

## ΞΞΕ971-VIRTUAL AND AUGMENTED REALITY TECHNOLOGIES

### 1. GENERAL

|   |   |                         |                 |
|---|---|-------------------------|-----------------|
| <b>SCHOOL</b>                                 | School of Technology  |                         |                 |
| <b>DEPARTMENT</b>                             | Department of Forestry, Wood Sciences, and Design   |                         |                 |
| <b>LEVEL</b>                                  | <i>Undergraduate</i>  |                         |                 |
| <b>CODE</b>                                   | ΞΞΕ971  | <b>STUDENT SEMESTER</b> | 9 <sup>th</sup> |
| <b>COURSE TITLE</b>                           | Virtual and Augmented Reality Technologies  |                         |                 |
| <b>ACTIVITIES</b>                             |   | <b>WEEKLY HRS</b>       | <b>ECTS</b>     |
|   | Lectures and Workshops  | 3                       | 4               |
|   |   |                         |                 |
|   |   |                         |                 |
| <b>TYPE OF COURSE</b>                         | Scientific area   |                         |                 |
| <b>PREREQUISITES:</b>                         | None  |                         |                 |
| <b>LANGUAGE TEACHING AND EXAMINATION:</b>     | Greek   |                         |                 |
| <b>THE COURSE OFFERED TO STUDENTS ERASMUS</b> | No  |                         |                 |
| <b>WEBPAGES COURSE (URL)</b>                  | <a href="https://eclass.uth.gr/courses/FWSD_U_152/">https://eclass.uth.gr/courses/FWSD_U_152/</a> |                         |                 |

### 2. LEARNING OUTCOMES

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| <b>Learning Outcomes</b>  |
| <p>The aim of the course is to provide basic knowledge concerning Augmented and Virtual Reality (AR/VR) with emphasis to applying AR/VR systems in the areas of Environment, Wood and Furniture.</p> <p>At the end of the course students will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the way users perceive and interact with AR/VR environments</li> <li>• Design user interaction methods and 3D information representation</li> <li>• Utilise common AR/VR application development methodologies, technologies and tools</li> <li>• Have an understanding of the methods and tools that can be used to design AR/VR environments</li> <li>• Understand and use AR/VR applications in common application areas, such as training, workforce support, marketing, customer relationship management</li> </ul> |
| <b>General Skills</b>   |
| <p>Upon successful completion of the course, the students will be able to develop and cultivate basic professional and social skills:</p> <ul style="list-style-type: none"> <li>• Search, analysis and synthesis of data and information, using the necessary technologies</li> <li>• Adaptation to new situations</li> <li>• Decision making</li> <li>• Autonomous work</li> <li>• Teamwork</li> <li>• Demonstration of social, professional and moral responsibility and sensitivity to gender issues</li> <li>• Exercise criticism and self-criticism</li> <li>• Promoting free, creative and inductive thinking</li> </ul>   |

### 3. COURSE CONTENT

In the theoretic part the following topics are described:

History of Virtual, Augmented and Mixed Reality (VR,AR,MR). AR/VR hardware. AR/VR applications in business and everyday life. AR/VR application design and development principles. Equipment for immersion and interaction AR/VR engines and immersive environment creation. AR/VR development tools (Unity3D, AR toolkit, Vuforia). Introduction to 360 panoramic video and Ambisonic. 3D User interface design for AR/VR environments. Development of content and interaction types (embodied, tangible). Technologies and mechanisms for tracking position, movement and interaction actions. Visualisation methods, rendering, overlaying, 3D stereoscopic vision. Adding 3D models to AR/VR applications. AR/VR use cases: New product design, personnel training, object inspection and simulation, fault repair, Product visual promotion in exhibition rooms, customer management. Designing mixed reality installations. Legal and ethical matters concerning AR/VR.

Students develop final semester assignments in groups. Course lectures and other activities are supported by workshops, where each student team is discussing their work and seeking solutions to any problems it faces or specialized knowledge about specific aspects of its work.

The final semester assignment requires submission of the assignment materials as well as a 10 minute oral presentation at week 12. The semester assignment counts for 20% of the total course assessment and the remaining 80% is obtained through written examination.

### 4. TEACHING AND LEARNING METHODS - EVALUATION

|  |   |                          |
|--|---|--------------------------|
| <b>DELIVERY METHOD</b>                                   | Face to face  |                          |
| <b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</b> | Use of a course website on the e-class platform for posting (a) notes, (b) internet links, (c) announcements, search tools and social networks<br><br>Furthermore, use of equipment such as video projector, interactive board, and use of server and terminal stations at the laboratory room. |                          |
| <b>TEACHING ORGANISATION</b>                             | <b>Activity</b>   | <b>Semester Workload</b> |
|  | Interactive Teaching – Lectures   | 26                       |
|  | Studio workshops  | 22                       |
|  | Semester assignments  | 27                       |
|  | Self-study  | 25                       |
|  | <b>Course Total</b>   | <b>100</b>               |
| <b>STUDENT EVALUATION</b>                                | Both intermediate and final evaluation is applied.<br><br>The evaluation of the theoretical part is carried out by: <ol style="list-style-type: none"> <li>1. Optional intermediate written examination</li> <li>2. Semester assignment</li> <li>3. Final written exam</li> </ol>               |                          |

## 5. RECOMMENDED-BIBLIOGRAPHY

### - Recommended literature:

- Λέπουρας, Γ., Αντωνίου, Α., Πλατής, Ν., Χαρίτος, Δ., 2015. Ανάπτυξη συστημάτων εικονικής πραγματικότητας. [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/2546> (in Greek).
- Gerard Jounghyum. Designing virtual reality systems: the structured approach. London: Springer, 2005.
- Kipper, Gregory. Augmented reality: an emerging technologies guide to AR. Amsterdam; Waltham, MA: Syngress, 2013.
- Μουστάκας, Κ., Παλιόκας, Ι., Τζοβάρας, Δ., Τσακίρης, Α., 2015. Γραφικά και εικονική πραγματικότητα. [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/4491>. (in Greek)
- Βοσινάκης, Σ., 2015. Εικονικοί κόσμοι. [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: <http://hdl.handle.net/11419/3187>. (in Greek)

### - Relevant scientific journals:

- IEEE Transactions on Visualization and Computer Graphics, IEEE Society
- Visual Computer
- Computer Animation and Virtual Worlds