

ENG-431

**Safety of chemical processes**

Nanchen Annik

Cursus	Sem.	Type
Ing.-chim.	MA1, MA3	Obl.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Written
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Lecture	2 weekly
<b>Number of positions</b>	

**Summary**

The main focus of the lecture is on reactive hazards (thermal process safety) + introduction to explosion protection. While being based on theory, the lecture is oriented towards industrial practice. The lecture is 7x4h

**Content**

- Thermal process safety, systematic procedure for the assessment of thermal risks, analysis of incidents
- Fundamental aspects of thermal safety, calorimetric methods
- Decomposition reactions, characterisation, autocatalytic reactions, heat accumulation conditions
- Safe chemical reactors: criteria for the choice of the best suited reactor type and design
- Technical aspects of process safety, choice of risk reducing measures
- Introduction to explosion protection

**Keywords**

Runaway  
 Reaction  
 risk assessment  
 Explosion protection  
 Reactive Hazards  
 Thermal process safety

**Learning Prerequisites****Required courses**

Basic chemistry and chemical engineering courses

**Recommended courses**

Thermochemistry  
 Reaction kinetics

**Learning Outcomes**

By the end of the course, the student must be able to:

- Assess / Evaluate thermal risks
- Propose risk reducing measures
- Design an experimental plan
- Characterize a runaway reaction
- Exploit calorimetric measures
- Identify explosion risks

### Transversal skills

- Take account of the social and human dimensions of the engineering profession.
- Take responsibility for health and safety of self and others in a working context.

### Teaching methods

The course is given as a series of lectures. Case studies prepared by the students will be used to introduce each topic. Some exercises will be done during the lecture, others will be left for the student to do on its own. Solutions to all exercises will be provided.

### Assessment methods

The final grade will be the combination of the case study presentations (10%) and the final written exam (90%).

### Resources

#### Bibliography

#### **Thermal Safety of Chemical Processes: Risk Assessment and Process Design**

2nd edition, 2020

Author: Francis Stoessel

ISBN: 9783527339211 | Online ISBN: 9783527696918

#### **Explosion Hazards in the Process Industries**

2nd Edition - June 14, 2016

Author: Rolf K. Eckhoff

Paperback ISBN: 9780128032732 eBook ISBN: 9780128032749

References for further study:

#### **What went wrong?**

6th edition 2019

Authors: Trevor Kletz, Paul Amyotte

ISBN: 978-0-12-810539-9

#### **Introduction to Process Safety for Undergraduates and Engineers**

2016

CCPS (Center for Chemical Process Safety)

ISBN: 978-1-119-24126-3

#### Ressources en bibliothèque

- [Thermal Safety of Chemical Processes: Risk Assessment and Process Design](#)
- [Explosion Hazards in the Process Industries](#)
- [What went wrong?](#)
- [Introduction to Process Safety for Undergraduates and Engineers](#)

#### Références suggérées par la bibliothèque

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**Moodle Link**

- <https://go.epfl.ch/ENG-431>