CENTER FOR INFORMATICS AND TECHNICAL SCIENCES

I AFFIRM:
DEAN:

CURRICULUM

EN417

COMPUTER DESIGN OF TECHNOLOGICAL SYSTEMS

Adopted: prot. No. 9/18.05.2007 Updated prot. No. 13 of11.03.2020
Lecturer: **Prof. Dr. Eng. Radostin Dolchinkov**

ANNOTATION

The discipline provides knowledge about the basic concepts, apparatus and some of the most popular methods of computer graphics, solutions for automation of design and engineering work. Terminology is introduced, the main areas of application of computer graphics systems, the main 2D and 3D transformations are covered. The training is carried out with the Solid Edge CAD system of SIEMENS PLM Software.

The discipline provides knowledge for modeling, assembling and validating projects, and generating production documentation.

Solid Edge is a computer aided design (CAD) system for creating mechanical assemblies, modeling parts, and producing drawings. Built on STREAM technology, Solid Edge is designed to increase software productivity with an interface that maximizes user productivity and return on investment.

Solid Edge STREAM captures the essence of CAD technology, providing engineers with a logical and consistent interface that closely matches actual production. STREAM technology makes Solid Edge easy to learn, easy to operate, and more productive than other mid-range systems in the CAD market.

STATUTE AND STRUCTURE

major	**status**	**Credits**	**full-time study**				part-time study			
			l	s	u	gene	l	s	u	gene
KEVEI	Mandatory	6	15	25	20	60	10	15	5	30
ESEO	Mandatory	6	15	25	20	60	10	15	5	30
PIM	Mandatory	6	15	25	20	60	10	15	5	30
SIIT	Mandatory	6	15	25	20	60	10	15	5	30
KST	Selectable	6	15	25	20	60	10	15	5	30
SI	Selectable	6	15	25	20	60	10	15	5	30
ICN	Selectable	6	15	25	20	60	10	15	5	30

MAIN OBJECTIVES

The main objective of the course is to master the basic concepts, the apparatus and the possibilities of creating drawing documentation with the mid-range CAD system Solid Edge. The structure of the Solid Edge system is examined and the main features are noted, the commands for working with the main two-dimensional graphic primitives are presented and how they are used, the means of the system for creating an accurate drawing and dimensioning and the ways of editing graphic information are explained. The system performs calculations of machine elements and assemblies using built-in rules and laws of theoretical mechanics, then automatically models the 3D assembly directly in the machine assembly module.

Three of the four parts of the system - Part, ==== and Draft - are considered separately.

With the help of the capabilities of the Solid Edge system, accelerated creation of assembled products is carried out by analyzing and saving specific design data.

The progressive sides of the latest ST4 and ST6 versions of the product are explored including the Hybrid 2D/3D module, featuring the new ability for AutoCAD users to create 3D details from 2D assembly drawings and the new unique ”Zero D” capability that defines the structure of the article before the geometry is created on paper.

About every 10 years, a revolutionary change in CAD technology enables you to drastically shorten the design cycle. Now, with synchronous technology, Solid Edge® software brings to market the next breakthrough in 3D CAD design since the days of parametric systems in the 1990s.

Solid Edge ST with Synchronous Technology is the most complete feature-based 2D/3D CAD system on the market today. It combines the speed and flexibility of direct modeling with the precise control of dimensional design to provide the fastest, most flexible design solution possible.

The aim of the course is to master basic skills in the field of engineering graphics and industrial design through the use of Siemens PLM Software technologies and software products

PREREQUISITES

Students should have listened to the courses or have initial knowledge of Windows 8 operating systems.

COURSE CONTENT

Topic 1. Subject and tasks of the course. Complex solution of the tasks in design and construction of products. Ways to create drawings and documentation.

Topic 2. Basic features of the Solid Edge CAD system.

Screen allocation. Basic two-dimensional graphics primitives and how they work.

Topic 3. Assembling.

Basic parametric 3D Solid modeling. Boolean operations

Topic 4. Creating an accurate drawing.

Setting precise coordinates - absolute, relative, Cartesian and polar. Relationships. Establishing a drawing format. Sizing.

Topic 5. Coordinate transformations in a plane.

Window, view. mirror image, scale, offset. Copy by template.

Topic 6. Views and Sections.

Topic 7. Formatting of documentation-hatching, text, specification.

Topic 8. Reproduction of engineering components. Move, copy, rotate.

