ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

93000982 - Telemedicine Laboratory

DEGREE PROGRAMME

09AU - Master Universitario en Ingenieria Biomedica

ACADEMIC YEAR & SEMESTER

2020/21 - Semester 2

Index

Learning guide

1. Description

1.1. Subject details

Name of the subject	93000982 - Telemedicine Laboratory
No of credits	3 ECTS
Type	Optional
Academic year ot 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	2020-21

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Maria Elena Hernando Perez (Subject coordinator)	B-316	mariaelena.hernando@upm.es	Tu - 15:00 - 18:00 W - 12:00 - 15:00 It is necessary first to schedule an appointment via email.
Gema Garcia Saez	B-303	gema.garcia.saez@upm.es	Tu - 10:00 - 12:00 W - 12:00 - 13:00 It is necessary first to schedule an appointment via

			email.

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

2.2. Research assistants

Name and surname	Email	Faculty member in charge
Tapia Galisteo, Jose	jose.tapia.galisteo@upm.es	Garcia Saez, Gema

2.3. External faculty

Name and surname	Email	Institution
Carmen Pérez Gandia	cperez@gbt.tfo.upm.es	ETSI Telecomunicación

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Telemedicina

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

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 diseminación de resultados

4.2. Learning outcomes

RA124 - Theoretical knowledge and practical skills in the technologies necessary for the development and integration of telemedicine services

RA75 - Apply evaluation methodologies to assess the impact of a telemedicine system

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

RA125 - To know different technologies used in the creation of Telemedicine Systems: design of relational data bases, communication protocols, remote consultation services among specialists, visualization of clinical information, cooperative diagnosis and teleradiology

* 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

The laboratory provides students with a set of methods and resources for their training in the design, development and evaluation of digital health systems and telemedicine applications.

The student will develop prototypes of final applications in which he will acquire knowledge about different technologies: the storage and transmission of medical images with the DICOM standard, the design and management of relational databases, the graphical visualization of clinical data, remote access to databases through Web servers and communication protocols with medical devices.

The practices are sized to be carried out in full in the laboratory. Students must submit a brief report within one week after completing each practice.

The selected environment for development is a high-level GUI of type WYSIWYG (What You See Is What You Get) that graphically allows the selection of user interface components (buttons, selection lists, data tables, .. .), its positioning in the place it is desired on the screen and its configuration through its properties. This allows the student to create applications in a fast an efficient way because it minimizes the amount of code that the student

has to create create.

The Telemedicine Laboratory includes the following practices with their respective contents:

1. Introduction to GUI design: Usability

- Usability principles

- Evaluation of usability parameters in different Telemedicine systems

2. Introduction to the development environment

- Development of applications using the proposed development environment and language

3. DICOM transmission

- Introduction to the DICOM image exchange protocol

- Send images from a DICOM client

- Installation of a DICOM storage server

4. Mailbox for Medical images

- Creation of a tool to manage sending of medical images

5. Management of Patients and Visits

- Specification of the application

- Design and Management of relational databases

- Development of the tool to manage visits and patient data

6. Tool to manage medical images

- Development of the application for viewing medical images

7. Web access to medical databases

- Introduction to web technologies

- Development of a website to access medical databases

- Improved usability of the developed application

- Deployment of a web server

8. Mobile application development

5.2. Syllabus

1. Introduction to GUI design
2. Introduction to the development environment
3. Transmision of medical images with DICOM
4. Mailbox for medical images
5. Management of patients and visits
6. Management of medical images
7. Web access to medical databases
8. Mobile App development

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	**Introduction** Duration: 01:00 Lecture **Introducción to the practical sessions** Duration: 01:30 Lecture			
2		**Practical session 1** Duration: 02:30 Laboratory assignments		
3		**Practical session 2** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 1** Individual work Continuous assessment Not Presential Duration: 00:15
4		**Practical session 3** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 2** Individual work Continuous assessment Not Presential Duration: 00:15
5		**Practical session 4** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 3** Individual work Continuous assessment Not Presential Duration: 00:15
6		**Practical session 4** Duration: 02:30 Laboratory assignments		
7		**Practical session 5** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 4** Individual work Continuous assessment Not Presential Duration: 00:15
8		**Practical session 5** Duration: 02:30 Laboratory assignments		
9		**Practical session 6** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 5** Individual work Continuous assessment Not Presential Duration: 00:15

