UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Computation and Graphic Representation

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Computation and Graphic Representation (L9019)

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:	20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutora MARIA INÊS VASCONCELLOS FURTADO

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

To provide students with fundamental knowledge of computer graphics, emphasizing the creation and integration of visual elements in web applications. Provide a solid foundation for understanding modeling, rendering and graphic interactivity.

15. Specific Objectives

- Learn HTML, CSS and JavaScript for developing web interfaces.
- Explore Tinkercad as an initial tool for creating simple 3D models.
- Understand the basic principles of computer graphics, including geometric transformations and homogeneous coordinates.
- Enable students to use graphics APIs such as WebGL to create interactive 3D graphics for the web.

16. Skills to be acquired

Develop web pages using HTML, CSS and JavaScript. Create and manipulate 3D models with Tinkercad. Apply computer graphics techniques for 2D modeling, rendering and animation. Implement geometric transformations using homogeneous coordinates. Use graphics APIs to create and integrate dynamic 3D graphics into web applications, fostering practical skills in visual programming and digital interface design.

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17. Teaching Methodology

Theoretical exposition of concepts and objectives of the different stages of the subject. Practical monitoring of the individual development of students in the dialogue with the tools presented to them throughout the course.Students will develop practical projects throughout the course to apply the knowledge acquired.

18. Course Unit Program

1 Introducing the Fundamental Concepts of Programming for the Web
- Introduction to web programming.
- Basics of HTML, CSS and JavaScript.
- Development of simple web pages.

2. HTML
- Basic structure of an HTML document.
- Tags and fundamental elements.
- Creating web pages with HTML.

3. CSS
- Styling web pages with CSS.
- Formatting text, images and elements.
- Responsive layouts and adapting to different devices.

4. JavaScript
- Introduction to the JavaScript language.
- DOM (Document Object Model) manipulation.
- Events and interactivity on the web.
- Development of interactive scripts.

5. Introduction to Tinkercad
- Exploring and using Tinkercad as a 3D modeling tool.
- Creation of simple models and familiarization with the interface.

6. Basic Computer Graphics
- Introduction to basic computer graphics concepts.
- Notions of modeling, rendering and animation.
- Practical application examples in 2D graphics.

7. Interactive Graphic Systems
- Presentation of interactive graphic systems.
- Use of user interaction techniques.
- Development of simple graphic interfaces.

8. 2D Geometric Transformations and Homogeneous Coordinates
- Concepts of 2D geometric transformations.
- Use of homogeneous coordinates for graphical representation.
- Practical applications of geometric transformations.

9. Graphical APIs, WebGL
- Introduction to graphics APIs.
- Using WebGL for 3D graphics on the web.

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19. Assessment Methods

The evaluation will be based on attendance, the execution and presentation of works of application of the knowledge as well as two tests and a final work.

20. Didactic Resources

Teaching resources: computers with internet access, integrated development environment (IDE), slide presentations, guided practical projects, step-by-step tutorials, explanatory videos, updated bibliography, and practical demonstrations.

21. Sustainability Objectives

SDG 4 - Quality education: promotes digital literacy and skills in programming and computer graphics, essential in computer engineering.
SDG 9 - Industry, innovation and infrastructure: develops skills to create efficient interfaces and graphic solutions, supporting technological innovation and digital services.
SDG 12 - Sustainable production and consumption: encourages computational efficiency and good practices that reduce the consumption of digital resources.

22. Keywords

Computer Graphics
Website
HTML
JavaScript
WebGL

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23. Main Bibliography

Author(s): ANGEL, E., SCHREINER, D.
Title: Interactive Computer Graphics with WebGL
Edition: 7th Year: 2015
Local:
Publisher: Pearson Education
ISBN Code: 978-1292019338

Author(s): Marschner, S., Shirley, P.
Title: Fundamentals of Computer Graphics
Edition: 5th Year: 2021
Local:
Publisher: CRC Press
ISBN Code: 978-1482229417

Author(s): Azevedo, E., Conci, A., Leta, F.R.
Title: Computação Gráfica: Teoria e Prática - Geração de Imagens, Vol. 2
Edition: 1 Year: 2021
Local:
Publisher: Alta Books
ISBN Code: 978-6555208160

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24. Complementary Bibliography

Author(s): Duckett, J.
Title: Front-End & Back-End Development with HTML, CSS, JavaScript, jQuery, PHP, and MySQL
Edition: 1 Year: 2022
Local:
Publisher: Willey
ISBN Code: 978-1119813095

Author(s): Cline, L.S.
Title: Make: The Complete Guide to Tinkercad
Edition: 1 Year: 2024
Local:
Publisher: Make Community, LLC
ISBN Code: 978-1680458374

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Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'COMPUTAÇÃO E REPRESENTAÇÃO GRÁFICA': Academic Year 2025/2026
Autor / Author	Prof. Doutora MARIA INÊS VASCONCELLOS FURTADO
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