



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros de
Telecomunicacion

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

93000963 - Biomedical Engineering Professional Projects

DEGREE PROGRAMME

09AU - Master Universitario En Ingenieria Biomedica

ACADEMIC YEAR & SEMESTER

2022/23 - Semester 2

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1. Description

1.1. Subject details

Name of the subject	93000963 - Biomedical Engineering Professional Projects
No of credits	6 ECTS
Type	Compulsory
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	09AU - Master Universitario en Ingenieria Biomedica
Centre	09 - Escuela Tecnica Superior De Ingenieros De Telecomunicacion
Academic year	2022-23

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Juan Jose Gomez Valverde		juanjo.gomez@upm.es	Sin horario.
Maria Jesus Ledesma Carbayo		mj.ledesma@upm.es	Sin horario.
Ignacio Oropesa Garcia		i.oropesa@upm.es	Sin horario.
Enrique Javier Gomez Aguilera		enriquejavier.gomez@upm.es	Sin horario.

Patricia Sanchez Gonzalez (Subject coordinator)	D-213	p.sanchez@upm.es	Sin horario. Solicitar por correo electrónico
Maria Elena Hernando Perez		mariaelena.hernando@upm.es	Sin horario.
Giuseppe Fico		giuseppe.fico@upm.es	Sin horario.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Diseño De Tecnologías Biomédicas

3.2. Other recommended learning outcomes

The subject - other recommended learning outcomes, are not defined.

4. Skills and learning outcomes *

4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CB08 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CB09 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CE-MIB06 - Proyectar, realizar, presentar y defender, un proyecto de Ingeniería Biomédica original realizado en talleres de grupos enfocado a entornos profesionales de empresa, hospital o investigación

CG-MIB01 - Resolver problemas e integrar conocimiento en temas nuevos o escasamente definidos y en entornos multidisciplinares del área de la Ingeniería Biomédica

CG-MIB02 - Analizar y aplicar la reglamentación correspondiente a la sensibilidad social y ética en los ámbitos de operación que pueden darse en Ingeniería Biomédica

CG-MIB03 - Utilizar la filosofía, el método científico y el método experimental para la búsqueda de innovación, la curiosidad científica y el desarrollo de actitudes creativas

CG-MIB04 - Utilizar las tecnologías de la información y la comunicación para la búsqueda de información, datos bibliográficos y adquisición de nuevo conocimiento para la formación permanente y el trabajo autónomo

CG-MIB05 - Utilizar técnicas de expresión oral y escrita para comunicar trabajos y conclusiones a comunidades de iguales o divulgación científica, elaboración de artículos, manuales de estilo y herramientas de edición para fomentar la capacidad de comunicación y disseminación de resultados

CG-MIB06 - Aplicar técnicas de trabajo colaborativo en equipos multidisciplinares internacionales y liderazgo, así como utilizar métodos para asumir la responsabilidad de orientar y dirigir trabajos científicos en el ámbito de la ingeniería Biomédica

CG-MIB07 - Utilizar la lengua inglesa como herramienta de trabajo

CG-MIB08 - Analizar y aplicar métodos de gestión, organización y planificación de proyectos avanzados en Ingeniería Biomédica

CG-MIB09 - Identificar y utilizar métodos para la búsqueda de recursos, la gestión económica y administrativa de proyectos avanzados en Ingeniería Biomédica

4.2. Learning outcomes

RA99 - Identifying and defining unmet clinical needs as part of the clinical care cycle or clinical processes and protocols.

RA101 - Creative teamwork process of iterative design of concepts of solution using iterative prototyping.

RA100 - Proposal of alternative solution designs to identified unmet clinical needs.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

This course will focus in the design of real world medical technology development. It will consist of an intensive and practical continuation of contents of DTB course to understand and define significant unmet medical needs and designing new

medical technologies to address them. Two main issues will be covered in this course: prototyping and creation of a business plan.

5.2. Syllabus

1. Validation of selected projects
2. Proof of concept definition
3. Specification of a proof of concept functional prototype
4. Prototype implementation
5. Business model

6. Schedule

6.1. Subject schedule*

Week	Classroom activities	Laboratory activities	Distant / On-line	Assessment activities
1	Introduction to the subject Duration: 01:30 Lecture Team Building Activity Duration: 00:30 Cooperative activities			
2	1. Validation of selected projects Duration: 02:00 Cooperative activities			
3	1. Validation of selected projects Duration: 02:00 Cooperative activities			
4	5. Business plan Duration: 02:00 Lecture			
5	2. Proof of concept definition Duration: 02:00 Cooperative activities			
6	2. Proof of concept definition Duration: 01:00 Cooperative activities 3. Specification of a proof of concept functional prototype Duration: 01:00 Cooperative activities			
7	3. Specification of a proof of concept functional prototype Duration: 02:00 Cooperative activities			
8				Midterm Report and presentation Group presentation Continuous assessment and final examination Presential Duration: 04:00
9	5. Business plan Duration: 02:00 Lecture			
10	4. Prototype implementation Duration: 02:00 Cooperative activities			

