



**T-306-RAS1**

**GREINING RÁSA**

**6 ECTS**

<b>Year of study:</b>	Second year.
<b>Semester:</b>	Fall.
<b>Level of course:</b>	2. First cycle, intermediate.
<b>Type of course:</b>	Skyldunámskeið HÁV, HEV, RAV, OV, VV.
<b>Mandatory prerequisites:</b>	Stærðfræði I (T-101-STA1), Eðlisfræði I (T-102-EDL1), Eðlisfræði II (T-202-EDL2).
<b>Schedule:</b>	Runs for 12 weeks – 4 lectures + 2 hours of problem solving sessions per week, possibly also lab sessions.
<b>Supervising teacher:</b>	Mohamed F Abdel-Fattah.
<b>Lecturer:</b>	Mohamed F Abdel-Fattah.

**Learning outcome:**

- After successful completion of the course, the students should understand the basic laws of circuit theory, including the Ohm's and Kirchhoff's laws.
- The students should be able to analyze different types of electric circuits using suitable circuit analysis methods (node voltage and mesh current methods), and apply suitable circuits theorems, superposition, source transformation, Thevenin's and Norton's theorems.
- The students should be familiar with the operational amplifiers (Op-Amp) and its basic circuits, and should understand the energy conservation in inductive and capacitive elements.
- The students should understand the concepts of phasors and impedances for AC sinusoidal analysis, and be able to apply the concepts of phasors and impedances with suitable circuit methods and theorems for AC sinusoidal circuit analysis.
- The students should be able to conduct time-domain analysis of simple RC, RL, and RLC networks.
- The students should be able to analyze, design and evaluate simple electric circuits. They should gain adequate experimental experience, for building simple circuits, and skills of using computer programming and simulation, e.g. by using NI Multisim, to analyze and design simple circuits.

**Content:**

- Basic concepts of charge, current, power and energy.
- Circuit elements, including different types of sources.
- Basic laws, including Ohm's and Kirchhoff's laws.
- Series and parallel connections, and Delta and Wye transformations.
- Circuit analysis methods; node voltage and mesh current methods.
- Circuit theorems; superposition, source transformation, Thevenin's/Norton's theorems and maximum power transfer.
- Operational amplifiers (Op-Amp) and its basic circuits.
- Inductors and capacitors and series and parallel combinations.
- First order RL and RC circuits, and the natural, forced and steady-state responses.
- Second order series and parallel RLC circuits.
- Concepts of phasors and impedances for AC sinusoidal analysis
- Circuits methods and theorems for AC sinusoidal steady-state and AC power analysis

**Birt með fyrirvara um breytingar.**

Uppfærðar upplýsingar um námsmat og kennsluáðferðir eru birtar í kennslukerfinu Canvas í upphafi hvorrar annar.



**Reading material:** Textbook: *Introduction to Electric Circuits*, J.A. Svoboda and R.C. Dorf, Wiley, 9th edition (Chapters 1 through 11). Laboratory manuals. Assignment manuals.

**Teaching and learning activities:** Lectures for the presentation of the fundamentals and theory. Exercises (problem solving). Computer simulations exercises, e.g. by using NI Multisim. Group assignments. Individual homework assignments.

**Assessment methods:** Quizzes (short tests). Midterm exam. Assignments; homework problems and lab exercises. Final exam; in order to pass this course, you need 50% or higher on the Final-Exam grade and 50% or higher on the total grade, of the final exam.

**Language of instruction:** English.

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Uppfært 15. maí 2020