Compulsory Modules: Inorganic Chemistry

The following compulsory modules corresponding to 13 SKS / 19.5 ECTS-Credits must be passed:

3rd semester	Compulsory Module: Inorganic Chemistry A *Tentative name module: Basic inorganic reaction*	SKS	ECTS-Credits
a	**Basic inorganic reactions (Reaction of inorganic compound)** Energy Gibbs reaction, the dissolution concept, reaction in water: acid-base inorganic reaction (Arrhenius acid and base, Brönsted-Lowry acid and base, HSAB concept), redox reaction, reaction in non-aqueous media, solid state reaction	3	3.99
b	**Experimental: synthesis of inorganic compounds** Synthesis of inorganic salts, crystallization, electrochemical-metal deposition, synthesis of metal-complexes, MOF, metal-oxide and semiconductor -oxide and materials base inorganic polymer (silica. Alumina-silica, carbon nanostructures etc.	1	1.33
	Total	4	5.32
	Learning Outcomes: LO 3. Students master in theory and working as a researcher in the field of science and technology with the ability to solve community problems with an orientation to sustainable development and to disseminate research results in scientific meetings and scientific publications. LO 5. Student have expertise in practical work in the laboratory, handling general and special chemicals, and implementing work safety and security systems. LO 6. Students master the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of micro-and micro molecular compound and their application. LO 8. Students have experience, and able to operate common chemical instruments, as well as able to analyze data and information from these instruments.		
	Prerequisites: Basic Chemistry 1 and Basic Chemistry 2 Practical course of Basic Chemistry 1 and Practical course of Basic Chemistry 2		

4th semester	Compulsory Module: Inorganic Chemistry B *Tentative name module: Elemental chemistry*	SKS	ECTS-Credits
a	**Elemental Chemistry** ▪ Main group chemistry (groups 1-2 and 13-18); description, properties and reactivities of s-block and p-block elements; importance of main group chemistry with regard to fundamental research and industrial processes based on critical discussions of ecological and toxicological connections. ▪ Transition metal chemistry focusing on d-block elements: general characteristics; basics, compound models, reactivity of coordination compounds; deposits, production and characteristics of d-metals; important compound classes; technically important processes, bioinorganic aspects, chemistry of lanthanides and actinoides.	3	3.99
	Total	3	3.99
	Learning Outcomes: LO 6. Students master the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of micro-and micro molecular compound and their application. LO 7. Mastery of the knowledge of work safety and security in the laboratory and understanding environmental issues and related regulations.		
	Prerequisites: Basic Chemistry 1		

2nd & 5th semester	Compulsory Module: Inorganic Chemistry Characterization *Tentative name module: Inorganic structure elucidation*	SKS	ECTS-Credits
a	**Structure of Inorganic Compound** Atom, Solid state, The wave Function (Schrödinger equation), Electron configuration and term symbol, formal charge of a molecule/ion, the lattice energy, crystal packing, chemical bonding, index miller, symmetry, operations and symmetry elements,	3	3.99
b	**Inorganic Compound Structure Elucidation** Spectroscopy based analysis (XRD, NMR, FTIR, UV Vis, Ms), elemental analysis (microanalysis), thermal analysis (TGA,	2	2.66

	DTA, DSC), physical analysis (porosity and surface area measurements, particle size measurement, magnetic properties (MSB, VSM, EPR/ESR)		
c	**Experimental of Inorganic Compound Characterizations** Characterization of inorganic compound such as, metal complexes, MOF, metal-oxide and semiconductor -oxide and materials base inorganic polymer (silica. Alumina-silica, carbon nanostructures etc. Spectroscopic and microscopic analysis: XRD, XRF, SEM-EDX, TEM, molecular spectroscopy (Spectroscopy FTIR and Uv -Vis, Raman), Thermal analysis, magnetic analysis Pore and particle size measurement (SAA, PSA).	1	1.33
	Total	6	7.98
	Learning Outcomes: LO 3. Students Master in theory and working as a researcher in the field of science and technology with the ability to solve community problems with an orientation to sustainable development and to disseminate research results in scientific meetings and scientific publications. LO 4. Mastery of basic principles and ability to use the software in determining the structure and energy of micro molecules, analysis, and synthesis in general or more specific fields in chemistry (organic, biochemistry, or inorganic), and data processing (analytical chemistry). LO 5. Student have expertise in practical work in the laboratory, handling general and special chemicals, and implementing work safety and security systems. LO 6. Students master the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of micro-and micro molecular compound and their application. LO 8. Students have experience, and able to operate common chemical instruments, as well as able to analyze data and information from these instruments		
	Prerequisites: Basic Chemistry 1 and Basic Chemistry 2 Practical course of Basic Chemistry 1 and Practical course of Basic Chemistry 2		