofisher.com/es/en/home/references/gibco-cell-culture-basics.html#webinars			