[MMC105] BIOMECHANICAL GENERATIVE DESIGN

GENERAL INFORMATION

Studies	MASTER'S DEGREE IN BIOMEDICAL TECHNOLOGIES			**Subject**	?
Semester	2	**Course**	1	**Mention / Field of specialisation**	???
Character	OPTIONAL				
Plan	2023	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	3	**Hours/week**	1.88	**Total hours**	33.8 class hours + 41.2 non-class hours = **75 total hours**

PROFESSORS

TORCA DE LA CONCEPCIÓN, IRENEO

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
BIOMECHANICS	*(No previous knowledge required)*
BEHAVIOR AND DESIGN OF BIOMECHANICAL SYSTEMS	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
MMRA26 - 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
MMRA28 - 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
MM14-2 - To apply mechanics concepts to the process of analysis, calculation and design of biomechanical and healthcare elements and assemblies using specific simulation tools		x		2,1
			Total:	3

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

SECONDARY LEARNING RESULTS

RMM131 **[!]** ***Calcular y diseñar conjuntos biomecánicos y sanitarios utilizando modelos estructurales de elementos finitos y de diseño generativo.***

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		13,5 h.	13,5 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		2 h.	2 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		15 h.	15 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.		20 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	75%
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	25%

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

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

CH - Class hours: 20 h.
NCH - Non-class hours: 32,5 h.
TH - Total hours: 52,5 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
Individual written and/or oral tests or individual coding/programming tests	40%
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.

MAKE-UP MECHANISMS
Observation (technical capacity, attitude and participation)

CH - Class hours: 5,5 h.
NCH - Non-class hours: 3,5 h.
TH - Total hours: 9 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
Individual written and/or oral tests or individual coding/programming tests	40%
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.

MAKE-UP MECHANISMS
Observation (technical capacity, attitude and participation)

CH - Class hours: 5,5 h.
NCH - Non-class hours: 3,5 h.
TH - Total hours: 9 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	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	1,5 h.	1 h.	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	50%

MAKE-UP MECHANISMS
Observation (technical capacity, attitude and participation)

project, master's thesis, challenges and problems

CH - Class hours: 1,5 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2,5 h.

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

CONTENTS

1. ADVANCED STRUCTURAL DESIGNa. Advanced structural simulationb. Advanced dynamis simulationc. Topologico optimization and generative design

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Specific Master Software
Subject notes
Technical articles
Moodle Platform

Bibliography

Fundamentals of Biomechanics: Equilibrium, Motion and Deformation, Nihat Özkaya, David Goldsheyder, Margareta Nordin. 4th edition, 2017, ISBN 978-3-319-44737-7, Springer

Finite Element Analysis: From Biomedical Applications to Industrial Developments. Edited by David Moratal, 2016. ISBN-10: 953-51-0474-8; ISBN-13: 978-953-51-0474-2. Open Access distributed under the Creative Commons Attribution 3.0 license

Mechanics of Materials, Roy R. Craig Jr., 3rd edition, 2011, ISBN 978-0-470-48181-3, John Wiley and Sons

A Primer of Biomechanics, George L. Lucas, 1999. Springer Science+Business Media. Springer