<table>
<tr><td>Subject code:<br>IFI7123</td><td colspan="2">Course title: Virtual and Augmented Reality Applications</td></tr>
<tr><td>Amount ECTS</td><td>3</td><td>Study semester:<br>Spring 2</td></tr>
<tr><td>Objective:</td><td colspan="2">The course presents a review of current Virtual Reality (VR) and Augmented Reality (AR) technologies and provides a detailed analysis of the engineering, scientific and functional aspects of VR systems and the fundamentals of VR modeling and programming.<br>The course also introduces to the development and building of virtual environments and simulators and presents some force and tactile feedback devices and newer visualization and interaction interfaces.<br>VR and AR applications in medicine and surgery, cultural heritage and games are also described.</td></tr>
<tr><td>Course description:</td><td colspan="2">Virtual and Augmented Reality technologies<br>▪ Introduction to Virtual Reality technology<br>▪ Introduction to Augmented Reality technology<br>▪ Visualization devices<br>o Head Mounted Display<br>o Cave<br>o 3D display<br>▪ Building of the virtual environment<br>o VR engine software: XVR<br>▪ Graphics rendering<br>▪ Interaction in the virtual environment<br>o Collision detection<br>o Collision response<br>o Force feedback<br>o Haptic interfaces<br>▪ Physical modelling<br>▪ User interfaces<br><br>Virtual and Augmented Reality in Medicine and Surgery<br>▪ Virtual Reality in medicine and surgery<br>▪ Building of the virtual environment in medicine and surgery<br>▪ Applications<br>o Diagnosis<br>o Surgical planning<br>o Rehabilitation<br>o Telesurgery<br>o Surgical training<br>▪ Visualization and navigation systems<br>▪ Augmented Reality in medicine and surgery<br>o Registration phase<br>▪ Applications<br>o Surgical planning<br>o Surgical training<br>o Real surgical procedure<br><br>Virtual and Augmented Reality in Cultural Heritage<br>▪ Virtual Reality in Cultural Heritage<br>▪ Edutainment in Cultural Heritage<br>o MediaEvo Project<br>▪ Augmented Reality in Cultural Heritage<br>▪ Applications</td></tr>
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| | **Virtual and Augmented Reality in games**<br>▪ Virtual Reality applications in games<br>o Billiard simulation<br>▪ Augmented Reality applications in games |
| Learning outcomes: | Has acquired knowledge in VR and AR technologies in terms of used devices, building of the virtual environment and modalities of interaction and modelling.<br>Has acquired knowledge in the main application of VR and AR technologies in medicine and surgery, cultural heritage and games. |
| Form of evaluation: | The form of evaluation will be an oral exam (40%) and a short project (60%). |
| Lecturer: | Lucio Tommaso De Paolis<br>Assistant Professor<br>Dept. of Innovation Engineering<br>Salento University<br>Italy |
| Title in English: | **Virtual and Augmented Reality Applications** |
| Prerequisite subjects: | C programming |
| Compulsory literature: | **Virtual Reality Technology**<br>G. Burdea and P. Coiffet<br>John Wiley & Sons, Inc.<br><br>**Emerging Technologies of Augmented Reality**<br>M. Haller, M. Billinghurst and B. Thomas<br>Idea Group Publishing |
| Replacement literature: | **Introduction to Virtual Reality**<br>J. Vince<br>Springer<br><br>**Augmented Reality**<br>R. Behriger, G. Klinker and D. W. Mizell<br>A K Peters<br><br>The lecturer will provide some papers and book chapters and will indicate some online documents and web sites on the main topics of the course. |
| Requirements for participating in studies and taking exams/assessments | A short project will be developed from the students and will be presented during the exam. |
| Requirements for independent work | A short project has to be developed from the students on the building of a simple virtual environment<br>A presentation of this project has to be presented during the oral exam. |
| Exam evaluation criteria or minimum level necessary to pass assessment | Project grading criteria (the lecturer will evaluate the developed project and the presentation of the work):<br>A - excellent: fully designed and implemented project together with a comprehensive report and sound presentation. |

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| | B - very good: fully designed and implemented project with a generic report and presentation.<br>C - good: fully designed but partially implemented project with a generic report and presentation.<br>D - satisfactory: partially designed and implemented project with a generic report and presentation.<br>E - sufficient: partially designed and implemented project with insipient report and presentation.<br>F - fail: more work is required before the credit can be awarded.<br><br>Oral exam grading criteria (the lecturer will evaluate the level of knowledge of the VR devices and the problems in the building of a VR application):<br>A - excellent: very deep knowledge and brilliant exposition of the course topics.<br>B - very good: deep knowledge and good exposition of the course topics.<br>C - good: good knowledge and good exposition of the course topics.<br>D - satisfactory: good knowledge and sufficient exposition of the course topics.<br>E - sufficient: sufficient knowledge and exposition of the course topics.<br>F- fail: more work is required before the credit can be awarded. |
| Additional information on course content, division of course by topics, incl. times of contact lessons taking place in the form of seminar.<br>. | • Virtual and Augmented Reality technologies<br>• Virtual and Augmented Reality in Medicine and Surgery<br>• Virtual and Augmented Reality in Cultural Heritage<br>• Virtual and Augmented Reality in games |

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| Unit in charge of subject: | Institute of Informatics |
| Name of person compiling course programme: | **Lucio Tommaso De Paolis** |
| Signature: |  |
| Date: | February 15, 2011 |

Course programme registered in the academic unit

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| Date | 02.03.2011.a. |
| Name of study assistant | Hanna-Liisa Pender |
| Signature | |