1. Subject name	**Vehicle Materials**				
2. Subject name in Hungarian	Járműszerkezeti anyagok				
3. Code	**BMEKOGGD002**	4. Evaluation type	**exam grade**	5. Credits	**4**
6. Weekly contact hours	**4 (0) Lecture**	**0 (0) Practice**	**0 (0) Lab**		
7. Curriculum	**PhD Programme**	8. Role	**Basic course**		
9. Working hours for fulfilling the requirements of the subject					**84**
Contact hours	56	Preparation for seminars	0	Homework	8
Reading written materials	8	Midterm preparation	0	Exam preparation	12
10. Department	**Department of Automotive Technologies**				
11. Responsible lecturer	Dr. Bán Krisztián				
12. Lecturers	Dr. Bán Krisztián				
13. Prerequisites	**recommended: BMEKOGGM601 - Advanced materials and technologies**				

14. Description of lectures

Giving high-level theoretical knowledge of vehicles structural materials, manufacturing processes of vehicle parts. Features and development directions of automotive pre-production technologies. Impact of impurities and alloys on mechanical properties of steels. Classification of steels by composition and use. Heat treatment technologies for steels. Advanced high strength steels. Cast irons. Types and properties of cast iron, heat treatment technologies for property modifications. Impact of impurities and alloys on the mechanical properties of non-ferrous and lightweight metals. Classification of non-ferrous and lightweight metals according to their composition and use. Heat treatment technologies for property modifications of non-ferrous and lightweight metals.
Bulk plastic deformation technologies and sheet metal forming. Main properties of plastics (structure, mechanical properties, transformation temperatures). Test methods for plastics. Plastics processing technologies. Properties of composite materials, production technologies (metal foams, in situ composites,fibre-reinforced composites). Properties of ceramics, manufacturing techniques of ceramic components. Surface modification procedures.

15. Description of practices

16. Description of labortory practices

17. Learning outcomes

A. Knowledge

- Knows the pre-production technologies of Fe-based, non-ferrous and lightweight metals.
- Has a deeper knowledge of impact of impurities and alloys on mechanical properties of steels.
- Knows the classification of steels by composition and use.
- Has a deeper knowledge of heat treatment technologies for steels.
- Has a deeper knowledge of types, structure and properties of advanced high strength steels.
- Has a deeper knowledge of types and properties of cast iron, heat treatment technologies for property modifications.
- Has a deeper knowledge of impact of impurities and alloys on the mechanical properties of non-ferrous and lightweight metals.
- Knows the classification of non-ferrous and lightweight metals according to their composition and use.
- Has a deeper knowledge of heat treatment technologies for property modifications of non-ferrous and lightweight metals.
- Has a deeper knowledge of bulk plastic deformation technologies and sheet metal forming.
- Has a deeper knowledge of main properties of plastics (structure, mechanical properties, transformation temperatures).
- Knows test methods for plastics.
- Knows plastics processing technologies.
- Has a deeper knowledge of properties of composite materials, production technologies (metal foams, in situ composites, fibre-reinforced composites).

- Has a deeper knowledge of properties of ceramics, manufacturing techniques of ceramic components.
- Has a deeper knowledge of surface modification procedures.

B. Skills

- Able to overview a technological or measurement process and capable of a deeper, causal, scientific analysis of it.
- Able to give suggestions for the development of a technological or measurement process.
- She/he is able to gather literature on a specific research topic and compile a summary based on it.
- Able to interpret the results found in the literature.
- Able to develop a suitable experimental method for a research topic and propose test methods.
- Able to interpret test results.

C. Attitudes

- She/he strives to develop his knowledge independently.
- Strives to explore the causal relationship with scientific depth.
- Strives to develop its own topic area.
- Strives to find connections between topics and disciplines.
- Strives to interpret the literature and their own research results independently and in teamwork, listening to others' thoughts.
- Strives to share her/his knowledge.

D. Autonomy and Responsibility

- Apply responsibly the knowledge acquired during the course with regard to their validity limits.
- Manages and communicates the results of others and their own results also in accordance with ethical standards.
- Endeavors to perform his assigned tasks independently in accordance with ethical standards.
- She/he knows how far his responsibilities are, informs his colleagues or his supervisor about her/his results, and when it is necessary.

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

The course ends with an oral examination.

19. Opportunity for repeat/retake and delayed completion

Possibilities for supplementation takes place in accordance with the applicable study and examination rules.

20. Learning materials

1. Thornton, Calangelo: Fundamentals of engineering materials, Prentice-Hall, Inc. New Jersey, 1985,
2. Flinn, Trojan: Engineering Materials and Their Applications,
3. Kalpakijan S.: Manufacturing Engineering and Technology, Prentice Hall, 2013.
4. Auxiliary materials and ppt's downloadable from the department website.

Effective date	27 November 2019	**This Subject Datasheet is valid for**	Inactive courses