

Elective Modules: Organic Chemistry

1	Elective Module: Organic Compound Analysis	SKS	ECTS-Credits
	<i>In this elective module some recent trend in organic compound analysis i.e., natural product analysis, chromatography of organic compound, and food chemistry will be discussed. The lectures will cover the current state of the topic and update research of each area of the lectures.</i>		
a.	Natural Product Analysis This course discusses the basic principles of the secondary metabolite isolation method including distillation, extraction, and chromatography. In addition, it also explains the identification and determination of the structure based on the spectroscopic method.	2	2.66
b	Chromatography of Organic Compound This course covers about the understanding about separation techniques using chromatography, especially for the separation of natural material compounds isolated from the source by various isolation techniques. Specifically, students will learn to use knowledge about chromatography and the characteristics of natural compounds to obtain optimal separation of natural materials through several optimization strategies. Students will learn to determine optimization steps based on initial data in the separation process. Optimization was carried out on parameters related to preparation, development, and analysis in chromatographic techniques.	2	2.66
c	Food Chemistry This lecture will discuss about food chemistry, their properties, their analysis and how they are processed in the body. It involves the study of chemical components and analysis component from water, proteins, lipids, carbohydrates, vitamin and mineral, food additive, food toxicology and halal food. Also, how different processing techniques affect a certain type of food and enhance the quality of food is studied.	2	2.66
Total		6	7.98
Learning Outcomes: 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.			

	Prerequisites: Compulsory module of Organic Chemistry		
2	Elective Module: Natural Based Products	SKS	ECTS-Credits
	<i>In this elective module the current state and update research about natural based product such as essential oils will be discussed.</i>		
a.	The Chemistry of Essential Oils This course covers introducing of essential oils -what they are, their isolation, analysis, characterization and their therapeutic effects. This course also provides knowledge on how to run creative business in essential oil products.	2	2.66
Total		2	2.66
Learning Outcomes: 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.			
Prerequisites: Compulsory module of Organic Chemistry			

3	Elective Module: Organic Polymer	SKS	ECTS-Credits
	<i>In this elective module some recent trend in organic polymer such as polymer material chemistry and renewable polymers and composites will be discussed. The lectures will cover the current state of the topic and update research of each area of the lectures.</i>		
a.	Polymer Material Chemistry This course will cover an overview and classification of polymers; polymerization reaction i.e., step-growth, addition, radical chain-growth, ionic chain-growth, coordination chain-growth polymerizations, and copolymerization; degree of polymerization, polymer molecular mass and its determination; polymerization technique; polymer processing technology; and polymer modification.	2	2.66
b.	Renewable Polymers and Composites	2	2.66

	Renewable polymers and composites are a subset of polymer chemistry that focuses on the use or utilization of renewable raw materials for the design and synthesis of monomers and polymers.		
	Total	4	5.32
	Learning Outcomes: 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.		
	Prerequisites: Compulsory module of Organic Chemistry		

4	Elective Module: Sustainable Organic Synthesis	SKS	ECTS-Credits
	<i>In this elective module, the designing of products and processes based on renewable resources i.e., natural fats and oils, terpenes, and other renewable starting materials will be discussed. The lectures will cover the current state of the topic and update research of each area of the lectures.</i>		
a.	Oleochemistry This course discusses about chemical compounds derived from natural fats and oils that can be used as raw materials. The study includes physico-chemical modifications of these materials.	2	2.66
b	Green Chemistry Green chemistry, also called sustainable chemistry, is an area of chemistry focused on the designing of products and processes that minimize the use and generation of hazardous substances.	2	2.66
	Total	4	5.32
	Learning Outcomes: 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.
	Prerequisites: Compulsory module of Organic Chemistry

5	Elective Module: Industrial Organic Material	SKS	ECTS-Credits
	<i>In this elective module some recent trend in industrial organic material i.e., enzyme and dye chemistry will be discussed. The lectures will cover the current state of the topic and update research of each area of the lectures.</i>		
a.	The Chemistry of Enzyme Topics cover enzyme function and structures include enzyme kinetics. This course also describes on production and purification of enzymes. The relationship between the structure and function of enzyme is an important basis for modern drug development, and in industrial biotechnology, the use and rational design of enzymes for sustainable bioprocesses are widely implemented approaches.	2	2.66
b	Dye Chemistry The course contains color theory (dyes and pigments), groups of dyes (azo, carbonyl, phthalocyanines, etc.), dyes and methods of their use, pigments (organic and inorganic), and application of dyes and pigment (textiles, leather, rubber, food).	2	2.66
Total		4	5.32
Learning Outcomes: 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.			

	Prerequisites: Compulsory module of Organic Chemistry
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