



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronic measuring systems [S2Eltech1E-ISP>EUP]

Course

Field of study

Electrical Engineering

Year/Semester

1/1

Area of study (specialization)

Smart Measurement Systems

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

dr hab. inż. Grzegorz Wiczyński prof. PP
grzegorz.wiczynski@put.poznan.pl

Lecturers

Prerequisites

Basic knowledge of mathematical analysis, basics of electrical engineering and metrology. Using the laws of electrical engineering to analyze AC and DC circuits. He is aware of the need to expand his competences and is ready to cooperate as part of a team.

Course objective

Acquiring knowledge by a student about advanced electronic measuring systems used in industry and medicine. Familiarization with simulation and design techniques with the use of appropriate tools and software. Expanding the knowledge of testing and checking procedures for electronic circuits.

Course-related learning outcomes

Knowledge:

1. Student knows the basic circuit solutions of electronic measurement systems.
2. Student has knowledge of modern development trends of electronic circuits and their limitations.
3. Student knows the principle of operation of basic electronic components their properties in the context of measurement and control solutions.
4. Student has knowledge of electronic circuit design in industrial and biomedical applications.

5. Student has the knowledge of how to properly test and check the properties and parameters of built electronic circuits.

Skills:

1. Student is able to verify the design of the operation of electronic circuits through the use of specialized simulation and design tools.
2. Student is able to design the process of testing and experimentally carry out basic measurements of electronic circuits using appropriate techniques and tools.
3. Student is able to work individually and in a group, realizing the set objectives to be achieved in a given time.

Social competences:

1. Student understands the need for continuous training and improvement of his professional competence due to the development of the field of electronic measurement systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: assessment of knowledge and skills demonstrated on a written test of a test and calculus nature (the written test sheet contains the information necessary to perform calculus tasks). Threshold for passing the test 50%.

Laboratory: Input tests and bonus knowledge necessary to complete the set problems in the laboratory task area. Evaluation of skills related to the implementation of the measurement task. Evaluation of reports on the performed exercises. Evaluation of the knowledge demonstrated on the written test in the content area of laboratory classes (test questions and calculation tasks).

Programme content

The subject focuses on electronic circuits which play a significant role in electrical and electronic measurement technology and metrology. Practical aspects of the design, verification by simulation, assembly and testing of selected electronic circuits are presented.

Course topics

Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports.

Lecture:

L1/2: Basic circuits with operational amplifiers used in measurements .

L3: I/I, U/U, U/I, I/U converters.

L4: Advanced active and switched capacitance filter circuits.

L5: Noise and interference in electronic systems.

L6: Biomedical signals - acquisition, conditioning and processing systems.

L7: Electronic measurement systems in industrial metrology systems .

Laboratory:

Laboratory classes are implemented in seven 90-minute meetings, in 4 subgroups. The topics of the laboratory classes are divided into three parts.

a) Topics of the first part are: getting acquainted with the measuring instruments and techniques used during the laboratory classes.

b) In the second part, a previously designed electronic measurement system is performed

c) The topics of the third part are: checking and testing the previously made circuits.

Teaching methods

Lectures are performed using multimedia presentations illustrated with simulation examples and necessary mathematical calculations on the blackboard.

Laboratory exercises are carried out in laboratory groups. During the course of the classes, the connection of the measuring system is performed, the indicated measurements are carried out, the results of the measurements are processed and a report is prepared. In addition, individual design and assembly of uncomplicated printed circuit boards is performed.

The educational methods used are student-oriented and motivate students to actively participate in the learning process through discussions and papers.

Bibliography

Basic:

1. A. Filipkowski, Układy elektroniczne analogowe i cyfrowe , WNT 1993
2. Z. Kulka , M. Nadachowski, Wzmacniacze operacyjne i ich zastosowania cz. 1 i 2 WNT 1983
3. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2007
4. J. Zakrzewski, Czujniki i przetworniki pomiarowe, Wyd. Politechniki Śląskiej, Gliwice 2004
5. J. Rydzewski, Pomiary oscyloskopowe, WNT, Warszawa, 2007.
6. K. Booth, Optoelektronika, WKiŁ, Warszawa, 2001.

Additional:

7. J. Jakubiec, J. Roj, Pomiarowe przetwarzanie próbkujące, wyd. Politechniki Śląskiej, Gliwice 2000
8. Denton J. Dailey, Electronic Devices and Circuits, copyright 2001 by Prentice-Hall, Inc., Upper Sadle River, New Jersey 07548, USA. Warszawa 2002.
9. Bibliografia wyszukana przez studenta ze źródeł drukowanych i elektronicznych
10. S. Tumański, Technika pomiarowa, WNT 2007.
11. W. Kester, Przetworniki A/C i C/A: teoria i praktyka, BTC, 2012.
12. W.E. Ciężyński, Rzeczywiste wzmacniacze operacyjne w zastosowaniach, Wyd. PŚ, Gliwice, 2012.
13. B. Carter, R. Mancini, Wzmacniacze operacyjne: teoria i praktyka, BTC, 2011.
14. Ch. Kitchin, L. Counts, Wzmacniacze operacyjne i pomiarowe: przewodnik projektanta, BTC, 2009.
15. Z. Nawrocki, Wzmacniacze operacyjne i przetworniki pomiarowe, Wyd. PWr, Wrocław, 2008.
16. R.A. Pease, Projektowanie układów analogowych: poradnik praktyczny, BTC, Warszawa, 2005.
17. L. Hasse, Zakłócenia w aparaturze elektronicznej, Radioelektronik, Warszawa, 1995.
18. Aviation Electronics Technician - Basic, NAVEDTRA 14028, 2003.
19. www.electropedia.org 1. Tretter S.A., Communication System Design Using DSP Algorithms, Springer, Boston 2008.

Breakdown of average student's workload

	Hours	ECTS
Total workload	59	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	29	1,00