COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001

INTERNATIONAL
CAMPUS OF
EXCELLENCE

POLITÉCNICA

ETSIT UPM

E.T.S. de Ingenieros de
Telecomunicacion

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

93000981 - Assistive Technologies

DEGREE PROGRAMME

09AU - Master Universitario En Ingenieria Biomedica

ACADEMIC YEAR & SEMESTER

2023/24 - Semester 2

Index

Learning guide

1. Description

1.1. Subject details

Name of the subject	93000981 - Assistive Technologies
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	2023-24

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Enrique Javier Gomez Aguilera		enriquejavier.gomez@upm.es	Sin horario.
Maria Fernanda Cabrera Umpierrez		mf.cabrera@upm.es	Sin horario.
Alvaro Gutierrez Martin		a.gutierrez@upm.es	Sin horario.
Giuseppe Fico (Subject coordinator)		giuseppe.fico@upm.es	M - 08:00 - 08:15

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Cecilia Vera Muñoz		cecilia.vera@upm.es	Sin horario.

* 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
Merino Barbancho, Beatriz	beatriz.merino@upm.es	Fico, Giuseppe

3. Skills and learning outcomes *

3.1. Skills to be learned

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

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

3.2. Learning outcomes

RA145 - Aplicación de conocimientos teóricos y habilidades prácticas en las metodologías más avanzadas y las tecnologías de la información y las comunicaciones para el modelado, desarrollo, integración y evaluación de servicios de inteligencia ambiental y tecnologías asistivas

* 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.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

The objective of this subject is to highlight the problem of disabled people to have an independent life.

The big difference between having accessible and not accessible means.

And the technical aids, that allow to overcome the gap between the environment difficulties and the people abilities.

4.2. Syllabus

1. Introduction to assistive technologies

    1.1. Definition of Assistive Technology from the WHO

    1.2. The Convention on the Rights of Persons with Disabilities

    1.3. Functional Diversity, Independent Living

2. Assistive Technologies Landscape and Taxonomy

    2.1. The Current Landscape and Trends in Assistive technology

    2.2. The International Classification of Functioning, Disability and Health (ICF)

3. Design for all, accessibility, usability

    3.1. Design for all concept, accessibility and usability

    3.2. Design for All principles or Universal Design

    3.3. Accessible design guides

    3.4. Human factors

    3.5. User-centered design methodologies

    3.6. Usability principles

    3.7. Participative design: involving users from the early stages of the systems development process

4. Support technologies for hearing impaired people

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4.1. Problematic of hearing impaired people.

4.2. Headphones.

4.3. Cochlear implants

4.4. Magnetic loops

4.5. Diagnostic systems: Audiometries, logoaudiometries, impedanciometries.

5. Support technologies for visual impaired people

5.1. Problematic of visual impaired people.

5.2. Aids for the development in the home.

5.3. Aids for access to the information.

5.4. Aids for navigation and orientation.

5.5. Visual prostheses.

5.6. Problematic of the deaf-blind people.

6. Technology for independent living, teleassistance and AAL

6.1. Teleassistance, introduction and current status

6.2. Introduction to AAL

6.3. Technologies, platforms and services for AAL

7. Mobility and prosthesis

7.1. Basic concepts: bionics, artificial organs, prostheses

7.2. Lower limb prosthesis

7.3. Upper limb prosthesis

8. Technologies for cognitive and functional neurorehabilitation

8.1. Introduction to Neurorehabilitation

8.2. Cognitive rehabilitation: technology and applications

8.3. Functional rehabilitation: technology and applications

8.4. Telerehabilitation

5. Schedule

5.1. Subject schedule*

Week	Classroom activities	Laboratory activities	Distant / On-line	Assessment activities
1	**Subject presentation. Chapter 1: Introduction to assistive technologies.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
2	**Chapter 2: Assistive Technologies Landscape and Taxonomy.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
3	**Chapter 3: Design for all, accessibility, usability.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
4	**Chapter 4: Support technology for hearing impaired people.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
5	**Chapter 5: Support technology for visual impaired people.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
6	**Chapter 6: Support technology for cognitive impaired people.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			

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7	**Chapter 7: Support technology for Communication.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
8	**Chapter 7: Technology for independent living, teleassistance and AAL.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
9	**Chapter 3: Mobility and prosthesis.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
10	**Definition of the Projects** Duration: 01:30 Lecture			
11	**Chapter 8: Technology for cognitive and functional neurorehabilitation.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities			
12	**Chapter 8: Technology for cognitive and functional neurorehabilitation.** Duration: 01:00 Lecture **debate about the class taught that week** Duration: 00:30 Cooperative activities		**Attendance to the other students works presentations, and later debate.** Duration: 08:00 Additional activities	**Students work presentation** Individual presentation Continuous assessment and final examination Presential Duration: 01:00
13				**written evaluation** Written test Continuous assessment and final examination Presential Duration: 02:00
14				
15				
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.

