

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	Uvod v procesno varnost
<b>Course title:</b>	Introduction to the Process Safety

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Ekotehnologije, 3. stopnja	/	1	1
Ecotechnologies, 3 <sup>rd</sup> cycle	/	1	1

**Vrsta predmeta / Course type** Izbirni / Elective

**Univerzitetna koda predmeta / University course code:** EKO3-781

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15			15	105	5

*\*Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transferred to individual work.*

**Nosilec predmeta / Lecturer:** Prof. dr. Marko Gerbec

<b>Jeziki / Languages:</b>	<b>Predavanja / Lectures:</b>	slovenščina, angleščina Slovenian, English
	<b>Vaje / Tutorial:</b>	slovenščina, angleščina Slovenian, English

**Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:**

Znanje, ki je ekvivalentno izobrazbi druge stopnje ali univerzitetni izobrazbi s področja naravoslovja ali tehnologije.

**Prerequisites:**

Knowledge, which is equivalent to a second level or university degree from natural sciences or technology

**Vsebina:**

- Značilnosti preteklih večjih nesreč (zgodovinski pregled, trendi, odziv družbe).
- Prepoznavanje in ocenjevanje tveganj za vidik procesne varnosti (metode za ugotavljanje virov nevarnosti, izdelava scenarijev nesreč, metode in orodja za ocenjevanje teže posledic in njihove verjetnosti, potencial za verižne nesreče).
- Uporaba rezultatov ocene tveganja (varnostne analize) za zniževanje tveganj, presoja sprejemljivosti in vplivov na okolje, načrtovanje zaščite in reševanja, obveščanje javnosti, prostorsko načrtovanje, itd.
- Sistemi obvladovanja procesne varnosti (management).
- Ocenjevanje kvalitete vodenja

**Content (Syllabus outline):**

- Characteristics of the past major accidents (historical overview, trends, societal response).
- Identification and assessment of process safety risks (methods for hazards identification, development of major accident scenarios, methods and tools for assessment of consequences and their likelihoods, domino effects potential).
- Use of the risk assessment results (safety analysis) for risk reduction, licensing procedures (tolerability assessment) related to the environmental impact assessment, emergency response planning, informing the public, spatial planning, etc.
- Process safety management systems.

organizacij/obratov, ocenjevanje varnostne kulture, ocenjevanje in upravljanje človeške zanesljivosti.

- Analize vzrokov izrednih dogodkov z nevarnimi snovmi.

- Assessment of management quality of the organizations/establishments, evaluation of the safety climate (culture), assessment and management of human reliability.
- Root cause analysis of the process safety incidents and accidents.

### Temeljni literatura in viri / Readings:

- Guidelines for risk based process safety. Center for Chemical Process Safety of the American Institute of Chemical Engineers (2007). 706 p. ISBN 978-0-470-16569-0.
- Guidelines for chemical process quantitative risk analysis, Second Edition. New York: Center for Chemical Process Safety of the American Institute of Chemical Engineers (2000), 754 p., ISBN 0-8169-0720-X.
- Lees' Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control. Volumes 1, 2 and 3. Fourth edition. Sam Mannan, Elsevier, 2012. ISBN: 978-0-12-397189-0.
- Risk Analysis and Control for Industrial Processes - Gas, Oil and Chemicals A System Perspective for Assessing and Avoiding Low-Probability, High-Consequence Events. Hans Pasman, 2015. Elsevier. ISBN: 978-0-12-800057-1.
- The Coloured Books - Yellow, Green, Purple, Red – download available at TNO (registration required): <https://www.tno.nl/en/focus-areas/urbanisation/environment-sustainability/public-safety/the-coloured-books-yellow-green-purple-red/>
- Leveson, N., 2011. Engineering a Safer World: Systems Thinking Applied to Safety. MIT Press, Cambridge, MA, USA. ISBN: 9780262533690 (open access title!).
- Reason J., 2007. Managing the risk of organizational accidents. Ashgate. ISBN 1840141040.

