COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2022/2023 SEMESTER II.

Course title	*Electronics 1.*
Course Code	IVB040AN
Hours/Week: le/pr/lab	2/0/2
Credits	4
Degree Programme	Electrical Engineering BSc 2. s., Computer Science Engineering BSc 2. s.
Study Mode	*daytime education*
Requirements	midsemester grade
Teaching Period	spring
Prerequisites	
Department(s)	Department of Automation
Course Director	Dr. Viktor Bagdán
Teaching Staff	

COURSE DESCRIPTION

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

The aim of this course is to provide an introduction to the fundamentals of analogue electronics. Methods of electronic circuit analysis and synthesis are presented and illustrated at laboratory practice.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

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

Passive devices. Methods of passive circuit analysis. First order filters. Resonance filters. Characteristics of quadrupoles, amplifiers. Transfer functions. Noise, noise rejection, distortion.
Basic principles of semiconductor devices. P-N junction, semiconductor diodes: structure, characteristics, packaging, transient phenomena in switching mode. Varactors, Zener diodes. Applications: rectifiers, voltage clippers, potential, voltage multipliers.
Structure, principle of operation and characteristics of bipolar junction transistors. H-parameter model. Miller principle. Early-effect. Basic circuits (common-emitter, common-collector, common-base, cascode amplifiers) modeling, characterization, biasing.
Structure, principle of operation and characteristics of field effect transistors. H-parameter model. Basic circuits (common-source, common-drain, common-gate) modeling, characterization, biasing.
Multistage amplifiers, feedback (series, parallel, voltage, current feedback). Effects on amplifier parameters (voltage gain, current gain, input and output impedance).
Amplifier types (voltage-, current-, transimpedance- and transadmittance-amplifiers). Power amplifiers. Amplifier classes: A, B, AB, C, D. Darlington connection. Overcurrent protection.
Operational Amplifiers: structure, applications, design and analysis principles of OpAmp circuits.
Photometry. Optoelectronic devices, photoresistor, photodiode, phototransistor, LED, optocoupler.

2. COURSE CONTENT

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

	TOPICS
LECTURE	*1. Conductors & Insulators*

	2. *Resistors, Ohm´s Law, Current & Voltage* 3. *What is AC, A.C. Waves, Measuring the Sine Wave, Capacitors & Inductors* 4. *DC Transients* 5. *Phase and Phasors, Reactance, Impedance* 6. *Filters & Wave shaping* 7. *LCR Series Circuits & LCR Parallel Circuits* 8. *Transformers* 9. *Atomic Structure of Matter, Semiconductor Materials* 10. *Diodes* 11. *Bipolar Junction Transistors*
PRACTICE	1. *topic* 2. *topic* 3. *topic* 4. *etc.*
LABORATORY PRACTICE	1. *Course description, goals and objectives, simulation programms introduction* 2. *Installation, how to use TINA simulation program* 3. *simulation of resistor networks* 4. *oscilloscope simulation* 5. *capacitors, inductors, transients simulation* 6. *Reactance & Impedance simulations* 7. *simulation of Filters & Wave shaping circuits* 8. *simulation of LCR Series Circuits & LCR Parallel Circuits* 9. *Transformers in circuits, simulation* 10. *Diode characteristics simulation, base diode circuits* 11. *BJT characteristics simulation* 12. *basic BJT circuits, simulation*

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.	Course description, goals and objectives	…	…	…
2.	Conductors & Insulators	https://learnabout-electronics.org/Resistors/resistors_00.php to https://learnabout-electronics.org/Resistors/resistors_14.php	learn, solve quiz questions	3rd week
3.	Resistors, Ohm´s Law, Current & Voltage	https://learnabout-electronics.org/Resistors/resistors_08.php to https://learnabout-electronics.org/Resistors/resistors_23.php	learn, solve quiz questions	4th week
4.	What is AC, A.C. Waves, Measuring the Sine Wave, Capacitors & Inductors	https://learnabout-electronics.org/ac_theory/index.php to https://learnabout-electronics.org/ac_theory/inductors05.php	learn, solve quiz questions	5th week

