



UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
3D Digital Technologies

Academic Year 2026/2027

1. Organic Unit

Faculty of Architecture and Arts

2. Course

DESIGN

3. Cycle

1st

4. Course Unit

3D Digital Technologies (L5016)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

2nd Semester



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8. Class type and workload (work time)

Theoretical classes:

Practical classes:

Theoretical-Practical Classes 30,00

Tutorial Guidance:

9. ECTS Credits

3,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutor JOÃO MIGUEL DE CARVALHO LOPES MESQUITA

12. Assistants

13. Teaching Language

Português

14. General Objectives

By the end of this module, students should have attained an intermediate level of proficiency both in modelling objects to be incorporated into three-dimensional computer-generated images and environments, and in deferred rendering in conjunction with other techniques for producing three-dimensional objects in real time, as well as in modelling geared towards the manufacture of objects using 3D printing technologies for prototypes or finished objects.

15. Specific Objectives

to equip students with the knowledge and skills in computer-aided design for the production of three-dimensional objects using digital sculpting techniques, and the design of functional objects and components for tangible multimedia.

16. Skills to be acquired

designing and modelling parts using curves for equipment prototyping; designing and modelling parts using meshes for artistic and sculptural work; digital printing skills, through the preparation of projects at the various stages of production.

17. Teaching Methodology



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The teaching methodologies used in this course module are the expository method, during which students are introduced to the theoretical aspects of the subject matter, including the analysis of case studies; the demonstrative method, during which the lecturer provides practical examples of the subject matter covered; the interrogative method, during which students have the opportunity to ask questions; and the active method, in which students are encouraged to put the material they have learnt i

18. Course Unit Program

Three-dimensional imaging. Theories and history. Modelling using parametric design (CAD, BIM, FEM).

Polygon modelling: vertex and edge extrusion techniques; subdivision, sculpting, particle systems, parametric modelling techniques, retopology; Other modelling techniques: curve-based modelling, NURBS, metaballs; Materials: Physical-Based Rendering (PBR); Textures and shading maps; UV coordinate projection techniques. Methodologies and tools for producing procedurally generated textures. Animation tools: keyframe/interpolation or physics-based algorithms; image post-production and export to other platforms; intermediate formats (FBX, GLTF, VDBM, STL). Process automation; optimisation of modelling techniques for 3D printing; printing techniques: FFF/FDM and SLAM; printing materials (PLA, ABS, others); finishing and artwork techniques. Future trends in 3D modelling: techniques utilising artificial intelligence, distribution platforms for printed parts;

19. Assessment Methods

The continuous assessment methodology follows the general regulations of Lusíada University, which stipulate that oral presentations and a final written exam are compulsory, as is a compulsory assignment, with the possibility of other optional assessment components, where the weighted average is calculated as $2x/n(n+1)$.

20. Didactic Resources

audiovisual studio
multimedia room
Creative Cloud
Affinity Suite
DaVinci Suite
FreeCAD/AutoCAD
exhibition room
3D printers

21. Sustainability Objectives

The general and specific objectives of the course unit focus on the acquisition of general and specific skills for carrying out 3D modelling work, with an emphasis on quality (objective 4). Taking into account the use of material resources, the course is taught with due regard to the ecological footprint of analogue (3D printing) and digital 3D modelling, and the human footprint in predominantly natural environments (objectives 13?14?15).



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22. Keywords

3D modelling
digital manufacturing
computer-aided design (CAD)



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23. Main Bibliography

Author(s): Vaughan, William
Title: [digital] modeling
Edition: Year: 2011
Local: Indiana, IN
Publisher: New Riders Press
ISBN Code:

Author(s): Chopine, Ami
Title: 3D Art Essentials
Edition: 1 Year: 2017
Local: New York, NY
Publisher: Routledge
ISBN Code:

Author(s): Venancio, Vinicius Machado
Title: Blender 3D Asset Creation for the Metaverse
Edition: 2023 Year: 2023
Local: Birmingham, UK
Publisher: Packt
ISBN Code:

24. Complementary Bibliography

Author(s): Hinchliffe, Jo
Title: FreeCAD For Makers (Raspberry Pi Official magazine)
Edition: 1 Year: 2022
Local: Crawley, West Sussex, UK
Publisher: Raspberry Pi
ISBN Code:

Author(s): Redwood, B. & Schöffer, F. & Garret, B.
Title: The 3D Printing Handbook
Edition: Year: 2017
Local: Amsterdam, NL
Publisher: 3D Hubs
ISBN Code:



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Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'TECNOLOGIAS DIGITAIS 3D': Academic Year 2026/2027
Autor / Author	Prof. Doutor JOÃO MIGUEL DE CARVALHO LOPES MESQUITA
Classificação / Classification	-
Descritores / Descriptors	-
Colaborador(es) / Colaborator(s)	-
Data Hora / Date Time	15/10/2026 00:36:00
Formato de dados / Data Format	Texto / Text, PDF
Estatuto de utilização / Usage	Acesso público / Public Access
Relação / Relation	Version 1,0
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