11	4. Prototype implementation Duration: 02:00 Cooperative activities			
12	5. Business plan Duration: 02:00 Lecture			
13	4. Prototype implementation Duration: 02:00 Cooperative activities			
14				Final Report and presentation Individual work Continuous assessment and final examination Presential Duration: 04:00 Team Evaluation (internal+mentor) Other assessment Continuous assessment Not Presential Duration: 00:30 Individual evaluation Other assessment Continuous assessment Not Presential Duration: 00:30
15				Individual exam Written test Final examination Presential Duration: 02:00
16				
17				

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	Midterm Report and presentation	Group presentation	Face-to-face	04:00	30%	5 / 10	CB06 CB07 CB08 CE-MIB06 CG-MIB02 CG-MIB04 CB09 CB10 CG-MIB01 CG-MIB05 CG-MIB07 CG-MIB06 CG-MIB03
14	Final Report and presentation	Individual work	Face-to-face	04:00	40%	5 / 10	CB06 CB07 CB08 CB09 CB10 CG-MIB01 CG-MIB02 CG-MIB03 CG-MIB04 CG-MIB05 CG-MIB06 CG-MIB07 CG-MIB08 CE-MIB06 CG-MIB09
14	Team Evaluation (internal+mentor)	Other assessment	No Presential	00:30	20%	3 / 10	
14	Individual evaluation	Other assessment	No Presential	00:30	10%	3 / 10	

7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	Midterm Report and presentation	Group presentation	Face-to-face	04:00	30%	5 / 10	CB06 CB07 CB08 CE-MIB06 CG-MIB02 CG-MIB04 CB09 CB10 CG-MIB01 CG-MIB05 CG-MIB07 CG-MIB06 CG-MIB03
14	Final Report and presentation	Individual work	Face-to-face	04:00	40%	5 / 10	CB06 CB07 CB08 CB09 CB10 CG-MIB01 CG-MIB02 CG-MIB03 CG-MIB04 CG-MIB05 CG-MIB06 CG-MIB07 CG-MIB08 CE-MIB06 CG-MIB09
15	Individual exam	Written test	Face-to-face	02:00	30%	4 / 10	CB06 CB08 CB09 CB10 CE-MIB06

7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

7.2. Assessment criteria

According to the Normativa de Evaluación del Aprendizaje de la Universidad Politécnica de Madrid, evaluation will assess if students have acquired all the competences of the subject. Thus, evaluation through global assessment will be carried out considering all the evaluation techniques used in continuous evaluation (EX, ET, TG, etc.), and will be celebrated in the exam period approved by Junta de Escuela for the current academic semester and year. Evaluation activities that assess learning outcomes that cannot be evaluated through a single exam can be carried out along the semester. Extraordinary examination will be carried out exclusively by the final examination method.

- In order to pass the course, students must obtain a minimum grade of 5/10
- All assignments must reflect the personal work and teamwork of the student, Detected copies will automatically mean failing the course.

Progressive evaluation:

- Midterm Report - 30%
- Final Written Report and Presentation - 40%
- Team Evaluations 20% - (Individual- 10% mentor - 10% team members evaluate each other)
- Individual Performance, presentations, questions, quizzes and Progress Deliverables - Individual- 10%

Global and extraordinary evaluation:

- Midterm Report - 30%
- Final Written Report and Presentation. Individual exam- 70%

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Biodesign: The Process of Innovating Medical Technologies (second edition), P. G. Yock, S. Zenios, J. Makower, T. J. Brinton, U. N. Kumar, F. T. J. Watkins, L. Denend, T. M. Krummel, C. Q. Kurihara, Cambridge University Press 2015	Bibliography	Main resource of the subject describing the design methodology
ebiodesign.org	Web resource	Videos, and other resources to guide the students in the application of the design methodology
Espacio Moodle de la asignatura	Web resource	In this website the material covered by the subject will be uploaded as well as the quizzes and deliverables.

9. Other information

9.1. Other information about the subject

This course is related to United Nations' Sustainable Development Goals, specially SDG3 (Good health and well-being) but also SDG4 (Quality education), SDG9 (industry, innovation, and infrastructure) and SDG10 (Reduced inequalities)