COURSE DESCRIPTION CARD - SYLLABUS

Course name
Photorealism in virtual engineering

Course

Field of study
Mechanical Engineering
Year/Semester
1/2
Area of study (specialization)
Virtual Design Engineering
Profile of study
general academic
Level of study
Second-cycle studies
Course offered in
Polish
Form of study
full-time
Requirements
elective

Number of hours

Lecture
0
Laboratory classes
30
Other (e.g. online)
Tutorials
Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Wydział Inżynierii Mechanicznej

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

KNOWLEDGE: student has knowledge of information technology and knowledge of mechanical engineering, including engineering graphics and CAD

SKILLS: student knows how to use CAx software; can integrate the information obtained and interpret it

SOCIAL COMPETENCES: the student is aware of the responsibility for the tasks performed, understands the need to acquire new knowledge.

Course objective

Students acquire basic knowledge in the field of 3D modeling, analytical geometry, lighting models and

scientific visualization. They will learn selected software for 3D modeling, animation and photorealistic rendering (e.g. Blender).

Course-related learning outcomes

Knowledge

K2_W07: Has knowledge of modeling, including the creation of a physical model, CAE (Computer Aided Engineering) systems; knows the basic concepts of modern methods of computer graphics and photorealistic rendering and their practical engineering applications.

K2_W10: Has knowledge in the field of CAD / CAM (Computer Aided Design / Computer Aided Manufacturing) systems, 3D geometric modeling methods, model visualization methods and procedures for using models for virtual product testing. Has knowledge in the field of integration of information flows, the use of IT tools supporting design.

Skills

K2_U10: Can select modeling methods in design, prepare a rendering pipeline and create a photorealistic visualization in the field of mechanical engineering; can select effective visualization procedures for their practical, engineering applications.

K2_U11: Can interpret natural and physical phenomena for the purposes of visualization.

K2_U14: Is able to describe and, in the basic scope, use engineering software systems to support design and photorealistic rendering software, describe the methods of 3D geometric modeling, methods of model and data visualization, and procedures for using models for virtual product testing.

Social competences

K2_K01: Understands the need for lifelong learning; can inspire and organize the learning process of others.

K2_K04: Can adequately set priorities for realization of the tasks specified by him or others.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Oral and written tests. Assessment of individually made projects.

Programme content

Parametric curves and surfaces. Ambient, diffusive and specular light. Lighting models. Goroud and Phong model. Material models. Ways of casting shadows. Analytical geometry (homogeneous coordinates, 2D and 3D transformations, projection, convex hull, collision detection). Modeling taking into account physics. Photorealistic visualization of technical objects.

Teaching methods

Information / problem lecture, Case study, laboratory with elements of project.

Bibliography

Basic

Foley J. D., v. Dam A., Feiner S. K., Hughes J. F., Philips R. L., Introduction to Computer Graphics,Addison-Wesley Professional, 1994

Hearn D., Baker P., Computer Graphics, Prentice Hall 1997

Zabrodzki J. i inni, Grafika komputerowa, metody i narzędzia, WNT 1994

Additional

Shirley P., Fundamentals of Computer Graphics, sec. ed. A K Peters, 2005

Jankowski M., Elementy grafiki komputerowej, WNT, Warszawa 2006

Kiciak P., Podstawy modelowania krzywych i powierzchni. Zastosowania w grafice komputerowej, WNT, Warszawa 2005

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	33	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	27	1,0

[1] delete or add other activities as appropriate