Силабус освітнього компонента
Програма навчальної дисципліни

CAM/CAE systems

Шифр та назва спеціальності
133 - Industrial engineering

Інститут
NNI of Mechanical Engineering and Transport

Освітня програма
Applied mechanics

Кафедра
Mechanical engineering technology and metal cutting machines (146)

Рівень освіти
Bachelor

Тип дисципліни
Special (professional) training, selective

Семестр
8

Мова викладання
English

Викладачі, розробники

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Doctor of technical sciences, professor, professor of the department "Technology of mechanical engineering and metal-cutting lathes" KhPI. Work experience - 37 years. Author of more than 170 scientific and educational and methodological works. Leading lecturer in the disciplines: "Computer-integrated technologies in mechanical engineering", "CALS technologies in mechanical engineering", "CAM/CAE systems in mechanical engineering",

Детальніше про викладача на сайті кафедри

Загальна інформація

Анотація

The discipline is aimed at mastering the theoretical foundations and methods of solving the problems of the industrial revolution "Industry 4.0". As part of the course, students will gain an understanding of the basic definitions of process modeling in industrial mechanical engineering and their role in ensuring the sustainable development of the mechanical engineering industry. In the course of training, students will acquire the skills of design features and calculations of modern CAD/CEM/CAE/CAPP..ERP systems..

Мета та цілі дисципліни

To develop in the student a complex interdisciplinary view on solving the problems of the industrial revolution "Industry 4.0". To form in the student knowledge of modern CAD/CAM/CAE..ERP platforms. The student must be able to work in CAD/CAM/CAE in the SolidWorks system.

Формат занять

Lectures, laboratory works, independent work, consultations, conversations, discussions, stories, shows, demonstrations, independent work, generalization and classification of the received information, etc. Final control - exam.

Компетентності

ZK1. The ability to think abstractly.
ZK2. Ability to apply knowledge in practical situations.
ZK4. Ability to search, process and analyze information from various sources.
ZK5. Ability to generate new ideas (creativity).
ZK6. The ability to conduct research at a certain level.
ZK8. The ability to act socially responsibly and consciously.
ZK10. Skills in using information and communication technologies.
ZK11. Ability to work in a team.
ZK12. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.
FK1. Ability to apply typical analytical methods and computer software tools for solving engineering problems of industrial mechanical engineering, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate computer software for solving engineering problems of industrial mechanical engineering.
FC2. The ability to apply fundamental scientific facts, concepts, theories, principles to solve professional problems and practical problems of industrial mechanical engineering.
Program competencies according to the educational program.
FK4. The ability to implement engineering developments in industrial mechanical engineering, taking into account technical, organizational, legal, economic and environmental aspects throughout the life cycle of the machine: from design, construction, operation, maintenance, diagnostics and disposal.
FC5. Ability to use computerized design systems and specialized application software to solve engineering tasks in the field of mechanical engineering.
FC6. The ability to evaluate the technical and economic efficiency of typical systems and their components based on the application of analytical methods, analysis of analogues and the use of available data.
FC7. The ability to make effective decisions regarding the selection of construction materials, equipment, processes and to combine theory and practice to solve an engineering task.
FC8. The ability to realize creative and innovative potential in project development in the field of mechanical engineering.

Результати навчання

PH4. Carry out engineering calculations to solve complex problems and practical problems in industrial mechanical engineering.
PH5. Analyze engineering objects, processes and methods.
PH7. Prepare production and operate products using automatic life cycle support systems.
PH9. Choose and apply the necessary equipment, tools and methods.
PH10. To understand the problems of labor protection and legal aspects of engineering activity in industrial mechanical engineering, the skills of forecasting the social and environmental consequences of the implementation of technical tasks.

Обсяг дисципліни

Загальний обсяг дисципліни 120 год. (4 кредитів ECTS): лекції – 40 год., лабораторні заняття – 20 год., самостійна робота – 80 год. РГ

Передумови вивчення дисципліни (пререквізити)

To successfully pass the course, you must have knowledge and practical skills in the following disciplines: "Ecology", "Draft geometry, engineering and computer graphics", "Basics of CAD", "Technological basics

of mechanical engineering", "Basics of occupational safety and human health" ", " Enterprise economics ", " Interchangeability, standardization and technical measurements ", " Computer technologies in mechanical engineering ", " Automated metal cutting equipment and robotic systems in mechanical engineering ", " Technology of automated mechanical engineering production.

