

[GBI203] BIOMEDICAL IMAGE PROCESSING

GENERAL INFORMATION

Studies	DEGREE IN BIOMEDICAL ENGINEERING	Subject	?
Semester	2	Course	3
Character	COMPULSORY	Mention / Field of specialisation	
Plan	2022	Modality	Face-to-face
Credits	3	Language	EUSKARA
		Total hours	42.9 class hours + 32.1 non-class hours = 75 total hours

2030 AGENDA GOALS



PROFESSORS

CILLA UGARTE, RODRIGO

REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GBR303 - To analyze the operation of medical imaging equipment and apply image processing techniques to improve and parameterize the images obtained.			x	2,56
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and/or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		x		0,2
G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		x		0,24
Total:				3

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

SECONDARY LEARNING RESULTS

2RGB393 (2 sem)

LEARNING ACTIVITIES

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

CH	NCH	TH
1,9 h.	1,1 h.	3 h.

EVALUATION SYSTEM

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

W

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

CH - Class hours: 1,9 h.

NCH - Non-class hours: 1,1 h.

TH - Total hours: 3 h.

2RGB391 (2 sem)

LEARNING ACTIVITIES

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

CH	NCH	TH
1,25 h.	,75 h.	2 h.

EVALUATION SYSTEM

Self-assessment

W

25%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

Co-assessment	25%
Observation (technical capacity, attitude and participation)	50%

CH - Class hours: 1,25 h.

NCH - Non-class hours: ,75 h.

TH - Total hours: 2 h.

RGB310 [!] *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.	6 h.	12 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.		1 h.
Computer simulation exercises, individually and/or in teams	7 h.	9 h.	16 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

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

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

50%

MAKE-UP MECHANISMS

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

CH - Class hours: 17 h.

NCH - Non-class hours: 15 h.

TH - Total hours: 32 h.

RGB309 [!] *Argumenta la selección de las teorías 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	5 h.	3 h.	8 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.		1 h.
Computer simulation exercises, individually and/or in teams	4 h.	7 h.	11 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	9 h.	3 h.	12 h.

EVALUATION SYSTEM

W

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

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

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

30%

50%

MAKE-UP MECHANISMS

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

CH - Class hours: 19 h.

NCH - Non-class hours: 13 h.

TH - Total hours: 32 h.

2RGB392 (2 sem)

LEARNING ACTIVITIES

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

CH

,6 h.

NCH

,4 h.

TH

1 h.

EVALUATION SYSTEM

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

W

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

CH - Class hours: ,6 h.

NCH - Non-class hours: ,4 h.

TH - Total hours: 1 h.

2RGB390 (2 sem)

LEARNING ACTIVITIES

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

CH

1,25 h.

NCH

,75 h.

TH

2 h.

EVALUATION SYSTEM

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

W

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

CH - Class hours: 1,25 h.

NCH - Non-class hours: ,75 h.

TH - Total hours: 2 h.

2RGB394 (2 sem)

LEARNING ACTIVITIES

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

CH

1,9 h.

NCH

1,1 h.

TH

3 h.

EVALUATION SYSTEM

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

W

100%

MAKE-UP MECHANISMS

Observation (technical capacity, attitude and participation)

CH - Class hours: 1,9 h.

NCH - Non-class hours: 1,1 h.

TH - Total hours: 3 h.

CONTENTS

1. Introduction 1. Basics of image processing 2. Image quality parameters 3. Noise in images2. Intensity transforms and spatial filtering 1. Basic intensity transformation strategies 2. Histogram processing 3. Basics of spatial filtering 4. Low pass and high pass filters3. Morphological operations and segmentation 1. Segmentation 2. Morphological operations

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

- [!] *Realización de prácticas en ordenador*
- [!] *Transparencias de la asignatura*
- [!] *Plataforma Moodle*

Bibliography

Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing Using MATLAB, Gatesmark Publising, 2009.
M. Rangayyan. Biomedical Image Analysis. CRC PRESS, 2005.