

DEPARTMENT OF EDUCATION AND SCIENCE OF UKRAINE  
ДВНЗ the «Приазовський state technical university»  
Faculty of engineer and welding  
Department «Lifting - transport machines and details of machines»

**ASSERT:**  
Dean of faculty

\_\_\_\_\_ **M. Vereskun**

\_\_\_\_\_ \_\_\_\_, 2019

## «COMPUTER MULTI-BODY DESIGN»

### PROGRAM educational discipline

for the bread-winners of educational degree bachelor  
specialities: 163 the «Biomedical engineering»  
(code and name)

specializations: \_\_\_\_\_  
(code and name)

educational program:  
(code and name)



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**2019**



## 1. Description of educational discipline

Form of studies	Credits ECTS	Hours	Audience hours				Самост. work	Distribution after semesters			
			All	Lectures	Practical	Laboratory		Examinations	Tests	Course. works	Course. projects
Daily	4	120	32	16	–	16	88	8	–	–	–

### ENTRY

The program of study of educational discipline is the «Computer multi-body design» made in accordance with the educationally-professional program of preparation of bread-winners after **the first**

by the **bachelor** level of higher education after

by speciality (by specialization) 163 the Biomedical engineering.

by the educational program \_\_\_\_\_

**The article of** study of educational discipline the «Computer multi-body design» is the fixed assets and methods of computer 3D design; decision of practical tasks of three-dimensional design of physical objects.

#### **Interdisciplinary copulas.**

Previous disciplines are an informatics, prelude of profession, computer graphics.

The study of this discipline is required by all disciplines of curriculum, where constructing, planning of details and constructions, development of drafts is foreseen and others like that.

The program of educational discipline consists of such semantic modules:

The semantic module is a 1 Introduction to the computer design. Packages of softwares of the automated planning. Modern CAD (computer - aided design).

Semantic module 2. System of computer design of «Solid Works». Design bases are in «Solid Works». Parametrization of models.

## **1. Aim and task of educational discipline**

### **1.1. By the aim of teaching of educational discipline**

«A computer multi-body design» is providing of specialists the necessary level of theoretical knowledge for development of spatial models in the modern systems of the 3D design, application of modern software during planning.

In the process of study of discipline students must learn to work in the environment of modern to the computer-aided designs: «AutoCAD», «Solid Works», «Compass 3D». Able to choose optimal ways for development of spatial models.

### **1.2. By the basic tasks of study of discipline**

«A computer multi-body design» is receipt of knowledge from fundamental principles of computer spatial 3D design, ability to use numeral methods in FEM calculations at the decision of project tasks.

### **1.3. List of competence:**

According to the requirements of the educationally-professional program students must:

#### **to know:**

- general concepts of engineering and automated design;
- providing of CAD;
- existing CAD of the system and their possibility;

#### **able:**

- to develop graphic materials in the environments of the programs «AutoCAD», «Solid Works», «Compass 3D»;
- in the environment of «Solid Works» to develop by volume models, execute the calculations of FEM.

Aim of practical employments - forming of knowledge and abilities necessary for the decision of scientific and technical tasks with the use of computer and modern CAD of the systems.

The gained knowledge must assist the successful study of the special courses, high efficiency of implementation of course and diploma projects of speciality.

Independent work of students can be sent to fixing of skills of algorithmization and use of modern software. By a base application «AutoCAD» packages can serve for the independent study of separate divisions of course, «Solid Works», «Compass 3D», «MathCAD» and also programs of calculation on COMPUTER of knots and details. Reading of lectures is accompanied by demonstration of software with application to the projector, evident materials.

For independent work a student gets an individual task. Estimations are taken into account at tricking into of aggregate result of studies.

On the study of educational discipline taken 120 hours 4 credits ECTS.

## **2. Informative volume of educational discipline**

### **Semantic module 1.**

**№ 1.** Packages of softwares of the automated planning. Bases of work from AutoCAD, Solid Works. Possibilities of the programs: initial menu, work with graphic arts (creation of draft, detail, assembling); creation of list of moving, forces of reactions, pin pressure, loading and tension in various directions; epures of cut and iso for the revision of results into a model. Instruments of flat, cylindrical and spherical cut. Use of Design Check Wizard. Criteria of destruction in COSMOSWorks: for plastic and fragile materials. A graphic reflection is results in any direction. To process results frequency, longitudinal bend, thermal, nonlinear, test on the shock loading and analysis of tiredness. (16 hours)

