



1. Subject name	Modern 3D Design PhD				
2. Subject name in Hungarian	Korszerű 3D ábrázolás PhD				
3. Code	BMEKOJSD006	4. Evaluation type	exam grade	5. Credits	2
6. Weekly contact hours	0 (0) Lecture	2 (0) Practice	0 (0) Lab		
7. Curriculum	PhD Programme	8. Role	Specific course		
9. Working hours for fulfilling the requirements of the subject					120
Contact hours	28	Preparation for seminars	10	Homework	62
Reading written materials	0	Midterm preparation	0	Exam preparation	20
10. Department	Department of Railway Vehicles and Vehicle System Analysis				
11. Responsible lecturer	Dr. Ficzeré Péter				
12. Lecturers	Dr. Ficzeré Péter				
13. Prerequisites					
14. Description of lectures					

Types and description of CAD systems
 Demonstration of applications and role of 3D engineering modeling software in machine design
 Modeling of prismatic bodies, preparation of patterns
 Modeling of revolved bodies
 Creating 3D cuts, adding subtitle labels, callouts, managing output formats
 Examination of physical properties, determination of center of volume and mass. Determination of the areas of the surfaces
 Create assemblies, constraining of the parts
 Fit investigation, exploded views, motion simulation
 Renderings
 Generation of drafts (views, cuts, etc.), item numbers, parts list
 Lofted and swept protrusions and cuts
 Basics of the finite element analysis (linear static structural, normal modes, buckling, steady state heat transfer)
 Shape optimisation
 Generative design
 Documentation

15. Description of practices
 Exercising theoretical knowledge with examples and case studies.

16. Description of laboratory practices

17. Learning outcomes

- A. Knowledge
- Knowledge of modeling, simulation and testing capabilities provided by design software.
 - Knows the conditions for interoperability between CAD models.
 - He understands the basic conditions of finite element analysis and can define the necessary conditions. He can define the conditions, variables, target functions needed for shape optimization.
- B. Skills
- Able to create a model of any complex part.
 - Able to receive and modify any model made in another CAD system.
 - Able to perform physical examinations of the designed parts (determination of the center of volume and mass. Determination of the area of the surfaces.
 - Able to assemble parts and to constrain to function properly.
 - Able to test and control assemblies (Fit investigation, exploded view, motion simulation.
 - Able to produce proper documentation (use of sections, labels, pointing lines, colors) and assembly instructions. Able to create drawings and videos of structures
 - Able to create rendered, realistic graphs and place them in their real environment (virtual reality).

- Able to produce high quality marketing materials.
- Able to generate the necessary views, sections with the help of the prepared solid models. Able to produce correct technical drawings according to standard rules.
- Able to create a solid model based on drawings.
- Able to produce formats required for CAM software.
- Able to make finite element analysis on parts or on complex structures, assemblies.
- Able to define the needed constraints, loads, boundary conditions. Able to evaluate the results and to document them at the appropriate level.
- Able to perform shape optimization using finite element simulation results.
- Able to define the constraints, thresholds, design variables, convergence criteria and target function required for the optimisation process.
- Able to implement generative design in practice.

C. Attitudes

- Strive to maximize their abilities to make their studies at the highest possible level, with a profound and independent knowledge, accurate and error-free, in compliance with the rules of the applicable tools, in collaboration with the instructors.

D. Autonomy and Responsibility

- Take responsibility for the quality of the work and the ethical standards that set an example for the classmates, using the knowledge acquired during the course.

18. Requirements, way to determine a grade (obtain a signature)

It is required to fulfill in time the individual student work.

19. Opportunity for repeat/retake and delayed completion

According to the TVSZ.

20. Learning materials

Effective date	27 November 2019	This Subject Datasheet is valid for	2024/2025 semester II
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