COURSE DESCRIPTION CARD - SYLLABUS

Course name
CAD systems and electromagnetic compatibility [S1Eltech1P>D-CADiKE]

Course

Field of study
Electrical Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
practical

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

Fundamentals of electrical engineering, electromagnetism, computer science, physics and mathematics. Calculation of electrical circuits and electromagnetic fields distributions. Ability to work in a team and to improving their own competence. Basic knowledge of the principles of preparing project documentation, general knowledge of engineering software.

Course objective

Mastering the knowledge of the basic problems of electromagnetic compatibility (EMC), with particular emphasis on the specifics of compatibility in vehicles. Acquiring the skills to prepare project documentation using engineering software.

Course-related learning outcomes

Knowledge:
1. Has knowledge in the field of electrical circuits and their mutual interactions and electromagnetic

field interactions on the environment (technosphere).
2. Knows that interacting electromagnetic disturbances affect the quality and reliability of electrical components and devices, and knows methods to reduce these negative interactions.
3. Knows types and applications of engineering software.

Skills:
1. Can read and understand catalog cards, standards and technical documentation as well as manuals for electrical equipment.
2. Is able to predict the possibility of irregularities in the operation of electrical devices due to the electromagnetic interactions of the surrounding technosphere, interpret these conditions, perform measurements of the functioning parameters of these objects, draw the appropriate conclusions and apply measures to limit the appearance of adverse effects.
3. Is able to prepare project documentation of the device / electrical installation using engineering software, e.g. AutoCAD.

Social competences:
1. Is able to think creatively and act in the area of electromagnetic compatibility. Is aware of the importance of taking into account the electromagnetic compatibility of electrical devices in shaping the proper management of energy and raw materials in the processes of operating electrical equipment, as well as promoting and implementing pro-ecological activities. It is capable of intelligently transmitting the objectives of electromagnetic compatibility to the public.
2. Is aware of the need to improve their qualifications and the need to use modern tools to support the work of an engineer.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: assessment of knowledge and skills demonstrated in the written exam of a problem nature.
Laboratory classes: current assessment of acquired skills based on tasks performed with varying degrees of difficulty.
Projects: ongoing assessment of project progress, evaluation of the completed project, with particular emphasis on maintaining the form and transparency of completed documentation.

Programme content

Electromagnetic compatibility (EMC) issues and elements of electromagnetism and signal analysis. Types and use of engineering software.

Course topics

Introduction and issues of electromagnetic compatibility (EMC). Basic issues of electromagnetism and signal analysis. Mechanisms of the spread of disturbances (coupling) and their impact on devices and systems. Impact of the electromagnetic field on the technical and biological environment. Impact of disturbances in electrical and electronic circuits - measures and devices related to electromagnetic compatibility tests and limiting the impact of disturbances on technical objects, with particular emphasis on the specificity of EMC in vehicles. Types of engineering software and their applications. Basic and advanced program support from the AutoCAD package. Rules and practical performance of drawing documentation using engineering
software.

Teaching methods

Lecture: multimedia presentation (including: drawings, photographs, animations, sound, films) supplemented with examples given on the board; presenting a new topic preceded by a reminder of related content, known to students from other subjects; taking into account various aspects of the presented issues, including: economic, ecological, legal, social, etc.
Laboratory classes: presentation of the software package functionality, drawing tasks.
Project: discussion of the principles of preparing electrical installation project documentation, principles of selection of installation elements, design tasks.
Design classes take place on the premises of an industrial plant.

Bibliography

Basic
1. Charoy A., Zakłócenia w urządzeniach elektronicznych. Zasady i porady instalacyjne, cz. 1-4, z serii: Kompatybilność elektromagnetyczna, WNT, Warszawa 1999-2000.
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8. Lejdy B.: Instalacje elektryczne w obiektach budowlanych, WNT, Warszawa 2003.
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Additional
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2. Kaiser K. L.: Electromagnetic compatibility handbook, CRC Press, Boca Raton 2005.
3. Perez R.: Handbook of electromagnetic compatibility, Academic Press, New York 1995.
4. Tesche F. M., Ianoz M. V., Karlson T.: EMC analysis methods and computational models, Wiley, New York 1997.
5. Bednarek K, Zagadnienia kompatybilności elektromagnetycznej w motoryzacji, Zeszyty Naukowe, Elektryka nr 100, Politechnika Łódzka, Łódź, październik 2003, s. 183-192.
6. Bednarek K., Wilk Ł., Stan normatywno-prawny i badania w zakresie kompatybilności elektromagnetycznej samochodowych układów elektrycznych, Konferencja Naukowo-Techniczna Zastosowania Komputerów w Elektrotechnice, Poznań, kwiecień 2007, s. 231-232.
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10. Bednarek K., Kasprzyk L., Kształtowanie jakości energii i niezawodności w systemach zasilania elektrycznego, Przeglad Elektrotechniczny, 92 (2016), nr 12, 9-12.
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12. Krakowski M.: Elektrotechnika teoretyczna. Tom 2, PWN, Warszawa 1995.
13. Normy i rozporządzenia związane z instalacjami elektrycznymi.
14. Tematyczne strony internetowe, ogólnodostępne kursy online obsługi programu AutoCAD.
15. Katalogi producentów oprzewodowania i aparatów instalacyjnych.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	90	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00