

Subject card

Subject name and code	Cosmeceuticals and nutraceuticals_ laboratory, PG_00166078						
Field of study	Marine Biotechnology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	2		ECTS credits		2.0		
Learning profile	academic		Assessment form				
Conducting unit	Laboratory of Physical Biochemistry -> UG Institute of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Bogdan Banecki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		2.0		23.0	55
Subject objectives	The aim of the classes is to familiarize students with the practical aspects of marine biotechnology and methods used in laboratories to develop dietary supplements and medicinal products. Students learn about biotechnological processes, analytical techniques, and acquire skills necessary for laboratory work. The classes include obtaining and using active substances from marine organisms in the pharmaceutical and cosmetics industries. The emphasis is on teamwork and individual planning of experiments and contact with modern equipment.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MBMU2-KU03] Can use and critically analyze available scientific information; can prepare and present - orally or in writing - a paper covering detailed problems in the field of marine biotechnology on the basis of the scientific information or their own work, with the use of scientific language, including specialized terminology and conceptual apparatus; has the ability to conduct discussions		Is capable of independently searching for, critically evaluating, and interpreting various scientific sources, and subsequently preparing and presenting (orally or in writing) a study on selected aspects of marine biotechnology, using specialized terminology and scientific argumentation. Also possesses the ability to conduct a substantive discussion grounded in the gathered data.		[SU2] presentation/project/paper/report [SU8] observation of student's independent or team work		
	[MBMU2-KW02] Has advanced knowledge of the possibilities of biotechnological use of marine resources		Demonstrates in-depth knowledge of the potential and various methods for the biotechnological utilization of marine resources, taking into account innovative solutions and the latest research trends.		[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/report		

Subject contents	These exercises are intended to familiarize students with the process of creating medicinal or cosmetic products using the potential of marine organisms, from the design stage, development of analytical methods, through formulation development, method validation, to quality control of finished products: - Extraction of oil from chlorella and spirulina. Quality control of oil. - Extraction of a natural active compound of marine origin (fucoxanthin) from <i>Fucus vesiculosus</i> - Determining the release profiles of active pharmaceutical ingredients (APIs) of marine origin from tablets - Formulation and permeation study of red algae extract gels using franz cell diffusion testing - Validation of measurement apparatus and equipment - Determination of collagen content in cosmetics and nutraceuticals commercially available		
Prerequisites and co-requisites	Knowledge of the basics of operation of biophysical equipment: UV VIS spectrometer, gas and liquid chromatograph, mass spectrometry. Knowledge of basic processes of molecular biology, biotechnology, microbiology. Ability to operate laboratory equipment.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	reports	51.0%	25.0%
	entry tests	51.0%	25.0%
	practical implementation of the experiment	51.0%	50.0%
Recommended reading	Basic literature	<i>Importance of algae oil as a source of biodiesel</i>; A. Demirbas, M. F. Demirbas; Energy Conversion and Management, 2011, 52(1): 163-170, 10.1016/j.enconman.2010.06.055 <i>Lipid and morphological changes in developing rapeseed, brassica napus</i>; D. B. Fowler, R. K. Downey; Canadian journal of plant science, 1970, 50(3): 233-247, 10.4141/cjps70-047 <i>The effect of temperature on the oil content and fatty acid composition of the oils from several oil seed crops</i>; David T. Canvin; Canadian journal of botany, 1965, 43(1): 63-69, 10.1139/b65-008 <i>Novel Separation Techniques for Isolation and Purification of Fatty Acids and Oil By-Products</i>; Udaya N. Wanasundara¹, P. K. J. P. D. Wanasundara, Fereidoon Shahidi; Published Online: 15 JUL 2005; DOI: 10.1002/047167849X.bio065 - Colin Poole & Michael Cooke, 2000, Extraction, in Encyclopedia of Separation Science, 10 Vols., ISBN 9780122267703 <i>A Rapid Method for the Determination of Fucoxanthin in Diatom</i>. L. J. Wang,, Y. Fan, R. L. Parsons, G.R. Hu, P.Y. Zhang, F.L. Li; Mar Drugs, 2018, 22:16(1):33, 10.3390/md16010033 <i>The Biochemical Composition and Antioxidant Properties of Fucus vesiculosus from the Arctic Region</i>. E. D. Obluchinskaya, O. N. Pozharitskaya, D.V. Zakharov, E.V. Flisyuk, I. I. Terninko, Y. E. Generalova, I. E. Smekhova, A. N. Shikov; Marine Drugs, 2022; 20(3):193, 10.3390/md20030193 - FDA Guidance for Industry: Documents such as "Dissolution Testing of Immediate Release Solid Oral Dosage Forms" provide regulatory perspectives and standardized methodologies, which can be very instructive for students. - USP-NF and EP Monographs: The United States Pharmacopeia and European Pharmacopeia contains standardized methods and specifications for drug substances, including detailed procedures for dissolution testing and other analytical techniques. - Percutaneous Absorption: Drugs, Cosmetics, Mechanisms, Methods" by Robert L. Bronaugh and Howard I. Maibach	
	Supplementary literature	"Topical Drug Bioavailability, Bioequivalence, and Penetration" by Vinod P. Shah, Howard I. Maibach "Pharmaceutical Skin Penetration Enhancement" edited by Kenneth A. Walters and Jonathan Hadgraft "Skin Barrier: Chemistry of Skin Delivery Systems" by Johann Wiechers "Methods for Skin Absorption" by William G. Reifenrath - Recent research articles from journals such as the Journal of Controlled Release, International Journal of Pharmaceutics, and European Journal of Pharmaceutics and Biopharmaceutics "Fundamentals and Applications of Controlled Release Drug Delivery" by Juergen Siepmann, Ronald A. Siegel, Michael J. Rathbone	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		