**№ 2.** Work is with graphic arts on flat. Вибір of плоскостей, creation of new плоскостей, use of flat surfaces of details. Work is with drawings primitives. Commands of division are «Instruments to the sketch» (edit of primitives instructions). Робота with arrays. Контентне of menu of the system. (15 hours)

**№ 3.** Commands of creation of by volume surfaces. Витягнута and бобишка is returned, parameters of these commands. Examples on the use and possible errors are during creation of by volume surfaces. Creation of твердотільних models of details with the use of commands of витягнута and бобишка is returned. (14 hours)

**№ 4.** Commands of creation of by volume surfaces. Витянута of бобишка along a trajectory. Parameters of this command. Examples are from the use of this command. Command «бобишка is prolate after cuts». Parameters of this command. Examples are from the use of this command. Possible errors are during the use.

(14 hours)

## **Semantic module 2.**

**№ 5.** Edit of by volume surfaces instructions are in Solid Works. Фаска and rounding of flat surfaces and edges. Parameters of these commands and possible errors are during the use. Examples of the use. (14 hours)

**№ 6.** Work is with assembling. Beginning of creation of документа. Addition elements. Principles of collection of knots: moving in space, rotation of details. Possibilities of connection of details are after their surfaces (cylindrical, flat), edges and points. Commands are from quality of the executed assembling control. (15 hours)

**№ 7.** Design of physical processes for details and assembling: rotation, linear moving, attractive power, other. Typical errors are during the design of physical processes. Commands are from determination of «mass descriptions». (14 hours)

**№ 8.** Planning is in середовищи of Solid Works. Examples of creation of typical elements. Planning of metallic constructions. Examples. A method of eventual elements is in Solid Works. Implementation of calculations and construction of epures are in Solid Works with the use of additions of COSMOSWorks. (15 hours). A receipt of physical models is with the use of 3D printing. Features of construction of models are for 3D printing. (14 hours)

### **3 Recommended literature**

#### **Base**

1. Steve Heather AutoCAD 3D Modeling. - Industrial Press, Incorporated, 2017.– 296 pages. ISBN 0831136138, 9780831136130:
2. David C. Planchard SOLIDWORKS 2018 Quick Start with of Video Instruction. - Published of on: 2018 CSWP
3. Theo Zizka 3D Modeling. - Cherry Lake, 2014. - 32 pages/
4. AutoCAD 2019 From Zero to of Hero Paperback. - Independently of published (January 22, 2019), ISBN of -10: 1794614664, ISBN of -13: 978-1794614666, 201 pages
5. Clarence T. Rivers 3D Printing: The Ultimate 3D Printing Guide. 44 pages. 2014

#### **Auxiliary**

6. Shaun Foster, David Halbstein Integrating 3D Modeling, Photogrammetry of and of Design. - Springer London Heidelberg ISSN 2191-5768 ISSN 2191-5776 (electronic) ISBN 978-1-4471-6328-2 ISBN 978-1-4471-6329-9 (eBook) DOI 10.1007/978-1-4471-6329-9
7. James Floyd Kelly 3D Modeling of and of Printing of with of Tinkercad : Create of and of Print Your Own 3D Models. - Que Publishing 800 East 96th Street, Indianapolis, Indiana 46240 USA. 294 pages

#### **Methodical providing**

8. Methodical pointing to independent work on discipline of «Basis of the automated planning of machines» for the students of daily and in absentia separations of speciality of 133: branch engineer / of Y. Sahirov is Mariupol, 2019. - 69c.
9. Caripov Ю.Г. Methodical pointing to independent to work in relation to the study of discipline the «Automated planning of LTM» for the students of daily and in absentia separations. Area of knowledge : 13 is the mechanical engineering. Speciality: 133 is the Branch engineer. An educational degree is a bachelor. it is Mariupol, 2019. are 52 p.s

## **Informative resources**

10. **<http://www.mycomp.com.ua>**
11. **<http://www.texnika.com.ua>**
12. <http://itc.ua/>
13. <http://mo.pstu.edu/> (methodical providing of SHEI «PSTU»)
14. <http://ds.pstu.edu/> (materials of the controlled from distance formation of SHEI «PSTU»)
15. <http://www.twirpx.com/files/informatics/http://www.twirpx.com/files/informatics/> (materials are from an informatics and computing engineering)

### **4. Form of final control of success of studies**

Final control is *examination*

### **5. Facilities of diagnostics of success of studies**

Entrance control of - current control is control questions to the studied material; an estimation of presence and activity is on lectures; module control and final control are realization of examination.