10		**Practical session 6** Duration: 02:30 Laboratory assignments		
11		**Practical session 7** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 6** Individual work Continuous assessment Not Presential Duration: 00:15
12		**Practical session 7** Duration: 02:30 Laboratory assignments		
13		**Practical session 8** Duration: 02:30 Laboratory assignments		**Deliverable: report practical session 7** Individual work Continuous assessment Not Presential Duration: 00:15
14		**Make-up of practical sessions** Duration: 02:30 Laboratory assignments		**Oral presentation of practical sessions** Problem-solving test Continuous assessment Presential Duration: 01:00 **Deliverable: report practical session 8** Individual work Continuous assessment Not Presential Duration: 00:15
15				
16				
17				**Final deliverable: Reports and oral presentation of practical sessions** Individual presentation Final examination Presential Duration: 00:30

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. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
3	Deliverable: report practical session 1	Individual work	No Presential	00:15	3.75%	3 / 10	CG-MIB05 CG-MIB04 CB06
4	Deliverable: report practical session 2	Individual work	No Presential	00:15	3.75%	3 / 10	CG-MIB04 CB06
5	Deliverable: report practical session 3	Individual work	No Presential	00:15	7.5%	3 / 10	CG-MIB05 CG-MIB04 CB06
7	Deliverable: report practical session 4	Individual work	No Presential	00:15	11.25%	3 / 10	CG-MIB05 CG-MIB04 CB06
9	Deliverable: report practical session 5	Individual work	No Presential	00:15	18.75%	3 / 10	CB06 CG-MIB05 CG-MIB04
11	Deliverable: report practical session 6	Individual work	No Presential	00:15	11.25%	3 / 10	CG-MIB04 CB06 CG-MIB05
13	Deliverable: report practical session 7	Individual work	No Presential	00:15	11.25%	3 / 10	CG-MIB04 CB06 CG-MIB05
14	Oral presentation of practical sessions	Problem-solving test	Face-to-face	01:00	25%	5 / 10	CG-MIB04 CG-MIB05
14	Deliverable: report practical session 8	Individual work	No Presential	00:15	7.5%	3 / 10	CG-MIB04 CB06 CG-MIB05

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Final deliverable: Reports and oral presentation of practical sessions	Individual presentation	Face-to-face	00:30	100%	0 / 10	CG-MIB04 CB06 CG-MIB05

7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

7.2. Assessment criteria

Students will be qualified through continuous evaluation by default. According to the Normativa de Evaluación del Aprendizaje de la Universidad Politécnica de Madrid, students willing to renounce to continuous evaluation must send an email via Moodle to the coordinator before two weeks from the beginning of the course.

Evaluation will assess if students have acquired all the competences of the subject. Thus, evaluation through final 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.

In order to pass the course, students have to deliver the requested material about the practical sessions. Passing score for the whole course is 5/10. Delays in handing in of deliverables will be penalised. Students who do not reach the passing score via continuous assessment will be able to do so in the extraordinary examination.

The extraordinary examination will be carried out exclusively by the final examination method:

FINAL SCORE = 75% reports about practical sessions and 25% oral presentation

Both in the final assesment case and in the extraordinay examination, the practical reports have to be delivered one week before the official examination date.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Statements about practical sessions	Others	Statements describing the tasks to be performed by the student and the report to deliver as a result of the work
Files and other resources to perform the practical sessions	Others	
Tutorials	Web resource	Tutorials about software and development tools

9. Other information

9.1. Other information about the subject

The chronogram and the evaluation activities could suffer changes along the course

Teaching activities will preferably be carried out in person, but if the situation and the number of students make it necessary, some activities could be organized online following the guidelines of the UPM.