



1. Subject name	Vehicle simulation and optimisation				
2. Subject name in Hungarian	Járműszimuláció és optimalás				
3. Code	BMEKOV638	4. Evaluation type	mid-term grade	5. Credits	5
6. Weekly contact hours	2 (10) Lecture	2 (11) Practice	0 (0) Lab		
7. Curriculum	Vehicle Engineering MSc (J)	8. Role	Specialization (sp) at Vehicle Engineering MSc (J)		
9. Working hours for fulfilling the requirements of the subject					150
Contact hours	56	Preparation for seminars	12	Homework	0
Reading written materials	60	Midterm preparation	22	Exam preparation	0
10. Department	Department of Aeronautics and Naval Architectures				
11. Responsible lecturer	Dr. Zobory István				
12. Lecturers	Dr. Zobory István				
13. Prerequisites					
14. Description of lectures					
The real vehicle system and its investigation model. The discrete and distributed parameter models, hybrids. Formulation of the system model giving the basis of the simulation procedura. Typical techniques: linearization, considering the non-linearities. Parameter space, state space, and excitation space. The stair-like simulation technology. Possibilities for the solution of the system equations: time-domain and frequency-domain analyses. Numerical solutions by using digital simulation. Special solvers for differential equations. Real-time simulations. Prediction of the motion and loading conditions of vehicles. Statistical analysis of the simulation results. Stochastic simulation. The problem of system optimization. Selection of the optimization objective function, action-parameters and constraint conditions. Analytical and numerical optimization techniques. Problems leading linear programming (LP). Algorithm of the generalized gradient method . Procedure in case of a random variable valued objective function (stochastic field).					
15. Description of practices					
Solving tasks connected with the theoretical material. Application and comparison of the linearization methods. Model construction. Comparison and evaluation of the solutions given by the different system prameters.					
16. Description of labortory practices					

17. Learning outcomes	
A. Knowledge	
<ul style="list-style-type: none">Understands and applies the mathematical and scientific principles and procedures of vehicle simulation and optimization.Understands and can apply in a wide circle the theories and terminologies elaborated for professional area of vehicle simulation and optimization.Knows and understands the basic facts, limits and development possibilities of the vehicle simulation and optimization.In details knows and understands the modeling methods of the vehicle simulation and optimization.	
B. Skills	
<ul style="list-style-type: none">Able to apply in innovative way the required mathematical and scientific principles and procedures for solving the problems connected with the vehicle simulation and optimization.Able to apply, to analyze and to evaluate the methods applied in the field of the vehicle simulation and optimization.Shows ability to apply integrated knowledges in the field of the vehicle simulation and optimization.	
C. Attitudes	
<ul style="list-style-type: none">Open and receptive to know and to accept the developments and innovations which are taken place on the field of the vehicle simulation and optimization. The sense of vocation is depth.Accepts the professional and ethical values-system connected with the professional area of the vehicle engineering.Pursuing to use complex and on system-oriented mentality based approach to the processes.	

D. Autonomy and Responsibility

- Pro-activity in professional work, the self-standing selection and application of the solution methods.
- Making decision circumspectly and responsibility.

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

The criterion of signature is both the active participation at the class (attitude), and during the semester successfully written two midterm tests (knowledge, ability, autonomy). In the fields of attitudes and autonomy the results achieved in the semesters are included in the final classification by weight 50%. At the end of semester there is an examination (knowledge, ability, attitude).

19. Opportunity for repeat/retake and delayed completion

Possibility to refit the midterm exams, to repeat the examination, properly to the Study and Exam Regulations.

20. Learning materials

Zobory i.: Járműszimuláció és optimálás. Department's publication.. Bp. 2000.

Department's publication about of special simulation problems of the vehicle systems.

Effective date	10 October 2019	This Subject Datasheet is valid for	Inactive courses
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