COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2025/26 SEMESTER 2

Course title	*Electrical Engineering 2*
Course Code	*IVB469ANVM*
Hours/Week: le/pr/lab	*2/3/0*
Credits	*5*
Degree Programme	*Electrical Engineering (BsC)*
Study Mode	
Requirements	*signature with exam grade*
Teaching Period	*2*
Prerequisites	*Electrical Engineering 1*
Department(s) Course Director	*Dept. of Electrical Networks*
Teaching Staff	***Dr. Istvan GYURCSEK***

COURSE DESCRIPTION

Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

Electric circuit theory and electromagnetic theory are the fundamental principles upon, which many branches of engineering are built. Therefore, the basic electric circuit theory is not only the one of the most important courses for students learning information technology, electrical engineering but always an excellent starting point for the beginnings in all kind of engineering education.

Circuit theory is also valuable for students specializing in other branches of the physical sciences because circuits are good model for the study of energy systems in general, and because the applied mathematics, physics, and topology involved.

In different branches of engineering, we are often interested in communicating or transferring energy from one point to another. To do this an interconnection of electrical devices is required. The interconnection is referred as an electric circuit and each component of the circuit is known as an element.

This course is the short collection of the fundamental principles is given helping to understand the basics of practical electricity i.e. the basics of electric circuits.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

This subject covers the fundamental principles of the electricity that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course. The aim of the subject either is to convey fundamental knowledge on the advanced AC circuit analysis examining three-phase circuits, frequency responses and resonance behaviors, followed by first- and second order dynamic circuits. The aim of

the subject is also to convey knowledge on methods of the general circuit analysis applying integral transform methods like Laplace transform and Fourier transform.

2. COURSE CONTENT

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

	TOPICS
LECTURE	The semester is divided into the following principle periods and attendant exercises. The rough outline of the schedule is summarized as below: **ADVANCED AC CIRCUITS** Sinusoidal steady-state analysis (nodal analysis, mesh analysis, superposition theorem, source transformation, Thevenin and Norton equivalent circuits, op amp AC circuits) Magnetically coupled circuits (mutual inductance, energy in a coupled circuit, linear transformers, ideal transformers, three-phase transformers, applications) (examples) Frequency response (transfer function, decibel scale, Bode plots) (examples) Resonance circuits (series and parallel resonances, passive and active filters, applications) (examples) Multi-wave signals and circuits (trigonometric and exponential Fourier series, symmetry considerations, frequency spectra, circuit applications, average power and RMS values) (examples) **TWO-PORT CIRCUIT ANALYSIS** Two-port networks (impedance and admittance parameters, hybrid parameters, transmission parameters, relationships between parameters, interconnection of networks, symmetric two-ports, applications) (examples) **DYNAMIC CIRCUITS** First-order circuits (source-free RC and RL circuits, singularity functions, step response of RC and RL circuits, applications) (examples) Second-order circuits (finding initial and final values, source-free series and parallel RLC circuits, step response of a series and parallel RLC circuits, general second-order circuits, electrical duality, applications) (examples) **INTEGRAL TRANSFORMS IN CIRCUIT ANALYSIS** The Laplace transform (definitions, properties, inverse Laplace transform, , application to integrodifferential equations, convolution integral, circuit element models, circuit analysis, transfer functions in s-domain) (examples) The Fourier transform (definitions, properties, circuit applications, Parseval's theorem, comparing the Fourier and Laplace transforms, applications) (examples)
PRACTICE	Seminars are scheduled in accordance with the lectures.

