Goi Eskola Politeknikoa | Mondragon Unibertsitatea
Course: 2022 / 2023 - Course planning

[GBI103] BIOMEDICAL IMAGE PROCESSING

GENERAL INFORMATION

Studies	DEGREE IN BIOMEDICAL ENGINEERING			**Subject**	Signal Treatment
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2017	**Modality**	Adapted Face-to-face	**Language**	EUSKARA
Credits	3	**Hours/week**	2.42	**Total hours**	43.6 class hours + 31.4 non-class hours = **75 total hours**

PROFESSORS

TERMENON CONDE, MAITE

REQUIRED PREVIOUS KNOWLEDGE

Subjects	**Knowledge**
(No specific previous subjects required)	*(No previous knowledge required)*

SKILLS

VERIFICA SKILLS

SPECIFIC

GBCE23 - To understand and apply knowledge of electronic engineering in the design and development of medical equipment

GENERAL

GBCG5 - To know how to perform measurements, calculations, valuations, studies, reports, task planning schemes, and other activities pertaining to the field of Biomedical Engineering.

CROSS

GBCTR2 - To be able to do their job in cooperative, participatory environments, with awareness of social responsibility.

BASIC

G_CB2 - To be able to apply knowledge to occupational or professional tasks; have the necessary skills to pose and defend arguments, and to solve problems within their field of study

LEARNING RESULTS

RG301 **Assumes responsibilities in the work team, organizing and planning the tasks to be developed, facing the contingencies and encouraging the participation of its members.**

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 h.	1 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	100%	*(No mechanisms)*

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

RG302 **Analyze the intervening variables in the problem and propose actions for a stable situation.**

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	2 h.	1 h.	3 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	100%	*(No mechanisms)*

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

RG304 **Define the problem, develop the solution and present the conclusions in a efficient manner, arguing and justifying each one of them in writing.**

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	2 h.	1 h.	3 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	100%	*(No mechanisms)*

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

RG305 **Define the problem, develop the solution and present the conclusions in a efficient manner, arguing and justifying each one of them in spoken form.**

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	2 h.	1 h.	3 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	100%	*(No mechanisms)*

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

RGB327 **[!]** *Argumenta la selección de las teorias más relevantes que permitan solucionar un problema de procesamiento de imágenes biomédicas*

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	6 h.	4 h.	10 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Computer simulation exercises, individually and/or in teams	7,3 h.	9,7 h.	17 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	3 h.		3 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory	30%	Individual written and oral tests to assess technical skills of the subject

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exercises, term projects, challenges and problems		Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices
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	20%	
Individual written and/or oral tests or individual coding/programming tests	50%	

CH - Class hours: 18,3 h.
NCH - Non-class hours: 13,7 h.
TH - Total hours: 32 h.

RGB328 [!] *Aplica técnicas para el procesamiento digital de imágenes biomédicas y analiza sus resultados*

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	6 h.	4 h.	10 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
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Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	3 h.		3 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	30%	*(No mechanisms)*
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	20%	
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    1. Introduction to image processing
    2. Quality parameters on images
    3. Noise on images
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    1. Basic strategies for intensity transformation
    2. Histogram processing
    3. Spatial filtering
    4. Low pass and high pass filters
3. Frequency filtering
    1. 1D Fourier transformation
    2. 2D Fourier transformation
    3. Aplication of the Fourier transform to image filtering
    4. Frequency filters
4. Morphological Operations and Segmentation
    1. Morphological Operations
    2. Segmentation

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Computer practical training Slides of the subject Moodle Platform	M. Rangayyan, "Biomedical Image Analysis", CRC PRESS, 2005. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing Using MATLAB, Gatesmark Publising, 2009.