Line breeding. Circular reproduction.

Topic 9. Constructing large assemblies with many components.

Kinematic simulation of mechanisms. Associative drawing and documentation.

Topic 10. 3D sketching.

Coordinate spaces. Coordinate systems.

SEMINAR EXERCISES

Topic 1. Basic features of the Solid Edge CAD system.

Screen allocation. Basic two-dimensional graphics primitives and how they work.

Topic 2. 3D sketching. Coordinate spaces. Coordinate systems. Coordinate transformations in a plane. Move, copy, rotate, mirror, scale, offset. Copy by template.

Topic 3. Creating 3D models - modeling using the revolved protrusion base property.

Topic 4. Creating 3D models - modeling using the basic protrusion property.

Topic 5. Creating 3D models - modeling using a sketch.

Topic 6. Modeling with sheet material

Topic 7. Creating an accurate drawing. Setting precise coordinates - absolute, relative, Cartesian and polar. Establishing a drawing format. Sizing.

Topic 8. Creation of technical documentation. Forming documentation-hatching, text, specification. Table of Materials.

Topic 9. Working with assemblies in Solid Edge. Direct and indirect details.

LABORATORY EXERCISES

Topic 1. Modeling 3D models from a drawing.

Topic 2. Modeling of 3D models from nature.

Topic 3. Knowledge check on modeling a part using Extrude and Revolve.

Topic 4. Modeling with sheet material – Sheet metal, on a detail from a drawing.

Topic 5. Knowledge check on modeling a detail with sheet material.

Topic 6. Creating an accurate drawing of a part of nature. Dimensioning.

COURSE ASSIGNMENT

Each student receives a coursework consisting of three course assignments, which are developed during the semester. The defense takes place at the end of the semester.

PLANNED LEARNING ACTIVITIES AND TEACHING METHODS

The educational content of the discipline is oriented to the mixed type of learning, which is characterized by the integration of various information and communication technologies and traditional and interactive teaching methods.

In order to provoke the thinking of the students, as well as to motivate their participation in the course of the work during the lectures, the so-called interactive lecture. It makes it possible to "break" the content on a given topic into segments - a segment of a lecture combined with a segment where students work in groups or independently on a certain part of the content, participate in discussions, present materials on tasks set by the teacher.

The course has also been developed in electronic form. It is uploaded to the MOODLE educational platform and provides students with access to the learning materials - theoretical and practical - at any time and place.

In the platform, the training course is presented through resources in the form of theoretical materials, through various activities for students - assignments, discussion forums.

EVALUATION METHODS

Each student during the semester is assessed with a running grade. It is obtained as a result of the conducted three control works and a developed and defended course work.

The final grade is formed as a result of the semester exam, the current grade and test tasks solved in the exam.

To form the assessment, the student collects points, the maximum value of which is 100. The distribution of points by evaluated activities is as follows:

1. Auditor employment..... .... 34 points

1.1. Current control of lectures, control tests - 14 points

1.2. Current control of seminar, laboratory exercises - 20 points

(visits, control works, participation in exercises, independent works, etc.)

2. Outside classroom employment .... 12 points

2.1. Course assignments, term papers, projects, protocols, etc. - 12 points

3. Examination procedure..... .... 54 points

The overall grade is determined by the sum of the points during the semester and by the examination procedure:

36-50t. - Middle 3); 51-65 items – Good (4); 66-80 t.–Pl. Good(5); Over 81 points – Excellent (6).

The student must have a minimum of 14 points from the control during the semester and a minimum of 22 points from the examination procedure in order to form a comprehensive assessment.

RECOMMENDED LITERATURE

1. Solid Edge-SpaceCAD, Quick Start Guide, Kazanlak, 2004
2. Dolchinkov R., G. Tonev, Manual for working with the Solid Edge CAD system, BSU, 2006.
3. Dolchinkov R., G. Tonev, Manual for working with the Solid Edge CAD system, BSU, 2007.
4. http://www.simens.com.
5. http://www.spacecad.bg.
6. http://www.solidedge.bg.
7. http://arintek.ru/services/education/39-opisanie-kursov-2020
8. http://menk.mf.tu-sofia.bg/

9.http://www.plm.automation.siemens.com/ru_ru/products/velocity/solidedge/index.shtml

10. http://www.plmlanit.ru/index.php?option=com_content&view=article&id=55&Itemid=76
11. http://industryinfo.bg/statiadetails.aspx?id=3632