Course title: **New ceramic materials and ceramic processing (I-226)**

Teacher:

Prof. Lidija Ćurković, Ph.D., University of Zagreb Faculty of Mechanical Engineering and Naval Architecture

Assist. Prof. Anamarija Rogina, Ph.D., University of Zagreb Faculty of Chemical Engineering and Technology

Teaching hours: 20

Syllabus: Physico-chemical principles. The position of ceramics in materials science. Raw materials. Synthetic materials and processing methods. Rheological behavior of slurries and pastes. Suspensions. Sterical and electrosterical stabilization of suspensions. Viscosity. Colloids. Plasticity. Forming processes, pressing., casting processes, plastic-forming processes. Molecular polimerization forming. Sol-gel methods. Gelation. Processing additives. Drying. Sintering. Structure of sintered bodies. Structure of porous ceramics. Thin ceramic films. Fibers. Dopands. Ceramics composites New processing methods. Hydrothermal synthesis. Chemical vapor deposition (CVD) Flame pyrolysis, Plasma pyrolysis. Epitactic growth. Silicate ceramics. Oxide ceramics (Al2O3, ZrO2, mullite ZrO2 and stabilized ZrO2). Non-oxide ceramics (Si3N4; SiC, AlN, sialons).Properties of ceramics: thermal properties, electrical properties, corrosion, wear, density, porosity, strength (bending, compression and tensile strength), elasticproperties, hardness (Vickers, Knoop i Rockwell). Ceramography. Bioceramics, biocompatible and bioactive materials. Nano-particles and nano-composites. Viskers. Technical ceramics. Structural ceramics. Electronic and optoelectronic ceramics. Translucent ceramics.

Teaching methods: **Lectures, discussions.**

Examination methods: **Seminars, oral exam.**

Monitoring of the course quality and successfulness: **Student Survey.**

List of recommended readings:

1. M. W. Barsoum, *Fundamentals of Ceramics*, IOP Publishing Ltd., 2003.
2. A. G. King, *Ceramic Technology and Processing*, William Andrew Publishing Inc., 2002.
3. J. B. Wachtmanw, R. Cannonm, J. Matthewson, *Mechanical Properties of Ceramics*, John Wiley & Sons, Inc., USA, 2009.
4. C. Barry Carter, M. Grant Norton, *Ceramic Materials Science and Engineering*, Springer, 2007.
1. ngineering, Polymer 98 (2016) 172-181.