

## Compulsory Modules: Organic Chemistry

The following compulsory modules corresponding to 23 SKS / 34.5 ECTS-Credits must be passed:

3 <sup>rd</sup> & 4 <sup>th</sup> semester	Compulsory Module: <b>Reaction of Organic Compound</b>	SKS	ECTS-Credits
a	<b>Basic organic reactions (Reaction of organic compound)</b> This course discusses about basic organic reactions and its reaction mechanisms including their stereochemistry.	3	3.99
b	<b>Organic synthesis</b> This course contains functionalization and transformation of functional groups, formation of carbon-carbon bonds, basic principles of synthesis of aliphatic and aromatic compounds, types of disconnections, and synthesis strategy as well as design synthesis.	2	2.66
c	<b>Experimental: synthesis of organic compounds</b> This course contains the application of basic techniques in organic chemistry experiments which include synthesis and purification techniques.	1	1.33
d	<b>Physical Organic Chemistry</b> Physical organic chemistry is the study of the relationship between structure and reactivity of organic molecules. More specifically, physical organic chemistry applies the experimental tools of physical chemistry to the study of the structure of organic molecules and provides a theoretical framework which interprets how structure influences both mechanisms and rates of organic reactions.	3	3.99
<b>Total</b>		9	11.97
<b>Learning Outcomes:</b> LO 5. Students have expertise in working practices in the laboratory, handling general and special chemicals and implementing work safety and security systems. LO 3. Students master theory and work as a researcher in the field of science and technology and able to solve community problems with an orientation to sustainable development and disseminate research results in scientific meetings and/or scientific publications. 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.			

	<b>Prerequisites:</b> Basic Chemistry 1 and Basic Chemistry 2 Practical course of Basic Chemistry 1 and Practical course of Basic Chemistry 2
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3 <sup>rd</sup> & 5 <sup>th</sup> semester	Compulsory Module: <b>Natural Products</b>	SKS	ECTS-Credits
a	<b>Natural Products</b> This course studies the concept and theory of the structure of natural biological compounds based on the biosynthetic pathway of secondary metabolites. The subjects covered include Polyketide (acetate-malonate); terpenoids and steroids (mevalonate); phenylpropanoids, flavonoids, stilbenes, xanthones (shikimate); alkaloids (amino acids).	2	2.66
b	<b>Experimental: Isolation of Organic Compound</b> This course is containing the application of basic techniques in organic chemistry experiments including separation techniques by recrystallization, distillation and extraction, as well as purification by chromatographic method.	1	1.33
<b>Total</b>		3	3.99
<b>Learning Outcomes:</b> LO 5. Students have expertise in working practices in the laboratory, handling general and special chemicals and implementing work safety and security systems. LO 3. Students master theory and work as a researcher in the field of science and technology and able to solve community problems with an orientation to sustainable development and disseminate research results in scientific meetings and/or scientific publications. 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.			
<b>Prerequisites:</b> Basic Chemistry 1 and Basic Chemistry 2 Practical course of Basic Chemistry 1 and Practical course of Basic Chemistry 2			

2 <sup>nd</sup> & 5 <sup>th</sup> semester	Compulsory Module: <b>Structure of Organic Compound and Elucidations</b>	SKS	ECTS-Credits
a.	<b>Structure of Organic Compound</b> Organic chemistry is the study of the structure, properties, composition, reactions, and synthesis of compounds containing carbon, which include not only hydrocarbons but also compounds with a number of other elements, including nitrogen, oxygen, halogens, phosphorus, silicon, and sulfur, also introduce stereochemistry of organic compounds.	3	3.99
b	<b>Organic Compound Structure Elucidation</b> This course is the study of how to elucidate the structure of organic compounds using spectroscopy-based analysis (FTIR, MS, and NMR).	3	3.99
<b>Total</b>		6	7.98
<b>Learning Outcomes:</b> 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.			
<b>Prerequisites:</b> Basic Chemistry 1 and Basic Chemistry 2			

3 <sup>rd</sup> & 5 <sup>th</sup> semester	Compulsory Module: <b>Biochemistry</b>	SKS	ECTS-Credits
a	<b>Biomolecule structure</b> This course is designed to provide the students with theoretical knowledge and insight about the foundations of macromolecular structure and how the structure relates to function. It is necessary to know the structure of biomolecules in order to understand biological and biochemical processes at a molecular level.	2	2.66
b	<b>Biochemical Reaction</b> This course provides main aspects of biochemistry by relating molecular interactions to their effects on the organism as a whole, especially as related to human biology.	2	2.66

c	<b>Experimental: Biochemistry</b> This course is design for student to practice of key experimental techniques used in biochemistry and develop their key skills, such as experimental design, laboratory competence, data analysis and scientific report writing.	1	1.33
<b>Total</b>		5	6.65
<b>Learning Outcomes:</b> LO 5. Students have expertise in working practices in the laboratory, handling general and special chemicals and implementing work safety and security systems. LO 3. Students master theory and work as a researcher in the field of science and technology and able to solve community problems with an orientation to sustainable development and disseminate research results in scientific meetings and/or scientific publications. 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.			
<b>Prerequisites:</b> Basic Chemistry 1 and Basic Chemistry 2 Practical course of Basic Chemistry 1 and Practical course of Basic Chemistry 2			