DETAILED SYLLABUS AND COURSE SCHEDULE

LECTURE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Resonance circuits	[4] 5.20L-RES.pdf [3] Chapter 14	active paricipation	before next lecture
2.	Magnetically coupled circuits	[4] 5.30L-TRF.pdf [3] Chapter 13	active paricipation	before next lecture
3.	Frequency response	[4] 5.40L-FRQ.pdf [3] Chapter14	active paricipation	before next lecture
4.	Mid-term test		written test	
5.	Two-port networks	[4] 5.60L-TWO.pdf [3] Chapter 19	active paricipation	before next lecture
6.	First-order circuits	[4] 6.10L-FOC.pdf [3] Chapter 7	active paricipation	before next lecture
7.	Second-order circuits	[4] 6.30L-SOC.pdf [3] Chapter 8	active paricipation	before next lecture
8.	Mid-term test		written test	
9.	Academic Holiday			
10.	Fourier series	[4] 5.50L-FRS.pdf [3] Chapter 17	active paricipation	before next lecture
11.	Laplace transform	[4] 7.10L-LPT.pdf [3] Chapter 15-16	active paricipation	before next lecture
12.	Fourier transform	[4] 7.30L-FRT.pdf [3] Chapter 18	active paricipation	before next lecture
13.	Mid-term test		written test	
14.	Mid-term retake		retake test	

PRACTICE, LABORATORY PRACTICE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Resonance circuits	[4] 5.20X-RES.pdf	active paricipation	before next lecture
2.	Magnetically coupled circuits	[4] 5.30X-TRF.pdf	active paricipation	before next lecture
3.	Frequency response	[4] 5.40X-FRQ.pdf	active paricipation	before next lecture
4.	Mid-term test		written test	
5.	Two-port networks	[4] 5.60X-TWO.pdf	active paricipation	before next lecture
6.	First-order circuits	[4] 6.10X-FOC.pdf	active paricipation	before next lecture
7.	Second-order circuits	[4] 6.30X-SOC.pdf	active paricipation	before next lecture

8.	Mid-term test		written test	
9.	Academic holidays			
10.	Fourier series	[4] 5.50X-FRS.pdf	active paricipation	before next lecture
11.	Laplace transform	[4] 7.10X-LPT.pdf	active paricipation	before next lecture
12.	Fourier transform	[4] 7.30X-FRT.pdf	active paricipation	before next lecture
13.	Mid-term test		written test	
14.	Mid-term retake		retake test	

3. ASSESSMENT AND EVALUATION

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

ATTENDANCE

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

Attending is required all classes, in accordance with the rules of the education and will impact the grade. Unexcused absences will adversely affect the grade and in case of absence from more than 30% of the total number of lessons will be grounds for failing the class. To be in the class at the beginning time and stay until the scheduled end of the lesson is required. Tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency the student must present a valid excuse, such as a doctor's note.

ASSESSMENT

Course-unit with final examination

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

Type	Assessment	*Weighting as a proportion of the pre-requisite for taking the exam*
1. Mid-term test 1	*100 points*	*30 %*
2. Mid-term test 1	*100 points*	*30 %*
3. Mid-term test 3	*100 pints*	*30 %*
4. Active participation in lectures and seminars	*100 points*	*10 %*

Requirements for the end-of-semester signature

Mid-term assessment of 40 %

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

The specific regulations for grade betterment and re-take is read and applied according to the general Code of Studies and Examinations. Tests and the records can be repeated/improved during the semester.

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

The exam is successful if the result is minimum 40 %.

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

The mid-term performance accounts for *10* %, the performance at the exam accounts for *90* % 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 Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[1] Dr. Gyurcsek – Dr. Elmer: Theories in Electric Circuits, GlobeEdit, 2016, ISBN:978-3-330-71341-3
[2] Dr. Gyurcsek: Electrical Circuits – Exercises, FEIT, University of Pécs, 2019, ISBN:978-963-429-385-9
[3] Ch. Alexander, M. Sadiku: Fundamentals of Electric Circuits, 6th Ed., McGraw Hill NY 2016, ISBN: 978-0078028229
[4] Neptun ‘Community Space’; uploaded materials

RECOMMENDED LITERATURE AND AVAILABILITY

[5] Materials, shared in Microsoft Temas group.