

[MMD106] APPLIED BIOSIGNAL PROCESSING

GENERAL INFORMATION

Studies	MASTER'S DEGREE IN BIOMEDICAL TECHNOLOGIES	Subject	?
Semester	2	Course	1
Character	OPTIONAL	Mention / Field of specialisation	???
Plan	2023	Modality	Face-to-face
Credits	3	Language	ENGLISH
		Total hours	44.3 class hours + 30.7 non-class hours = 75 total hours

PROFESSORS

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REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
SIGNAL AND BIOMEDICAL IMAGES PROCESSING	(No previous knowledge required)

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
MMR-26 - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		x		0,72
MMR-28 - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way		x		0,18
MM19-2 - Constructing biomedical signal processing algorithms for diagnosis and prognosis in the healthcare field		x		2,1
Total:				3

KC: Knowledge or Content / SK: Skills / AB: Abilities

SECONDARY LEARNING RESULTS

RMM147 [!] *Define los objetivos, realiza la planificación para su consecución y su seguimiento sistemático coordinando su trabajo con los demás miembros del equipo.*

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	1,3 h.	,7 h.	2 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%	Observation (technical capacity, attitude and participation)
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	50%	

CH - Class hours: 1,3 h.
NCH - Non-class hours: ,7 h.
TH - Total hours: 2 h.

RMM145 [!] *Conoce y es capaz de aplicar las herramientas de resolución de problemas en el campo de la Ingeniería Biomédica con iniciativa, toma de decisiones, creatividad y razonamiento crítico.*

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	5,5 h.	3,5 h.	9 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Individual written and/or oral tests or individual	40%	Observation (technical capacity, attitude and participation)

coding/programming tests

Co-assessment 5%

Prototype / Product 55%

Comments: If the score of the defense is lower than 5, this evaluation item will be evaluated in its entirety (%100) with the score of the defense. A co-evaluation system will be implemented to adjust the score of the student based on his or her participation in the Project.

CH - Class hours: 5,5 h.

NCH - Non-class hours: 3,5 h.

TH - Total hours: 9 h.

RMM144 [!] *Analiza las variables intervinientes en la solución de los problemas y plantea acciones para lograr una situación estable asumiendo responsabilidades en el equipo de trabajo, afrontando contingencias y organizando y planificando tareas.*

LEARNING ACTIVITIES

CH

NCH

TH

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

5,5 h.

3,5 h.

9 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

40%

Observation (technical capacity, attitude and participation)

Co-assessment

5%

Prototype / Product

55%

Comments: If the score of the defense is lower than 5, this evaluation item will be evaluated in its entirety (%100) with the score of the defense. A co-evaluation system will be implemented to adjust the score of the student based on his or her participation in the Project.

CH - Class hours: 5,5 h.

NCH - Non-class hours: 3,5 h.

TH - Total hours: 9 h.

RMM139 [!] *Diseñar aplicaciones de tratamiento de señal avanzados para señales de electromiografía*

LEARNING ACTIVITIES

CH

NCH

TH

Computer simulation exercises, individually and/or in teams

7,5 h.

4,5 h.

12 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

3 h.

2,5 h.

5,5 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

60%

Individual written and/or oral tests or individual coding/programming tests

Individual written and/or oral tests or individual coding/programming tests

40%

Comments: If the score of the exam is lower than 5, it will be mandatory to repeat the exam. The final grade will consist of 25% from the first exam and 75% from the recovery exam.

Comments: If the score of the exam is lower than 4, this evaluation item will be evaluated in its entirety (%100) with the score of the exam.

CH - Class hours: 10,5 h.

NCH - Non-class hours: 7 h.

TH - Total hours: 17,5 h.

RMM140 [!] *Diseñar aplicaciones de tratamiento de señal avanzados para señales de electrocardiografía*

LEARNING ACTIVITIES

Computer simulation exercises, individually and/or in teams

CH

5 h.

NCH

3 h.

TH

8 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

5 h.

4,5 h.

9,5 h.

EVALUATION SYSTEM

W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

60%

Individual written and/or oral tests or individual coding/programming tests

40%

Comments: If the score of the exam is lower than 4, this evaluation item will be evaluated in its entirety (%100) with the score of the exam.

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

Comments: If the score of the exam is lower than 5, it will be mandatory to repeat the exam. The final grade will consist of 25% from the first exam and 75% from the recovery exam.

CH - Class hours: 10 h.

NCH - Non-class hours: 7,5 h.

TH - Total hours: 17,5 h.

RMM146 [!] *Define el problema, el desarrollo de la solución, así como las conclusiones de manera eficaz, argumentando y justificando cada una de ellas, y haciendo un uso correcto del lenguaje, por escrito y de manera oral.*

LEARNING ACTIVITIES

Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams

CH

1,5 h.

NCH

1 h.

TH

2,5 h.

EVALUATION SYSTEM

W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

50%

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

50%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

CH - Class hours: 1,5 h.

NCH - Non-class hours: 1 h.

TH - Total hours: 2,5 h.

RMM141 [!] *Diseñar aplicaciones de tratamiento de señal avanzados para señales de electroencefalografía*

LEARNING ACTIVITIES

Computer simulation exercises, individually and/or in teams

CH

5 h.

NCH

3 h.

TH

8 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

5 h.

4,5 h.

9,5 h.

EVALUATION SYSTEM

W

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

60%

Individual written and/or oral tests or individual coding/programming tests

40%

Comments: If the score of the exam is lower than 4, this evaluation item will be evaluated in its entirety (%100) with the score of the exam.

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

Comments: If the score of the exam is lower than 5, it will be mandatory to repeat the exam. The final grade will consist of 25% from the first exam and 75% from the recovery exam.

CH - Class hours: 10 h.
NCH - Non-class hours: 7,5 h.
TH - Total hours: 17,5 h.

CONTENTS

- 1.- Myoelectric signal processing
 - 1.1.- EMG signal modelling
 - 1.2.- EMG signal parametrization
- 2.- Cardiac signal processing
 - 2.1.- Delineation and parametrization of ECG
 - 2.2.- HRV parametrization
- 3.- Electroencefalography signal processing
 - 3.1.- Artifact removal
 - 3.2.- EEG signal parametrization

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Technical articles
Moodle Platform
Computer practical training
Slides of the subject

Bibliography

"EEG Signal Processing and machine learning", Saney and Chambers, Wiley, 2022.
Sörnmo, L., & Laguna, P. (2005). Bioelectrical signal processing in cardiac and neurological applications (Vol. 8). Academic press.