

Electronics I

Code: MK3ELT1R06RX17-EN

ECTS Credit Points: 6

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Electromagnetism

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+4

Topics:

Introduction to electronics: features of electronic circuits, solid state devices. Transistors, unipolar and bipolar transistors. Operation, characteristics, and basic circuits. Amplifiers: 4 port theory, transfer functions, feedback: positive and negative. Semiconductors, diode, special diode. Common emitter amplifier. Differential amplifier: operational modes, circuit. Class A and AB amplifiers. Power amplifiers. Operational amplifiers: inverting and non-inverting type. Filters: Low and high pass filter, band pass filter.

Literature:

Compulsory:

- Electronic Circuits: Handbook for Design and Application, U. Tietze, Ch. Schenk, 2nd edition, 2008, ISBN-10: 3540004297

Schedule

1st week Registration week

2nd week:

Lecture: Pure and doped semiconductor characteristics, PN junction behavior at forward and reverse bias conditions.

Practice: Safety regulations, laboratory order, the use of measuring instruments.

4th week:

Lecture: Bipolar transistor structure, gain, transistor parameters and characteristics, the FE connection, adjusting the set point.

Practice: DC specific analysis of common emitter basic circuit. Report writing.

6th week:

Lecture: Principles of operation of field-effect transistors.

Practice: Analysis of common source basic circuit. Report writing.

8th week: 1st drawing week

3rd week:

Lecture: Characteristics and applications of semiconductor diodes, the rectifier circuit operation, the one-way, two-way rectifier circuits operation.

Practice: Silicon diode opening and closing characteristics measurements. Analysis of rectifier circuits. Report writing.

5th week:

Lecture: Areas of application of bipolar transistor, circuits transistor basic (CB, CC circuits),

Practice: AC specific analysis of common emitter basic circuit. Report writing.

7th week:

Lecture: Principles of operation of transistor amplifiers. (A, AB class, differential amp.)

Practice: Analysis of differential power amplifier basic circuit. Report writing.

9th week:

Lecture: Feedbacks concept, types and implementation. Operational Amplifier model structure (differential amplifier, level transmitting amplifiers) and features.

Practice: Analysis of phase inverting operational amplifier basic circuit. Report writing.

11th week:

Lecture: Operation and characteristics of basic operational amplifier circuits (summing, differential, differentiator and integrator basic circuit)

Practice: Analysis of integrator operational amplifier basic circuit. Report writing.

13th week:

Lecture: Bode and Nyquist diagram

Practice: Analysis of differential operational amplifier basic circuit. Report writing.

10th week:

Lecture: Operation and characteristics of basic operational amplifier circuits (inverting, non-inverting, follower basic circuit)

Practice: Analysis of summing operational amplifier basic circuit. Report writing.

12th week:

Lecture: Using of the operation amplifier

Practice: Analysis of differentiator operational amplifier basic circuit. Report writing.

14th week:

Lecture: Filters: Low and high pass filter, band pass filter.

Practice: Analysis of filters basic circuit. Report writing.

15th week: 2nd drawing week**Requirements****A, for a signature:**

Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Missed practice classes must be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as absence because of the lack of active participation in class. During the semester there are one test. Students have to sit for these tests.

Preparing measurement reports until deadline.

B, for a grade:

At the end of the course an exam must be taken. The minimum requirement for end-term test is 41%. Score Grade 0-40 fail (1) 41-55 pass (2) 56-70 satisfactory (3) 71-85 good (4) 86-100 excellent (5)