Budapest University of Technology and Economics
Faculty of Transportation Engineering and Vehicle Enginee

1. Subject name	**Design and testing of railway vehicle systems**				
2. Subject name in Hungarian	Vasúti járművek tervezése és vizsgálata				
3. Code	**BMEKOVRM607**	4. Evaluation type	**mid-term grade**	5. Credits	**10**
6. Weekly contact hours	**4 (19) Lecture**	**0 (0) Practice**	**2 (9) 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					**300**
Contact hours	84	Preparation for seminars	22	Homework	60
Reading written materials	102	Midterm preparation	12	Exam preparation	20
10. Department	**Department of Aeronautics and Naval Architectures**				
11. Responsible lecturer	Dr. Szabó András				
12. Lecturers	Dr. Zobory István, Dr. Kolonits Ferenc, Dr. Szabó András				
13. Prerequisites					

14. Description of lectures

Standard features of the rail vehicle design. Excitation effect of the track. Systemtechnical analysis of railway vehicles. The planning a running facility. Usig movement simulation in the planning procedure. Documentation of the plannind results. Consideration of the operating environment of the vehicle operation. Energetical, mass-stream and info-stream attributions in the plannig. Consideration of the vehicle load-conditions. Real-time simulation methods. Optimization of the components in the vehicle system. Strength computation of the vehicle systems by FEM method. Railway vehicle design project.

15. Description of practices

16. Description of labortory practices

The design project connected with the subject needs laboratory work: structure planning (autoCAD), stress analysis (VEM) and solving of further calculation tasks.

17. Learning outcomes

A. Knowledge

- Understands and applies the mathematical and scientific principles and procedures of the design and analysing of the railway vehicle.
- Understands and can apply in a wide circle the theories and terminologies elaborated for professional area of railway vehicles design and analysis.
- Knows and understands the analysing methods and development possibilities of the railway vehicle-technique.
- Knows and understands the methodology and problem solving techniques of the design and research of railway vehicles.

B. Skills

- Able to apply in innovative way the required mathematical and scientific principles and procedures for solving the problems connected with the railway vehicles design and analysis.
- Able to analyze, to evaluate, to document and to develop the methods and informations applied in the railway vehicle design and analysis.
- Able to global design of the railway vehicles like a complex system on the base of the system approach and the process oriented mentality.
- Able to execute the condition surveys connected with railway vehicles, and based on this able to elaborate the evaluation and the proposal.

C. Attitudes

- Open and receptive to know and to accept the developments and innovations which are taken place on the field of the speciality of railway vehicles.
- Accepts the professional and ethical values-system connected with the professional area of the railway.
- Pursuing to use complex and on system-oriented mentality based approach in the work.

D. Autonomy and Responsibility

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

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

During the semester there is a midterm test for evaluation of achievements in knowledge and ability. During the semester the FEM task and the complex vehicle design project must be solved (evaluation of knowledge, attitude, autonomy). The marks of the individual tasks are included in the final classification by weight 50%. Final evaluation in knowledge and ability are in framework of the examination at the end of semester. The criterion to participate at the examination are the complete achievement of the midterm test and individual tasks.

19. Opportunity for repeat/retake and delayed completion

Possibility to refit the control works and the homeworks, to repeat the examination, properly to the Study and Exam Regulations.

20. Learning materials

Zobory-Győrik: A maximumelv és a vonatmozgás optimális irányítása. Department's publication.. Bp. 198- , (2- oldal)
Zobory-Zábori: A hullámok terjedése anyagi pontok és rugók által egy hosszú vonatot reprezentáló egyirányban végtelen láncban. Department's publication.. Bp. 198- (- old.)
Győrik: Energetikai szempontból optimális vonatirányítás közelítő meghatározása. Department's publication.. Bp. 199- (20.oldal)
Department's publication for planning

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