5.	DC Transients	https://learnabout-electronics.org/ac_theory/dc_ccts40.php to https://learnabout-electronics.org/ac_theory/dc_ccts46.php	learn, solve quiz questions	6th week
6.	Phase and Phasors, Reactance, Impedance	https://learnabout-electronics.org/ac_theory/ac_ccts.php to https://learnabout-electronics.org/ac_theory/impedance74.php	learn, solve quiz questions	7th week
7.	First midterm test			
8.	Filters & Wave shaping	https://learnabout-electronics.org/ac_theory/filters.php to https://learnabout-electronics.org/ac_theory/filters86.php	learn, solve quiz questions	9th week
9.	LCR Series Circuits & LCR Parallel Circuits	https://learnabout-electronics.org/ac_theory/lcr_series.php to https://learnabout-electronics.org/ac_theory/lcr_para_105.php	learn, solve quiz questions	10th week
10.	Transformers	https://learnabout-electronics.org/ac_theory/transformers.php to https://learnabout-electronics.org/ac_theory/transformers06.php	learn, solve quiz questions	11th week
11.	Atomic Structure of Matter, Semiconductor Materials	https://learnabout-electronics.org/Semiconductors/semiconductors_01.php to https://learnabout-electronics.org/Semiconductors/semiconductors_03.php	learn, solve quiz questions	12th week
12.	Diodes	https://learnabout-electronics.org/Semiconductors/diodes_20.php to https://learnabout-electronics.org/Semiconductors/diodes_29.php	learn, solve quiz questions	13th week
13.	Bipolar Junction Transistors	https://learnabout-electronics.org/Semiconductors/bjt_01.php to https://learnabout-electronics.org/Semic	learn, solve quiz questions	14th week

		onductors/bjt_07.php		
14.	Second midterm test			
15.	Retake of midterm tests			

PRACTICE, LABORATORY PRACTICE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Course description, goals and objectives, simulation programms introduction		learn	2nd week
2.	Installation, how to use TINA simulation program		test	3rd week
3.	simulation of resistor networks	https://learnabout-electronics.org/Resistors/resistors_00.php to https://learnabout-electronics.org/Resistors/resistors_14.php	learn, test	4th week
4.	oscilloscope simulation	https://learnabout-electronics.org/ac_theory/index.php to https://learnabout-electronics.org/ac_theory/ac_waves03.php	learn, test	5th week
5.	capacitors, inductors, transients simulation	https://learnabout-electronics.org/ac_theory/capacitors.php to https://learnabout-electronics.org/ac_theory/dc_ccts46.php	learn, test	6th week
6.	Reactance & Impedance simulations	https://learnabout-electronics.org/ac_theory/reactance.php to https://learnabout-electronics.org/ac_theory/impedance74.php	learn, test	7th week
7.	First midterm test			
8.	simulation of Filters & Wave shaping circuits	https://learnabout-electronics.org/ac_theory/filters.php to https://learnabout-electronics.org/ac_theory/filters86.php	learn, test	9th week
9.	simulation of LCR Series Circuits & LCR Parallel Circuits	https://learnabout-electronics.org/ac_theory/lcr_series.php to https://learnabout-electronics.org/ac_theory/lcr_para_105.php	learn, test	10th week
10.	Transformers in circuits, simulation	https://learnabout-electronics.org/ac_theory/transformers.ph	learn, test	11th week

		p to https://learnabout-electronics.org/ac_theory/transformers06.php		
11.	Diode characteristics simulation, base diode circuits	https://learnabout-electronics.org/Semiconductors/diodes_20.php to https://learnabout-electronics.org/Semiconductors/diodes_29.php	learn, test	12th week
12.	BJT characteristics simulation	https://learnabout-electronics.org/Semiconductors/bjt_01.php to https://learnabout-electronics.org/Semiconductors/bjt_04.php	learn, test	13th week
13.	basic BJT circuits, simulation	https://learnabout-electronics.org/Semiconductors/bjt_05.php to https://learnabout-electronics.org/Semiconductors/bjt_07.php	learn, test	14th week
14.	Second midterm test			
15.	Retake of midterm tests			

13. 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 resulting in mid-term grade *(PTE TVSz 40§(3))*

Mid-term assessments, performance evaluation and their ratio in the final grade *(The samples in the table to be deleted.)*

Type	Assessment	Ratio in the final grade
Lecture midterm test 1	*max 30 points*	*25 %*
Lecture midterm test 2	*max 30 points*	*25 %*
Laboratory midterm test 1	*max 30 points*	*25 %*
Laboratory midterm test 2	*max 30 points*	*25 %*

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved 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.

Opportunity for retakes: 8th week (first tests), 15th week (second tests)

Grade calculation as a percentage

based on the aggregate performance according to the following table

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.

14. SPECIFIED LITERATURE

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

COMPULSORY READING AND AVAILABILITY

1. Learnabout Electronics, https://learnabout-electronics.org

RECOMMENDED LITERATURE AND AVAILABILITY

2. Tony R. Kuphaldt: Lessons In Electric Circuits, Volume II – AC, 2007
3. Tony R. Kuphaldt: Lessons In Electric Circuits, Volume III – Semiconductors, 2009
4. U. Tiecze, Ch. Schenk: Analogue and digital electronic circuits, Springer, 2008, ISBN: 3540004297
5. Horowitz, Hill W: The Art of Electronics, Cambridge University Press, 1989, ISBN: 0521370957
6. Ian R. Sinclair, John Dunton: Practical Electronics Handbook, Elsevier, 2007
7. Ron Mancini (Ed): Op Amps for Everyone, Texas Instruments, 2002
8. B Carter, TR Brown: Handbook of Operational Amplifier Applications, TI, 2001