COURSE UNIT DESCRIPTION

Course unit title	Code
Industrial Chemistry	

Annotation
The course conveys general topics from the chemical industry: safety, production processes and costs, as well as raw material purchasing, quality and application. The course is based on selected case studies from the chemical industry and will require teamwork. Additionally, the course will deliver a basic understating for those interested in creating their own business or spin-off companies.

Lecturer(s)	Department, Faculty
Coordinating: Vaidotas Navickas **Other:**	Faculty of Chemistry and Geosciences, Institute of Chemistry, Naugardukas str. 24, LT-03225 Vilnius

Study cycle	Type of the course unit
Masters	Mandatory

Mode of delivery	Semester or period when it is delivered	Language of instruction
e-learning	Fall semester	English

Requisites	
Prerequisites: General, inorganic and organic chemistry	**Co-requisites (if relevant):**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	135	48	87

Purpose of the course unit: programme competences to be developed			
The course is aiming to expand and develop communication skills, discuss and argue on scientific topics. Additionally, decisions making based on scientific facts accompanied by critical thinking going to be addressed.			
Learning outcomes of the study programme	**Learning outcomes of the course unit**	**Teaching and learning methods**	**Assessment methods**
Critical and analytical thinking (1.1)	Will be able to analyze, systematize and critically evaluate the quality of scientific information and professional research data	Project	Project
Communication and collaboration (3.1)	Will be able to present and explain research results to professional and non-professional audiences.	Presentation	Presentation
Communication and collaboration (3.2)	Will be able to work independently in an interdisciplinary team and take	Work on project and presentation	Work on project and presentation

	responsibility for decision making.		
Technological and scientific research (5.1.)	Will be able to reasonably select the most appropriate drug synthesis methods, advanced manufacturing technologies and validation tools from academic, industrial and regulatory perspectives.	Work on project and presentation	Work on project and presentation

Course content: breakdown of the topics	**Contact hours**							**Individual work: time and assignments**	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship/work placement	**Contact hours, total**	**Individual work**	**Assignments**
1. Safety in chemical industry: a. Safety data sheets (why we use them and how to use them). b. Personal safety. c. Protection of watrer and air. Regulations Risk matrix and risk assesment	4		8				**12**	**26**	Case studies and examples from chemical industry
2. Process safety: a. Heat balancing. b. Exothermic reactions. c. Adiabatic temperature increase. Endothermic reactions.	3		8				**11**	**25**	Introruction in european regulations
3. Design of a safe production process	2		8				**10**	**18**	Basic understandic of production economics. Selected case studies from industry.
4. Innovation & Economics of Production a. Finding a new product: market needs and blue ocean. b. Development of a new product and optimizing/enhancing an old one. c. Intelectual property (IP) d. Quality and quality management. e. Structure of product costs. f. Production costs: fix and variable. g. Calculating and optimizing production costs.	6		9				**15**	**18**	Literature study. Work on case studies.
Total	**15**		**33**				**48**	**87**	

Assessment strategy	**Weight %**	**Deadline**	**Assessment criteria**
Project "Create my own	100	Examinati	The students will work in a group of 4-5 people.

business”		on month	10% the idea with explanation, why certain topic was selected. 20% finding and analyzing relevant information. 20% economical calculation to show business potential 10% sales idea, application and implementation. 40% final presentation and discussion.

Author	Publishing year	Title	Issue of a periodical or volume of a publication; pages	Publishing house or internet site
Required reading				
Ed. by Shayne Cox Gad	2008	Pharmaceutical Manufacturing Handbook “Regulations and Quality”		Wiley
Gregory K. Mislick, others	2015	Cost Estimation: Methods and Tools		Wiley
Bernd Schäfer	2014	Natural Products in the Chemical Industry		Springer
H. G. Kessner	2002	Food and Bioprocess Engineering		Kessner
Recommended reading				
On demand, will be available from lecturer.				