Особливості дисципліни, методи та технології навчання

Teaching methods:
- the educational project, which conceptually consists of "learning through activity" is used mainly in practical work (rarely in lectures). Application of the method involves providing students with a wide enough set of projects to realize the possibility of a real choice. It should be noted that projects can be both individual and collective. The latter, among other things, contribute to the student's mastering of collective work methods. In order to master the project method of work, the student is provided with instructions on working on the project (methodological instructions). Each educational project involves obtaining a final result using improvised material on the topic of work, the results of which become a reference for obtaining a final assessment. Collective discussion of difficult moments in solving the given task forms the terrain of collective work and is a positive experience for both the student and the teacher.
- The project method is mainly focused on mastering the methods of working with DHW. An obligatory component of the learning process is control, or verification of learning results. The essence of checking the learning results is to identify the level of knowledge acquisition by students, which must meet the educational standard of the academic discipline.
- Explanatory and illustrative method, which involves the use of visual lecture material in the form of tables, posters, presentations made in the MS Power Point environment.
- Reproductive method used in performing practical work and solving typical tasks.
- The method of stimulating and motivating learning is applicable when encouraging students to independently study the materials of the discipline (the possibility of receiving motivational additional points for active work in classes, when preparing reports or completing a calculation task in advance).
- Methods of control and self-control, which involve checking current knowledge with instant surveys or short-term tests at the beginning of the lesson, as well as planned modular controls.

Mastering the discipline involves constant contact between the teacher and the student through a conversation, lecture, story, shows, demonstrations, self-study, independent work, generalization and classification of the information received, etc..

Програма навчальної дисципліни

Теми лекційних занять

Topic 1. CAD/CAM/CAE/CAPP systems. Industry 4.0. Industry 5.0
Topic 2. The program SolidWorks and SIMCO EDIT
Topic 3. SolidWorks CAM program.
Topic 4. SolidWorks Simulation program
Topic 5. SolidWorks Flow Simulation program
Topic 6. SAM program SolidCAM for SolidWorks
Topic 7. ERP systems
Topic 8. Java technologies

Теми практичних занять

Теми лабораторних робіт

Topic 1. 3D modeling in SolidWorks
Topic 2. Creation of CNC programs in SolidWorks CAM and CIMCO Edit
Topic. 3. Modeling of load and vibration processes
Topic 4. Modeling of aero and hydrodynamic flow processes.
Topic 5. SAM modeling of Solid CAM
Topic .6 Fundamentals of programming in Java

Самостійна робота

The course involves the implementation of an individual calculation task for the development of a flexible production cell for the production of a typical machine-building part.
Students are offered a list of topics, in accordance with the object of study of the discipline, for the preparation of illustrated reports. The report (3-5 min.) involves the creation of prerequisites for intensifying the discussion (>5 min.) in the student body regarding the collective establishment of unity in the highlighted issue.

Література та навчальні матеріали

Основна література»

1. Java: The Complete Reference, Eleventh Edition 11th Edition
by Herbert Schildt (Author) 978-1260440232 McGraw Hill December 12, 2018 1882pp.
2. https://netbeans.apache.org/
3. https://i40-tools.github.io/I40KG/docs/index.html
4. http://nvlpubs.nist.gov/nistpubs/ir/2016/NIST.IR.8107.pdf
5. https://www.i40.de/en/
6. CAD CAM CAE Notes as per syllabus by Dr. BAMU Aurangabad.
https://www.academia.edu/29707306/CAD_CAM_CAE_Notes?auto=download
7. http://adempiere.org/site/
8. https://www.digicor-project.eu/

«Додаткова література»

1. https://www.solidworks.com/
2. https://www.cimco.com/download/public/
3. https://www.solidcam.com/en
4. https://www.sap.com/index.html
5. https://www.java.com/en/

Система оцінювання

Критерії оцінювання успішності студента та розподіл балів

. 100% of the final grade consists of assessment results in the form of an exam (40%) and current assessment (60%).
Current evaluation: 2 tests (12% and 10%) and an individual calculation task (10%), an active position when discussing issues at lectures and practical classes (5%), successful performance of practical work (10%), preparation of an individual illustrated report on given topic (3%).
Exam: written assignment (2 questions from theory + solution of a practical problem) and oral conversation

Шкала оцінювання

Сума балів	Національна оцінка	ECTS
90–100	Відмінно	A
82–89	Добре	B
75–81	Добре	C
64–74	Задовільно	D
60–63	Задовільно	E
35–59	Незадовільно (потрібне додаткове вивчення)	FX
1–34	Незадовільно (потрібне повторне вивчення)	F

Норми академічної етики і політика курсу

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website:http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Погодження

Силабус погоджено

Завідувач кафедри
Oleksandr PERMYAKOV

Гарант ОП
Iryna Tynianova