

IKASTURTEA/ ACADEMIC YEAR 2026/27

IKASGAIA/SUBJECT:	PRODUCT DESIGN IN ADDITIVE MANUFACTURING	KURTSOA/COURSE:	4th
MODULUA/MODULE:	Innovation	KOKAPENA/LOCATION:	7th semester
ESPARRUA/SCOPE:	---	IRAUPENA/DURATION:	125 h
IZAERA/CHARACTER:	Optional course	KREDITUAK/CREDITS:	5 ECTS
KODEA/CODE:	28473	HIZKUNTZA/LANGUAGE:	English
PLANA/PLAN:	2024	IRAKASLEA/TEACHER:	Xabier Cearsolo Arambarri
AIPAMENA/MENTION:	---		Maidar Arana Lopez

HELBURUA/AIM:	• Understand the different technological groups and Additive Manufacturing (AM) technologies, and be able to propose the appropriate AM technology to use depending on product requirements. • Be able to optimize the weight of conventionally designed components using AM-oriented design software (DfAM) based on topology optimization. • Understand the properties, forms, and methods of obtaining the materials used in Additive Manufacturing. • Understand the different post-processing operations required for parts manufactured using Additive Manufacturing. • Be able to perform reverse engineering to obtain 3D geometries using a scanner. • Be able to program manufacturing execution toolpaths in one of the technologies. • The student should be able to understand the context in which innovation projects are developed (Variability, Uncertainty, Complexity, Ambiguity) and be able to plan, manage, and successfully achieve the proposed objectives. They should understand how to protect project results and be able to promote and carry out entrepreneurial projects.
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IKAS-PROZESUAREN EMAITZAK/LEARNING OUTCOMES

RC2 - Innovate in engineering processes and products through a reflective process that utilizes relevant variables governing system behavior to optimize solutions. TYPE: Competencies

RCO3 - Understand the theories and tools of mechanical engineering to meet the technical specifications required in engineering. TYPE: Knowledge or contents

RHT1 - Perform analysis, formulation, modeling, and resolution of engineering problems using fundamental sciences and technology. TYPE: Skills or abilities

RHT2 - Be capable of designing and analyzing solutions for mechanical components and systems using fundamental principles of mechanical engineering. TYPE: Skills or abilities

EDUKIAK/SYLLABUS

1. Introduction to Additive Manufacturing
2. Finite Element Simulation Method
3. DfAM – Topology Optimization
4. Scanning, Reverse Engineering, and Photogrammetry
5. Materials for Additive Manufacturing
6. Additive Manufacturing Technologies
7. Post-processing Operations
8. Project

IRAKASKUNTZA MOTA/TYPE OF TEACHING

	M	CP	PL	PO	SP	D
In person (hours)	20	20	0	0	20	0

Personal work (hours) 25 30 0 0 35 0

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M: Master class / CP: Classroom problem-solving class / PL: Laboratory practices / PO: Computer practices / SP: Project seminars / D: Dual

BALIABIDE DIDAKTIKOAK/TEACHING METHODS

- X Explanatory and/or demonstrative sessions by the teacher.
 - X Exercises carried out in the classroom with the help of the teacher.
 - X Practical application through exercises, simulations, and experimentation, either individually or in groups.
- An integrative case study representative of the skills to be acquired through the module.

BIBLIOGRAFIA/LITERATURE

- Bandyopadhyay, A., & Bose, S. (Eds.). (2025). *Additive Manufacturing* (3rd ed.). CRC Press. [EN]
- Zhang, J., & Jung, Y.-G. (Eds.). (2018). *Additive Manufacturing: Materials, Processes, Quantifications and Applications*
- Gibson, I., Rosen, D. W., Stucker, B., & Khorasani, M. (2021). *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing* (3rd ed.). Springer. [EN]
- Mukherjee, T., & DebRoy, T. (2023). *Theory and Practice of Additive Manufacturing*. John Wiley & Sons. [EN]
- Lamikiz Menchaca, A., Camacho López, A. M., Ferrándiz Bou, S., & Batista Ponce, M. (Coords.). (2023). *Fabricación aditiva*. UNED. [ES]

EBALUAZIO METODO ETA IRIZPIDEAK//EVALUATION METHODS AND CRITERIA

The assessment tests and activities for this subject will be carried out in accordance with the principles of academic integrity, honesty, and ethical behavior established in the regulations of the Elgoibar Dual Engineering School and the EHU. Upon entering the University, students signed the Declaration of Commitment to Ethical Behavior and Academic Honesty, pledging not to engage in plagiarism, academic fraud, or the use of unauthorized materials or devices (including artificial intelligence tools when not expressly permitted) in academic tests and assignments. Failure to comply with these obligations may lead to the academic and disciplinary consequences provided for in the university regulations in force.

Continuous Evaluation System

X Final Evaluation System

OHIKO DEIALDIA/ ORDINARY CALL

40 % Written and/or oral test

Completion and/or reporting of internships

60 % Report/Deliverables/Oral Presentations/Projects

Carrying out activities and/or projects in the dual entity

Argibideak/Clarifications:

FINAL assessment criteria:

Assessment activity	Period	Score	Observations
Report / Deliverables / Oral presentations / Projects (Group–individual)	Throughout the semester	60 % 0-60 points	If the assignment is not submitted when requested, it will receive 0 points. In order to average this mark with the other sections, a minimum score of 5 out of 10 must be obtained.
Final exam (individual)	Examination period	40 % 0-40 points	In order to average this mark with the other sections, a minimum score of 5 out of 10 must be obtained.

The assessment system will be the same for all enrolled students, as the course will involve different types of activities in addition to the exam,

which will be compulsory.

All activities included in the assessment system are equally important. Students who take part in any assessment activity of the course, even if they do not complete all of them, will receive a final grade. Any activities not completed will be awarded a mark of 0, and the corresponding average will be calculated. In order to pass the course, students must meet the defined minimum requirements and obtain a grade equal to or higher than 5 out of 10 when calculating the average of the different sections.

If the minimum required score has not been obtained in any section, the final grade will be calculated as follows: the average will be calculated using all marks, and if the mark obtained in the average:

Average $\geq 4 \rightarrow$ the final grade will be 4.

Average $< 4 \rightarrow$ the final grade will be the mark obtained in the average.

EZOHIKO DEIALDIA/ CALLEXTRAORDINARY

40 % Written and/or oral test

Completion and/or reporting of internships

60% Report/Deliverables/Oral Presentations/Projects

Carrying out activities and/or projects in the dual entity

Argibideak/Clarifications:

FINAL assessment criteria:

The assessment criteria are the same as those applied in the ordinary examination session.

Students who still need to meet the minimum requirement in one or more sections will retain the mark obtained in the section(s) in which the

minimum requirement was met, and will only have to retake the part(s) in which they did not achieve the minimum in the ordinary examination session.