UAB
Universitat Autònoma de Barcelona

Augmented and Virtual Reality

Code: 104760
ECTS Credits: 6

2024/2025

Degree	Type	Year
2503873 Interactive Communication	OT	4

Contact

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

It is recommended to take this subject together with the subject of Art and Architecture of Maps and Virtual Environments.

Objectives and Contextualisation

To be able to develop a Virtual and/or Augmented Reality application using tools such as Unity.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Act within one's own area of knowledge, evaluating sex/gender-based inequalities.
- Apply and integrate knowledge in the fields of social sciences, humanities and engineering to generate complex products and services tailored to citizens' needs.
- Design and create aesthetically pleasing, usable interfaces based on users' needs.
- Determine and plan the technological infrastructure necessary for the creation, storage, analysis and distribution of interactive multimedia and social-networking products.
- Devise, create, activate and integrate virtual and augmented-reality spaces, characters and objects.
- Display the ability to lead, negotiate and work in a team.
- Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
- Manage time efficiently and plan for short-, medium- and long-term tasks.
- Search for, select and rank any type of source and document that is useful for creating messages, academic papers, presentations, etc.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.

- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Communicate using language that is not sexist or discriminatory.
3. Create augmented reality products by combining technical skills and mastery of specific software with aesthetic taste.
4. Create geographies or maps that act as interfaces and allow users to interact with games.
5. Create virtual spaces using suitable software and efficient visibility techniques.
6. Cross-check information to establish its veracity, using evaluation criteria.
7. Design objects that combine aesthetic norms with perfect technical functionality.
8. Develop augmented reality projects, integrating digital and real-world elements.
9. Distinguish the salient features in all types of documents within the subject.
10. Form part of groups working on virtual-production projects.
11. Interpret and discuss documents on the main theories on virtual environments.
12. Plan and conduct academic studies in the field of augmented and virtual reality.
13. Present a summary of the studies made, orally and in writing.
14. Propose new methods or well-founded alternative solutions.
15. Propose projects and actions that are in accordance with the principles of ethical responsibility and respect for fundamental rights and obligations, diversity and democratic values.
16. Propose projects and actions that incorporate the gender perspective.
17. Show expertise in operating the relevant computer programmes.
18. Submit course assignments on time, showing the individual and/or group planning involved.
19. Use the virtual spaces created as narrative contexts.
20. Weigh up the risks and opportunities of both one's own and other people's proposals for improvement.

Content

Computer Graphics

- Definitions
- Applications
- Graphic Application
- 3D Graphics

Virtual Reality

- Definitions
- History and applications
- Components of a VR system

Unity and Virtual Reality

Augmented Reality

Unity and Augmented Reality

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes

Type: Directed			
Individual theory study	12	0.48	6, 9, 11
Solving practical exercises	12	0.48	3, 4, 5, 6, 7, 8, 9, 10, 12, 17, 18
Theory sessions	15	0.6	6, 9, 11
Type: Supervised			
Practicum	12	0.48	3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 17, 18, 19
Project	21	0.84	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Type: Autonomous			
Project autonomous work	70	2.8	3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 17, 18, 19

This subject places greater emphasis on practical work and project development compared to theoretical aspects. The practical and project component will be carried out through supervised work sessions with the professor, work demonstrations, and the submission of reports, documentation, and individual or group assignments.

Theory Classes: These are lecture-style classes where theoretical concepts (Computer Graphics, Virtual Reality, Augmented Reality) and practical applications (Unity) of the subject will be introduced. Although these are theory classes, a significant portion of the session will be dedicated to solving problems individually or in groups, as presented by the professor. It is recommended to have a laptop for these sessions.

Practical Work: Practical cases using Unity will be proposed for groups of two individuals. An assignment will be provided, and students are required to implement and present a Unity solution for the given case. These practical assignments will require the application of concepts explained in the theory classes.

Project: Midway through the course, students will form groups of 3 or 4 and will be provided with a project proposal involving the development of a Virtual and/or Augmented Reality application. The students will work on this project for a period of 6 weeks. Alternatively, students may propose their own projects. During class sessions, students will work on the project under the guidance of the professor, and periodic documentation submissions (such as progress reports and control documents) will be required. On the last day of class, each group will give an oral presentation of their project, accompanied by a previously submitted project report.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and participation in project sessions	0.1	0	0	10, 18
Delivery of practical work	0.2	3	0.12	3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 17, 18
Oral presentation	0.1	0.5	0.02	10, 13

Project realization	0.4	3	0.12	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
Theory test	0.2	1.5	0.06	6, 9, 13

The evaluation activities that can be scored out of 10 are the following:

a) Theory test (20% of the final grade)

b) Submission of practical exercises (10% of the final grade, optional)

c) Handing in practical assignments (20% of the final grade)

d) Practical work (project) (40% of the final grade)

e) Attendance and participation in the project sessions (10% of the final grade)

For the calculation of the final grade, each of the assessment activities must have a grade greater than 5, except for the submission of practical exercises.

The grade for remedial activities will be graded with a maximum of 8.

Students who have passed an assessment activity can present themselves for remedial work and in this case the mark will be assessed with a maximum of 10.

The maximum will be taken into account note of the two assessments.

In the event that the student commits any irregularity that could lead to a significant variation in the grade of an assessment act, this assessment act will be graded with 0, regardless of the disciplinary process that may be instituted. In the event that several irregularities occur in the evaluation acts of the same subject, the final grade for this subject will be 0.

This subject does not provide for the single assessment system.

Bibliography

• J.F. Hughes, A. van Dam, M. McGuire, D.F.Sklar, F.D. Foley, S.K. Feiner, K. Akeley,
Computer Graphics. Principles and Practice, third edition in C, Addison-Wesley,
2014.
• E. Pangilinan, S. Lukas, V. Mohan, Creating Augmented & Virtual
realities, O'Reilly Media, 2019.
• B. Arnaldi, P. Guitton, G. Moreau, Virtual and Augmented Reality,
ISTE, John Wiley & Sons, 2018.
• https://docs.unity3d.com/Manual/index.html, Pàgina oficial Unity.
• https://library.vuforia.com/, Pàgina oficial Vuforia.
• https://desktop.github.com/, Pàgina oficial de Githup Desktop

Software

• Unity
• Githup Desktop

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	61	Catalan	first semester	afternoon
(TE) Theory	6	Catalan	first semester	afternoon