<table>
<tr><td>Course Title</td><td colspan="5">Digital Logic</td></tr>
<tr><td>Course Code</td><td colspan="5">ACOE161</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Level</td><td colspan="5">BSc (Level 1)</td></tr>
<tr><td>Year / Semester</td><td colspan="5">1st Year/ 2nd Semester</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">Dr. Konstantinos Tatas</td></tr>
<tr><td>ECTS</td><td>5</td><td>Lectures/week</td><td>3</td><td>Laboratories/week</td><td>2</td></tr>
<tr><td>Course Purpose</td><td colspan="5">The aim of the course is to introduce students to Digital Design principles and theory, including understanding of binary representation of various types of data, the analysis and design of combinational digital circuits as well as the design and analysis of simple sequential circuits. This course lays the foundations for a more advanced courses in Digital Design as well as Computer Architecture.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">By the end of the course, students must be able to:<br>1. Explain how information is coded and manipulated in computers and digital systems in general.<br>2. Apply Boolean algebra, Karnaugh maps and algorithmic minimization techniques to analyze and design combinational digital circuits.<br>3. Use timing and state diagrams to design and analyze synchronous and asynchronous sequential digital circuits such as counters and registers.<br>4. Employ EDA tools for the simulation, design and implementation of digital circuits.<br>5. Simulate, build and test combinational and sequential logic circuits using TTL ICs.</td></tr>
<tr><td>Prerequisites</td><td colspan="2">None</td><td colspan="2">Co-requisites</td><td>None</td></tr>
<tr><td>Course content</td><td colspan="5"><ul><li>Number systems and codes: Introduction to computer numbering systems: Binary number representation. Conversion from decimal to any base and from any base to decimal. BCD representation and character codes.</li><li>Combinational circuits: Basic digital components, truth tables and logic functions Karnaugh maps and algorithmic minimization techniques. Circuit implementation of logic functions. Design of combinational MSI digital circuits such as decoders, encoders, adders/subtracters, multiplexers, comparators etc.</li></ul></td></tr>
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| | • **Sequential circuits:** Latches and Set/Reset, Data, JK and Toggle flip-flops. Positive and negative edge triggered flip flops. Asynchronous flip-flop inputs. Asynchronous counters, synchronous counters and shift registers.<br>• **Programmable logic devices and EDA tools**: Use of EDA for the simulation, design and implementation of digital circuits.<br>• **Laboratory Exercises:** Individual and small group experiments including simulation of digital circuits and implementation using TTL ICs. |
| Teaching Methodology | The course is structured in lectures that are conducted with the help of both computer presentations and traditional means. Practical examples and exercises are included in the lectures to enhance the material learning process. Often short post-lecture quizzes are used to assess the level of student understanding and provide feedback. Student questions are addressed during the lecture, or privately after the lecture or during office hours.<br>Lecture notes are available through the web for students to use in combination with the textbooks.<br>Students are assessed continuously and their knowledge is checked through tests with their assessment weight, date and time being set at the beginning of the semester via the course outline.<br>Laboratory experiments are carried out in small groups and lab reports are required two weeks after the laboratory class resulting in a cumulative mark. The first laboratory exercises are totally structured in order to familiarize the students with the equipment, while later exercises are less structured, allowing the student to create their own designs or programs for a given application. |
| Bibliography | Textbooks:<br>• Thomas Floyd, “**Digital Fundamentals 11th Ed**”, Pearson Education, 2015<br>References:<br>• John F. Wakerly, “**Digital Design: Principles and Practices** ”, 5th edition, Prentice Hall, 2018<br>• M. Mano, C. R. Kime, ***Logic and Computer Design Fundamentals***, 4th edition, Pearson, 2008 |
| Assessment | The final assessment of the students is formative and summative and is assured to comply with the subject’s expected learning outcomes and the quality of the course. In order to continuously assess students, given the fundamental nature of the course, coursework weight is set at 50%, which comprises assignments, a mid-term exam and laboratory work assessment. Assignments range from simple problems to work out, to circuit design |

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| | assignments that require demonstrate concept understanding as well as problem-solving skills. The assessment weight, date and time of each type of continuous assessment is being set at the beginning of the semester via the course outline. An indicative weighted continuous assessment of the course is shown below:<br>• Assignments: 10%<br>• Mid-Term exam: 20%<br>• Laboratory Work: 20%<br>• Final Exam 50% |
| Language | English |