

<i>Course</i>	Mechanical and Industrial Informatics			<i>Academic year</i>	2021/2022		
<i>Subject</i>	Advanced Manufacturing Technologies			ECTS	6		
<i>Type of course</i>	Compulsory						
<i>Year</i>	3rd	<i>Semester</i>	1st	<i>Student Workload:</i>			
<i>Professor(s)</i>	Luís Miguel Lopes Lourenço			<i>Total</i>	162	<i>Contact</i>	60
<i>Area Coordinator</i>	José Reinas dos Santos André						

Planned SD

1. LEARNING OBJECTIVES

Upon Intended learning outcomes C1- Acquire theory and practical knowledge of 3D digital modeling (parametric modeling). Modeling of parts and mechanical assemblies.

Intended learning outcomes C2- Acquire fundamental theory and practical knowledge about rapid prototyping technologies and reverse engineering techniques.

Intended learning outcomes C3- Acquire fundamental knowledge in rapid manufacturing and intelligent production systems.

Intended learning outcomes C4- Acquire theory and practical knowledge in CAD/CAM technology. Numerical control programming with CAD/CAM software.

2. PROGRAMME

1. Introduction to advanced manufacturing technologies.
2. Computer-aided three-dimensional design, parametric modeling practice.
3. Digital prototyping. Digital prototyping and traditional prototyping; an introduction to the practice of digital prototyping.
4. Rapid prototyping. Rapid prototyping processes and operating principles - advantages and disadvantages; an introduction to rapid prototyping practice.
5. Reverse engineering. Introduction to reverse engineering technology and reverse engineering practice.
6. Introduction to rapid manufacturing and intelligent production systems.
7. CAD/CAM technology and programming. CAD/CAM systems, programming and machining: hardware and software; materials to be machined; tools and cutting strategies; cutting parameters; analysis and simulation of the machining cycles; machining/job execution.

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

Intended learning outcomes C1 – syllabus contents in 2.

Intended learning outcomes C2 – syllabus contents in 1, 3, 4 and 5.

Intended learning outcomes C3 – syllabus contents in 1 and 6.

Intended learning outcomes C4 – syllabus contents in 1,2 and 7.

4. MAIN BIBLIOGRAPHY

Hopkinson, N.; Hague, R.; Dickens, P.; Rapid Manufacturing: an industrial revolution for the digital age, Wiley, 2006. ISBN: 978-0-470-03286-2

Gillespie, Laroux K.; Design For Advanced Manufacturing: Technologies, And Processes, McGraw-Hill, 2017. ISBN: 9781259587450

Costa, Américo; Autodesk Inventor 2013 - curso completo, FCA, 2013. ISBN: 978-972-722-736-5

Costa, Américo; Projeto 3D em Solidworks, Cenfim, FCA editora, 2016. ISBN: 978-972-722-820-1

Costa, Américo; Projeto 3D em Solidworks e Solidcam, Cenfim, FCA editora, 2021. ISBN: 978-972-722-913-0

Rocha, Joaquim; "Programação de CNC para Torno e Fresadora", CENFIM, FCA editora, 2016. ISBN: 978-972-722-843-0

Alavala, Chennakesava R.; CAD/CAM: Concepts and Applications, PHI Learning Ed., 2013. ISBN: 8120333403

Rocha, Joaquim; Programação CAD/CAM em Mastercam, Cenfim, FCA editora, 2016. ISBN: 978-972-722-842-3

Putnik, Goran D. et. al; Advanced Manufacturing Systems and Enterprises: Towards Ubiquitous and Cloud Manufacturing; University of Minho, School of Engineering, 2012

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Teaching methodologies

The contents are presented using theoretical-practical lessons (TP).

The contents are presented through lectures, using the whiteboard, audiovisual media and demonstrations using CAD/CAM software and laboratory equipment and workshop CNC machines, followed by practice with student participation intended to consolidate acquired knowledge.

Student evaluation

Ongoing assessment (minimum grade – 10/20):

A minimum of 3 practical assignments throughout the semester, including a written report - 50% and their presentation / defense (50%). The evaluation is exclusively ongoing with no possibility to pass via a final exam.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The oral presentation of the contents, using the whiteboard, audiovisual media, practical examples and practical demonstrations using laboratory / workshop equipment, ensures that students achieve the intended learning outcomes.

The ongoing practice throughout the lessons ensures the students acquire skills in advanced manufacturing technologies, particularly in CAD/CAM machining.

7. ATTENDANCE

N.A.

8. CONTACTS AND OFFICE HOURS

Professor: Luís Miguel Lopes Lourenço (Ph.D); mlopes@ipg.pt; office n.º 67

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Date: 30/06/2021