

[MMC002] ADDITIVE MANUFACTURING

GENERAL INFORMATION

Studies	MASTER'S DEGREE IN BIOMEDICAL TECHNOLOGIES		Subject	Development Technology
Semester	2	Course	1	Mention / Field of specialisation
Character	COMPULSORY		Language	CASTELLANO
Plan	2017	Modality	Adapted Face-to-face	Total hours
Credits	4,5	Hours/week	2.69	48.5 class hours + 64 non-class hours = 112.5 total hours

PROFESSORS

AURREKOETXEA NARBARTE, ION

REQUIRED PREVIOUS KNOWLEDGE

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

SKILLS

VERIFICA SKILLS

SPECIFIC

MMCE02 - To analyse and respond to real biomedical problems through emerging manufacturing processes

GENERAL

MMCG02 - Projecting, calculating, designing and manufacturing products and processes from conception to marketing.

MMCG04 - Providing a practical and useful interprofessional framework relating to end user's safety for the product or service

CROSS

MMCTR1 - To select one measure or idea out of several and implement them in response to the needs or circumstances emerging in the work process

MMCTR2 - To work with people, getting them involved and guiding them towards the achievement of a common goal, with a global vision of work and its characteristics (quality, deadlines, etc.), taking individual interests into account

BASIC

M_CB6 - To have and understand knowledge which provides a base or opportunity to be original in the development and/or application of ideas, often in an investigation context

M_CB7 - To know how to apply the acquired knowledge and competencies and the ability to solve problems in new or unfamiliar contexts within wider (or multidisciplinary) environments related to their field of study

M_CB9 - To share knowledge, conclusions and their rationale with specialised and lay audiences in a clear, unambiguous manner

LEARNING RESULTS

RMM147 [!] *Conocer y comprender los diferentes materiales, las técnicas y las estrategias específicas de la fabricación aditiva 3D en plásticos y metales.*

LEARNING ACTIVITIES

	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	2 h.	4 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	10 h.	25 h.	35 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	10 h.	10 h.	20 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

Individual written and oral tests to assess technical skills of the subject

CH - Class hours: 22 h.

NCH - Non-class hours: 37 h.

TH - Total hours: 59 h.

RMM148 [!] *Conocer y comprender los diferentes materiales, las técnicas y las estrategias específicas de bioprinting para cada tipo de tejido.*

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	4 h.	12 h.	16 h.

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	2 h.	4 h.
---	------	------	------

EVALUATION SYSTEM

W

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

100%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

CH - Class hours: 6 h.
NCH - Non-class hours: 14 h.
TH - Total hours: 20 h.

RMM149 [!] *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
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	8 h.	5,5 h.	13,5 h.

EVALUATION SYSTEM

W

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

100%

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: 8 h.
NCH - Non-class hours: 5,5 h.
TH - Total hours: 13,5 h.

RMM150 [!] *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
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	8 h.	5,5 h.	13,5 h.

EVALUATION SYSTEM

W

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

100%

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: 8 h.
NCH - Non-class hours: 5,5 h.
TH - Total hours: 13,5 h.

RMM151 [!] *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	2,5 h.	1 h.	3,5 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	100%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	
CH - Class hours: 2,5 h. NCH - Non-class hours: 1 h. TH - Total hours: 3,5 h.			

RMM152 [!] *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	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%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	
CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h.			

CONTENTS

- 1 - Introduction to 3D printing in medicine
- 2 – 3D printing technologies
- 3 - Materials for 3D printing in medicine
- 4 - Personalized 3D printing
- 5 – Cell 3D printing
- 6 – 3D printing in surgery
- 7 - 3D printing of pharmaceuticals
- 8 – 4D printing in medicine

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Technical articles Class presentations Video projections	3D Printing in Medicine; Edited by Dr. Deepak M. Kalaskar; Woodhead Publishing; eBook ISBN: 9780081007266; Hardcover ISBN: 9780081007174