# COURSE SYLLABUS AND COURSE REQUIREMENTS
# ACADEMIC YEAR 2022/2023 SEMESTER 1

| | |
|---|---|
| *Course title* | *Digital logic design 1* |
| *Course Code* | IVB033ANMI |
| *Hours/Week: le/pr/lab* | 2/2/0 |
| *Credits* | 4 |
| *Degree Programme* | Electrical Engineering Bsc English, Computer Science Bsc English |
| *Study Mode* | *full-time* |
| *Requirements* | exam |
| *Teaching Period* | 1 |
| *Prerequisites* | - |
| *Department(s)* | Dept. of Information Technology |
| *Course Director* | *Dr. Tukora Balázs* |
| *Teaching Staff* | *Dr. Tukora Balázs* |

## COURSE DESCRIPTION

*A short description of the course (max. 10 sentences).*
*Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description*

The course introduces the students to the basics of digital technology. They will learn how to describe the operation of a logic system, how time-invariant and sequential logic systems work, and finally, how a microprocessor system is built.

## SYLLABUS

*Neptun: Instruction/Subjects/Subject Details/Syllabus*

### 1. GOALS AND OBJECTIVES

*Goals, student learning outcome.*
*Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction*

The majority of the devices in information technology are digital systems. The course helps the students to understand the mathematical and logic basics of these systems and gives instructions for the designing and creation of them. Starting from the simplest building elements, the level of digital computers is reached systematically.

### 2. COURSE CONTENT

*Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content*

| | **TOPICS** |
|---|---|
| **LECTURE** | 1. *Tasks, operation and architecture of logic systems.*<br>2. *Boolean algebra, logic functions.*<br>3. *Minimizing logic functions: algebraic simplification, simplification with Karnaugh map.*<br>4. *Hazards in logic circuits, elimination of them.*<br>5. *Frequently used combinational logics: encoders, decoders, multiplexers, demultiplexers, arithmetic logic circuits.*<br>6. *Sequential logics: fundamentals, types, ways of representation.*<br>7. *Latches, flip-flops and circuits made of them: registers, counters.*<br>8. *Creating combinational and sequential logics with memory elements and programmable logic circuits.*<br>9. *Basics of microprocessor systems, main parts and tasks.* |
| **PRACTICE**<br>**LABORATORY PRACTICE** | *The topics of the practices follow the lectures.* |

## DETAILED SYLLABUS AND COURSE SCHEDULE

*ACADEMIC HOLIDAYS INCLUDED*

***LECTURE***

| *week* | **Topic** | **Compulsory reading; page number (from … to …)** | **Required tasks (assignments, tests, etc.)** | **Completion date, due date** |
|---|---|---|---|---|
| *1.* | Introduction | | | … |
| *2.* | Digital and analog signals. Number systems. Boolean algebra. Logic operations. | Lecture notes 1-2 | | |
| *3.* | Logic diagram. Logic gates. Normal forms. | Lecture notes 3 | | |
| *4.* | Simplification of logic functions with Karnaugh-maps | Lecture notes 4 | | |
| *5.* | Characteristics of digital circuits | Lecture notes 5 | | |
| *6.* | Common combinational logic circuits: Comparators, encoders, adders, multiplexers | Lecture notes 6 | | |
| *7.* | Hazards in the combinational logic | Lecture notes 7 | | |
| *8.* | Sequential logics. State table, state diagram. | Lecture notes 8 | | |
| *9.* | Autumn holiday | | | |
| *10.* | Latches, flip-flops: D, SR, JK, T | Lecture notes 9 | | |
| *11.* | Common sequential logic circuits: Debouncing, frequency dividers, counters, registers. | Lecture notes 10 | | |
| *12.* | Semiconductor memory. Creating combinational logic using memory circuits. | Lecture notes 11 | | |
| *13.* | Basics of microprocessor systems | Lecture notes 12 | | |
| *14.* | Test | | Test | |
| *15.* | Repeat test | | Repeat test | |

***PRACTICE, LABORATORY PRACTICE***

| *week* | **Topic** | **Compulsory reading; page number (from … to …)** | **Required tasks (assignments, tests, etc.)** | **Completion date, due date** |
|---|---|---|---|---|
| *1.* | - | | | |
| *2.* | Conversion between number systems, Boolean algebra | | | |
| *3.* | Creating and understanding logic diagrams | | | |
| *4.* | Simplification with Karnaugh maps | | | |
| *5.* | Building/simulating logic circuits | | | |
| *6.* | Building/simulating logic circuits | | | |
| *7.* | Building/simulating logic circuits | | | |
| *8.* | Building/simulating logic circuits | | | |
| *9.* | Autumn holiday | | | |
| *10.* | Behaviour of latches, flip-flops | | | |
| *11.* | Building/simulating logic circuits | | | |
| *12.* | Building/simulating logic circuits | | | |
| *13.* | Preparation for the test | | | |
| *14.* | - | | | |
| *15.* | - | | | |

## 3. ASSESSMENT AND EVALUATION

*(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)*

**ATTENDANCE**

*In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.*

***Method for monitoring attendance*** *(e.g.: attendance sheet / online test/ register, etc.)*

attendance sheet

**ASSESSMENT**

*Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.*

### *Course-unit with final examination*

***Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam***

*(The samples in the table to be deleted.)*

| Type | Assessment | *Weighting as a proportion of the pre-requisite for taking the exam* |
|---|---|---|
| **1.** test | *0-100%* | *100%* |
| **2.** | | |
| **3.** | | |
| **4.** | | |

***Requirements for the end-of-semester signature***

(Eg.: mid-term assessment of 40%)

Passed test

***Re-takes for the end-of-semester signature*** (PTE TVSz 50§(2))

*The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.*

**repeat test in case of failed test**

***Type of examination*** *(written, oral): oral*

***The exam is successful if the result is minimum*** ***40*** ***%.*** *(The minimum cannot exceed 40%.)*

***Calculation of the grade*** *(TVSz 47§ (3))*

Final grade is offered after passed test. This grade can be accepted or improved at an exam in the exam period. In this case the performance at the exam accounts for ***100*** % in the calculation of the final grade.

***Calculation of the final grade based on aggregate performance in percentage.***

| Course grade | Performance in % |
|---|---|
| excellent (5) | 85 % … |
| good (4) | 70 % ... 85 % |
| satisfactory (3) | 55 % ... 70 % |
| pass (2) | 40 % ... 55 % |
| fail (1) | below 40 % |

The lower limit given at each grade belongs to that grade.

## 4. SPECIFIED LITERATURE

*In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)*

**COMPULSORY READING AND AVAILABILITY**

[1.] Lecture notes available on Teams every week
[2.]

**RECOMMENDED LITERATURE AND AVAILABILITY**

[3.] Introduction to Logic Design, third edition by Alan B. Marcovitz, McGraw-Hill, 2010, online, Teams
[4.] ……
[5.] ……