COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronic circuits in practice [S1Eltech2>PO8-UEwP]

Course

Field of study
Electrical Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Dariusz Prokop
dariusz.prokop@put.poznan.pl

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

Lecturers

Prerequisites

Basic knowledge of electrical engineering and electronics. Basic knowledge of electronic analog circuits. Ability to effectively self-study in the field related to the design and construction of electronic circuits. Awarness of the need to expand their competences and is ready to cooperate as part of a team.

Course objective

Presentation of the basics of designing, manufacturing, commissioning and testing of electronic circuits as well as the selection of passive and active electronic components.

Course-related learning outcomes

Knowledge:
1. Ordered knowledge in the field of construction and principles of operation of electronic, optoelectronic and simple analog components and devices.
2. Knowledge typical engineering technologies in the field of Electrical Engineering.

Skills:
Skills:
1. Ability to design a simple electrical circuit designed for various applications.
2. Ability to use literature sources available in printed and electronic versions.
3. Ability to properly use electrical equipment in accordance with general requirements and technical documentation.

Social competences:
1. Understanding the need and knows the possibilities of lifelong learning (second and third cycle and post-graduate studies).
2. Ability to think and act in an entrepreneurial manner in the field of electrical engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures
Evaluation of the knowledge with a written exam related to the content of lectures (test, computational and problem questions). Passing threshold of test equals 50%. The grade from laboratory as well as attendance and activities during the lectures are taken intoaccount.
Laboratory
Assessment of knowledge necessary to implement the problems posed in the area of laboratory tasks. Assessment of skills related to the design, implementation, diagnostics and testing of completed electronic systems. Evaluation of reports on exercises performed. Assessment of knowledge demonstrated on the written test in the scope of laboratory content (test questions and calculating tasks).

Programme content

Passive and active elements used in the construction of electronic circuits. Electronic circuits power supply. Galvanic separation. Data signals transmission. Mechanical components of electronic systems: housings, cooling, shielding. Diagnostics and testing of electronic systems.

Course topics

Lectures
Passive and active elements used in the construction of electronic circuits: basic parameters and selection. Electronic circuits power supply. Galvanic separation. Data transmission. Mechanical components of electronic systems: housings, cooling, shielding. Diagnostics and testing of electronic systems. Methods and techniques for making printed circuit boards, types of laminates and their parameters, the cycle of developing design documentation, IPC industry standards, EMC and RED standards in the design of electronic systems.
Laboratory
At the beginning, students are familiarised with the safety rules during laboratory classes. The laboratory consists of two parts:
a) Design and construction of a simple electronic circuit in KiCad. Selection of appropriate values for electronic components, drawing of correct schematic diagrams, printed circuit board design - component layout, selection of connection parameters, connection routing, use of circuit ground planes, preparation of technical and implementation documentation.
b) Assembly of the electronic circuit based on the prepared technical documentation. Diagnostics and testing of the completed circuit, preparation of documentation for the completed task and test measurement results.

Teaching methods

Lecture
Lectures are performed using multimedia presentations illustrated with simulation examples and necessary mathematical calculations on the blackboard. Theoretical questions are presented in the exact reference to the practice.
Laboratory
Group project development and INDIVIDUAL making simple electronic circuits. Assembly (soldering) of

components on printed circuit boards. Individual use of laboratory equipment during diagnostics and testing of manufactured electronic circuits. Acquiring measurement results for as-built documentation.

Bibliography

Basic:
1. J. Kowalczyk, W. Głocki, Podstawy elektroniki, Difin, 2015.
2. A. Chwaleba, G. Płoszajski, B. Moeschke, Elektronika, WSiP, Warszawa, 2014.
3. P. Horowitz, W. Hill Sztuka elektroniki. Cz. 1 i 2, WKiŁ. Warszawa, 2013.
4. B. Carter, R. Mancini, Wzmacniacze operacyjne: teoria i praktyka, BTC, 2011.
5. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa, 2009.
6. J. Watson, Elektronika, WKiŁ, Warszawa, 2006.
7. L. Hasse, Zakłócenia w aparaturze elektronicznej, Radioelektronik, Warszawa,1995.
8. W. Marciniak, Modele elementów półprzewodnikowych, WNT, Warszawa, 1985.
9. B. Miedziński, V.N. Shoffa, B.Ślusarek, Kontaktrony i ich właściwości użytkowe, Wyd. PWr, Wrocław, 2012.

Additional:
10. W. Kester, Przetworniki A/C i C/A: teoria i praktyka, BTC, 2012.
11. W.E. Ciążyński, Rzeczywiste wzmacniacze operacyjne w zastosowaniach, Wyd. PŚ, Gliwice, 2012.
12. K. Górecki, Półprzewodnikowe źródła światła, Wyd. Akademii Morskiej, Gdynia, 2010.
13. W.E. Ciążyński, Idealne wzmacniacze operacyjne w zastosowaniach nieliniowych, Wyd. PŚ, Gliwice, 2010.
14. W.E. Ciążyński, Idealne wzmacniacze operacyjne w zastosowaniach liniowych, Wyd. PŚ, Gliwice, 2010.
15. Ch. Kitchin, L. Counts, Wzmacniacze operacyjne i pomiarowe: przewodnik projektanta, BTC, 2009.
16. P. Ruszel, Kompatybilność elektromagnetyczna elektronicznych urządzeń pomiarowych, Wyd. PWr, Wrocław, 2008.
17. Z. Nawrocki, Wzmacniacze operacyjne i przetworniki pomiarowe, Wyd. PWr, Wrocław, 2008.
18. R.A. Pease, Projektowanie układów analogowych: poradnik praktyczny, BTC, Warszawa, 2005.
19. P. Górecki, Wzmacniacze operacyjne: podstawy, aplikacje, zastosowania, BTC, 2004.
20. T.W. Więckowski, Badania kompatybilności elektromagnetycznej urządzeń elektrycznych i elektronicznych, Wyd. PWr, Wrocław, 2001.
21. Z. Zachara, K. Wojtuszkiewicz, PSpice: symulacje wzmacniaczy dyskretnych, MIKOM, Warszawa, 2001.
22. R. Schaumann, Van Valkenburg, E. Mac, Design of analog filters, Oxford University Press, 2001.
23. K. Booth, Optoelektronika, WKiŁ, Warszawa, 2001.
24. A. Król, J. Moczko, PSpice. Symulacja i optymalizacja układów elektronicznych, Nakom, Poznań, 1998.
25. J. Godlewski, Generacja i detekcja promieniowania optycznego, PWN, Warszawa, 1997.
26. C.H. Gooch, Przyrządy elektroluminescencyjne ze złączem p-n, WNT, Warszawa, 1997.
27. B. Schmidt, E. Kuźma, Termistory, WNT, Warszawa, 1972.
28. www.electropedia.org

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00