Course title: **Silicates and silicate glasses (I-227)**

Teacher:

Prof. Stanislav Kurajica, Ph.D., University of Zagreb Faculty of Chemical Engineering and Technology

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

Teaching hours: 20

Syllabus: Principles of [SiO_4] tetrahedra polymerization. Structures of silicates. Classification of silicates. Technically important silicate systems. Mullite: SiO_2-Al_2O_3 phase diagram, crystal structure, properties. Layered silicates: kaolinite, talc, mica, chlorite, vermiculite, montmorillonite, illite. Clays: clay-water system, ion exchange. Zeolites: structure, properties, application, fabrication of synthetic zeolites. Feldspars. Silica: polymorphous modifications of SiO_2, fabrication and use of synthetic SiO_2. Organosilicon compounds: silicon halides, silanoles, siloxanes, silicones. Silicate-based molecular nanotechnology. Silicate melts and its transformation into gassy state. Structure and kinetical theories. Types of silicate glasses. Relationship between glass composition and properties. Glass surface and its modification. Controlled glass crystallization. Phase separation in glasses. Crystallization mechanism and kinetics of crystal growth. Glass-ceramic and its properties.

Teaching methods: **Lectures, discussions.**

Examination methods: **Oral exam.**

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

List of recommended readings:

1. Arun K. Varshneya and John C. Mauro, *Fundamentals of Inorganic Glasses, Third Edition*, Elsevier, 2019.
2. F. Liebau, Structural Chemistry of Silicates: Structure, Bonding, and Classification, Springer-Verlag, Berlin, 1985.
3. P. J. Chenier, Survey of Industrial Chemistry, Kluwer Academic/Plenum Pub., New York, 2002.
4. D. T. Griffin, Silicate Crystal Chemistry, Oxford University Press, Oxford, 1992.