Course title: Engineering Polymers	**Neptun code: GEMTT547-a**
Course coordinator: name, position, scientific degree **Prof. Dr. Maria Berkes Maros, Full professor, PhD. Dr. habil.**	
type and number of lessons: lecture/seminar/practical lesson/consultation … / week or semester **4×2 hours lecture + 10×2 hours consultation / semester**	
method of accountability (colloquium/practical mark/other): **colloquium**	
curriculum location of the subject (autumn/spring): **spring**	
pre-study conditions: –	
The task and purpose of the subject:	
The course task is to familiarise students with the advantages, limitations and material-specific properties of the technical/engineering application of polymers. The course aims to enable PhD students to assess the specific user requirements that can be satisfied by applying polymeric materials under various operating conditions. The further objective is to enable students to select the appropriate polymeric material for a given engineering task, to estimate its expected performance, and to get acquainted with the most important mechanical properties, failure mechanisms and methods of their prevention, in addition to improving the performance and reliability of the engineering structures.	
Course description:	
Micro-macro level structural characterization of polymers. Structure / property / mechanical behaviour relationships in thermoplastic, thermosetting polymers, elastomers and liquid crystal polymers. Concepts and types of homogeneous and heterogeneous polymer structures. Background and peculiarities of the mechanical behaviour of polymers. The most important mechanical models of viscoelastic materials. Rheology: viscoelasticity and time dependence. Short and long-term mechanical tests of polymers. Deformation, fracture, and typical failure modes of polymers. Information content, determination and application of the mechanical properties. Processing technologies of polymers, peculiarities, limitations and proposed uses of specific processes. Typical applications of technical polymers (e.g. PA, PE, PP, PC, POM, ABS, polyimide, polysulfone, PVC, epoxy, phenols, amines, silicones), their relevant application properties and failure modes. Polymer matrix composites, polymer fibre materials. Environmental protection, recycling.	
Required literature:	
1. FAKIROV, S.: Fundamentals of Polymer Science for Engineers, Wiley-VCH Verlag GmbH & Co. KGaA, ISBN: 978- 3-527341313 (Hardback) (2017) p.386. https://doi.org/10.1002/9783527802180.fmatter 2. MYER KUTZ: Applied Plastics Engineering Handbook, Processing and Materials, Elsevier, 2011, ISBN 978-1-4377-3514-7, p574, doi.org/10.1016/C2010-0-67336-6 3. MITTAL, V.: High-Performance Polymers and Engineering Plastics, Wiley, ISBN: 978-1-118-01669-5 (2011) p.452.	
Recommended literature:	
1. GERDEEN, J. C., RORRER, R. A. L.: Engineering Design with Polymers and Composites, 2nd Ed., CRC Press, Taylor & Francis Group, ISBN 978-1-4398-6052-6 (Hardback) (2012) p. 306 2. ROSATO, D. V., DIMATTIA, D.P., ROSATO, D.V.: Designing with Plastics and Composites: A Handbook, Springer-Verlag New York Inc. ISBN 1461597250 (2013) p981. 3. YOUNG, R. J., LOVELL, P. A.: *Introduction to Polymers*, Second Edition, Chapman & Hall,1991, ISBN 0-412-30640-9, p.443KINLOCH, J., YOUNG, R. J.: Fracture Behaviour of Polymers, Elsevier Applied Science Publishers Ltd., ISBN 0-85334-186-9 (1983)	