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6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
12	Students work presentation	Individual presentation	Face-to-face	01:00	40%	/ 10	CG-MIB05
13	written evaluation	Written test	Face-to-face	02:00	60%	/ 10	CB07

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
12	Students work presentation	Individual presentation	Face-to-face	01:00	40%	/ 10	CG-MIB05
13	written evaluation	Written test	Face-to-face	02:00	60%	/ 10	CB07

6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Students work presentation	Individual work	Face-to-face	01:00	40%	/ 10	CG-MIB05
Written evaluation	Written test	Face-to-face	00:00	60%	/ 10	CB07

6.2. Assessment criteria

The evaluation will be carried. 40% out following the **progressive evaluation** and it will consider the following:
- Written exam assessing the knowledge on the topics of the course: 60%

- Students work presentation: 40%

In order to pass the course, there is a minimum score of 5 points out of 10 that should be obtained in all the team work deliverables and in the individual work.

Global evaluation

Students willing to renounce to the progressive evaluation must send an email via Moodle to the coordinator at least six weeks before the ordinary exam period approved by Junta de Escuela for the current academic semester and year. In this case, it is necessary to perform a team work + presentation in order to acquire all the competences of the subject. The content of this work will be agreed with the coordinator at least six weeks before the end of the semester.

Evaluation will assess if students have acquired all the competencies of the subject. Thus, evaluation through global assessment will be carried out considering all the evaluation techniques used in the progressive evaluation. Evaluation activities that assess learning outcomes that cannot be evaluated through a single exam can be carried out along the semester.

Extraordinary evaluation

Extraordinary evaluation will be carried out following the same evaluation techniques as in the global assessmen

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7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
Universal Design Handbook ISBN 0-07-137605-4. Coordinador: Robert Ivy, Editorial: McGraw Hill 2002	Bibliography	
HandBook of Augmentative and Alternative Communication ISBN 1-56593-684-1 Sharon L. Glemnen and Denise C De Coste Edtorial: Singular Publishing Group 1998	Bibliography	
http://www.utdallas.edu/~loizou/cimplants/tutorial/ Página web sobre implantes cocleares de la Universidad de Dallas.	Web resource	
The Engineering handbook of smart technology for aging, disability and independence ISBN 978-0-471-71155-1. Editor Sumi Helal, John Wiley¬Sons	Bibliography	
Guías de diseño accesible Tiresias http://www.tiresias.org	Web resource	
Government of Canada. ?Accessible Procurement Toolkit (APT)? http://www.apt.gc.ca/	Web resource	
General Concepts, Universal Design Principles and Guidelines http://trace.wisc.edu/world/gen_ud.html	Web resource	

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Principios del Diseño Universal. Center for Universal Design. http://design.ncsu.edu/cud	Web resource	
Poulson D., Ashby M., Richardson S. ?USERFIT A practical Handbook on user centred design for assistive technology. Handbook produced within the European Commission TIDE programme USER project?. HUSAT Research Institute, Loughborough, Leicestershire, 1996.	Bibliography	
ISO 13407:1999 . Human-centred design processes for interactive systems. ISO, Geneva, Switzerland.	Others	
Shneiderman B, Plaisant C. ?Designing the User Interface: Strategies for Effective Human-Computer Interaction? (4th Edition). Addison Wesley4 ed. 2004.	Bibliography	
Cooper A, Reimann R, Cronin D. ?About Face 3: The Essentials of Interaction Design?. Indianapolis, IN: Wiley3 ed. 2007.	Bibliography	
Jakob?s Nielsen website on usability and web design. http://www.useit.com	Web resource	
"Ambient Assisted Living" (AAL) is the name for a new European technology and innovation funding programme. http://www.aal169.org/	Web resource	
Cooper, R.A. et al, ?Rehabilitation engineering: an overview?, Wiley Encyclopedia of Biomedical Engineering, John Wiley&Sons, 2006.	Bibliography	

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Limitaciones metodológicas en los estudios de eficacia en rehabilitación neuropsicológica. Tecnologías Aplicadas al Proceso Neurorrehabilitador: Estrategias para valorar su eficacia. Badalona: Fundació , Institut Guttmann, 2008, pp. 240-244.	Others	
Tormos et al, Tecnologías aplicadas al proceso neurorrehabilitador, Institut Guttmann, Badalona, 2008.	Bibliography	