



## COURSE DATASHEET

<b>Semester:</b>	2015/16/1
<b>Course:</b>	Constructional Materials and their Technology (Part.I.)
<b>Code:</b>	VEMKGEB114A
<b>Responsible department:</b>	Institute of Mechanical Engineering
<b>Department code:</b>	MKGEI
<b>Responsible instructor:</b>	dr. Pál Horváth

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### Course objectives:

To introduce students in the state of the art of structural materials in engineering science, structure of materials, governing laws of structural development and techniques of structure characterization.

### Course content:

Structural materials. Introduction. Types of chemical bonding. Decomposition of structural materials. Properties. Methods of structure evaluation. Structure of solids. Periodic system. Structure and properties (mechanical, electrical, etc.) of solids. Structure of atom. Atomic nucleus. Atomic energies. Structure of crystallites. Miller indices. Crystal lattices. Bonding between atoms and molecules. Chemical bonding. Formation of crystal and crystallite. Crystal and lattice defects. Structural investigation. Investigation of macrostructure (optical microscope). Investigation of microstructure (SEM, TEM, XRD). Investigation of structure in atomic level (AFM, STM). Structure of alloys. Eutectics. Thermal behaviour of alloys. Preparation of phase diagrams. Reading of phase diagrams. Alloy diagrams. Heat treatment. Diffusion. Plastic deformation. Reformation and recrystallization. Heat treatment, heat treatment of steels. Investigation of structural materials. Physical investigations. Mechanical investigations. Static investigations. Investigations of sensitivity. Technological investigations. Investigations of defects. The effect of heat to the structure of structural materials. Atomic movements under heat loading. Diffusion. Refining. Recrystallization. Precipitation hardening. Investigation of structural materials. Testing machines. The evolution of materials structure during rupture investigation. Pressing and bending. Shearing and twisting. The effect of parameters to the material properties. Hardness tests. Dynamical strength determination methods. Charpy test. Technological tests. Failure determination by XRD and ultrasonication. Fatigue tests.

### Requirements, evaluation and grading:

Lecture attendance, 2 successful examinations in semester

### Required and recommended readings:

Dr.Prohászka J.: Bevezetés az anyagtudományba I., TK., Bp., 1988.; Dr.Gillemot L.: Anyagszerkezettan és anyagvizsgálat TK. Bp., 1988.; Dr.Zorkóczy B.: Metallográfia és anyagvizsgálat. TK. Bp., 1988.; Verő J.-Káldor M.: Fémtan. TK Bp., 1997.; Weißbach, W.: Werkstoffkunde und Werkstoffprüfung. Vieweg Verlag, 1994.; Schmitt-Thomas, K.G.: Metalkunde für die Maschinenwesen. Springer Verlag 1990.