### Cilji in kompetence:

#### Cilji:

- Razumevanje različnih vidikov varnosti (procesna, varnost pri delu, ipd.)
- Vrednotenje principov managementa procesne varnosti v industrijskih organizacijah, državnih organih in raziskovalnih organizacijah
- Vrednotenje uporabnosti analitskih metod pri ocenjevanju tveganj

#### Splošne kompetence:

- Poznavanje izbranih raziskovalnih metod, postopkov, procesov in orodij
- Izbira metod in orodij za ocenjevanje tveganj
- Vrednotenje povezanih negotovosti
- Sklepanje o pomenu tveganj na odločanje (sistemi vodenja)
- Sposobnost uporabe znanja v praksi
- Načrtovanje dela v skupini

### Objectives and competences:

#### Knowledge and understanding

- Detailed understanding of various safety aspects (process, occupational, etc.)
- Evaluation of process safety management principles in industrial organizations, statutory agencies and research organizations
- Evaluation of usefulness of analysis methods for risk assessment

#### General Competences:

- To master selected research methods, procedures, processes and tools
- Select method and tools for risk assessment
- Develop critical thinking and self-assessment
- Evaluate related uncertainties
- Infer the meaning of risks on the decision making (management systems)
- Application of the obtained knowledge
- Able to cooperate in a team

### Predvideni študijski rezultati:

#### Znanje in vrednotenje:

- Umestitve in razlikovanja vidika procesne varnosti napram sorodnim vidikom

### Intended learning outcomes:

#### Knowledge and understanding of:

- Positioning and differentiation of the process safety aspect against other similar aspects

- Družbenih in organizacijskih ukrepov za obvladovanje procesnih tveganj
- Specifičnih metod, postopkov in orodij pri ocenjevanju tveganj
- Pomena obvladovanja tveganj pri odločitvah (realizacija strategij, ipd.)

- Social and organizational measures to manage process safety risks
- Specific methods, procedures and tools for risk assessment
- The meaning of risk management at decisions (strategy realization, etc.)

**Metode poučevanja in učenja:**

- Predavanja
- Delavnice
- Seminarji

**Learning and teaching methods:**

- Lectures
- Workshops
- Seminars

Delež (v %) /

Weight (in %)

**Načini ocenjevanja:**

**Assessment:**

Ustni izpit, v katerem kandidat dokaže poznavanje in razumevanje temeljnih vsebin predmeta in predstavi njihovo vključevanje v svoj raziskovalni projekt, ali seminarsko delo. K predstavitvi so vabljeni vsi študenti pri predmetu in sodelavci pri v projektu/seminarju.

100 %

Oral exam, in which the candidate demonstrates his/her knowledge and understanding of the essential course content, and presents how this can be included in his/her research project or seminar work. The presentation shall be attended also by all students at the course and project/seminar participants.

**Reference nosilca / Lecturer's references:**

GERBEC, Marko, PONTIGGIA, Marco, ANTONIONI, Giacomo, TUGNOLI, Alessandro, COZZANI, Valerio, SBAOUNI, Mehdi, LELONG, Romain. Comparison of UDM and CFD simulations of a time varying release of LPG in geometrical complex environment. Journal of loss prevention in the process industries, 2017, 45, 56-68, doi: 10.1016/j.jlp.2016.11.020.

GERBEC, Marko, KONTIĆ, Branko. Safety related key performance indicators for securing long-term business development : a case study. Safety science, 2017, 98, 77-88, doi: 10.1016/j.ssci.2017.06.004.

GERBEC, Marko. Safety change management - a new method for integrated management of organizational and technical changes. Safety science, 2017, 100, 225-234, doi: 10.1016/j.ssci.2016.07.006.

GERBEC, Marko, BALFE, Nora, LEVA, Maria Cleva, PRAST, Steve, DEMICHELA, Micaela. Design of procedures for rare, new or complex processes. Part 1, An iterative risk-based approach and case study. Safety science, 2017, 100, 195-202, doi: 10.1016/j.ssci.2016.08.015.

GERBEC, Marko, BALDISSONE, Gabriele, DEMICHELA, Micaela. Design of procedures for rare, new or complex processes. Part 2, Comparative risk assessment and CEA of the case study. Safety science, 2017, 100, 203-215, doi: 10.1016/j.ssci.2016.10.015.