

## ONLINE COURSE:

"GOOD CHEMISTRY - METHODOLOGICAL, ETHICAL, AND SOCIAL DIMENSIONS"

ECC7, GENERAL ASSEMBLY, LIVERPOOL AUGUST 26TH 2018

Dr. Jan Mehlich
EuChemS Working Party on Ethics in Chemistry

### **Team**



#### EuChemS executive board

- President Pilar Goya
- Former president David Cole-Hamilton
- Secretariat (Nineta Hrastelj, Alex Schiphorst)

#### EuChemS Division of Chemical Education (DivCEd)

- Iwona Maciejowska
- Rachel Mamlok-Naaman

#### European Chemistry Thematic Network (ECTN)

- Walter Zeller
- Bill Byers
- Paola Ambrogi

#### EuChemS Working Party on Ethics in Chemistry (WP EiC)

- Hartmut Frank
- Luigi Campanella
- Jan Mehlich

### What is the goal?



 "Sustainable education of chemistry students as our future scientists and researchers"

#### o Goals:

- Good Scientific Practice, Scientific Integrity;
- Responsible professional conduct in academia, industry, or public service;
- Awareness of dual-use potentials and how to deal with it;
- Improving discourse skills.
- Therefore, a proper course needs sections on:
  - Scientific methodology;
  - Research ethics;
  - Social impact of chemistry.

### Content



Research Methodology

Science Theory Science History Scientific Method Logic

Scientific

Misconduct

Scientific

**Publishing** 

Limits of science

Scientific statements

Science under uncertainty

Good Scientific Practice

Experimentation

Measurement

Funding and academic freedom

Mentorship

Interest Intellectual

Conflicts of

Property

**Animal experiments** 

Fabrication of data

Falsification of data

Plagiarism

**Chemistry and Society** 

Risk | Precaution

Responsibility

Sustainability

S&T Discourse

**Science Communication** 

Public discourse

S&T Governance

Technology Assessment

### Why bother?



- Knowledge and awareness of the normative dimensions of chemistry <u>pays off</u> in the form of:
  - Professional skill and competence
  - Credibility
  - Societal support
  - Sustainable progress
  - Economic benefit

### **Course Design**



- Online Course, provided via e-learning platform Moodle
- Target group: Master (final year) and PhD (early phase) students.
- o 16 classes:
  - 45-60 min. video lecture;
  - Pre-assessment questions, warm-up reflections;
  - Chemical cases (historical, fictional);
  - Reading and discussion assignments;
  - Workshops and forums;
  - Quizzes (test questions for assessment of learning outcome).
- Estimated workload per class: 2-3 hours
- Great organisational flexibility:
  - Entire course = 2 ECTS; selection of 8-10 classes = 1 ECTS
  - Local instructors manage and adapt the course content on Moodle, or combine it with on-site (face-to-face) classes.

### **Course Outline**

European Chemical Society

1	Introduction		European Chemical Societ
2	Scientific Inquiry		
3	The Scientific Method(s)	10	Sustainability
4	Scientific Practice	11	Science and values
5	Scientific Misconduct	12	Responsibility
6	Scientific Publishing	13	Risk, Uncertainty, Precaution
7	Collaborations, Conflicts of Interest, Mentorship	14	Science Governance, Technology Assessment
8	Academic Freedom, Intellectual Property	15	Science Communication
9	Animal Experiments	16	Example: Nanoscience

### **Example**

Class No. Class Title

10 Sustail

Sustainability

#### Summary of content

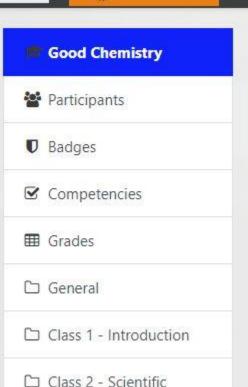
With this class, we start another section of this course: The impact of chemistry onto society and the environment. Here, the normative framework in the form of an ethos of science that has been used







ENGLISH (EN) -



#### Class 10 - Sustainability

01 - Warm-up: My own research project and sustainability

02 - Reading assignment: Sustainable and Green Chemistry (Albini, Protti)

03, 05, 07 - Video class: 10 - Sustainability

03, 05, 07 - Lecture Script

04 - Background information: Chemical Leasing

06 - Reading Material: REACH and Sustainability (ECHA report 2017)

👨 08 - Discussion forum: Chemistry & Sustainability

09 - Quiz

1	Warm-up reflection: My own research project and sustainability	
2	Reading assignment: Sustainable and Green Chemistry (Albini, Protti 2016, read	15 min.
	only chapter 1, the rest is optional)	
3	Watch the video, 0:00-32:55	33 min.
4	Further information: Chemical leasing (youtube video)	10 min.
5	Watch the video, 32:56-36:56	4 min.
6	Reading material: REACH and sustainability (read only chapter 2 of the provided	20 min.
	report, the rest is optional)	
7	Watch video, 36:56-end	10 min.
8	Discussion/reflection: Chemistry and Sustainability	15 min.
9	Quiz	5 min.

### **Course Objectives**



- Understanding basic science theory and applying it in daily research activity,
- Increasing knowledge on theory, conduct and communication of chemical science,
- Applying ethics to scientific practice and science assessment,
- Learning concepts of responsibility and sustainability in the context of chemistry,
- Acquiring skills for interdisciplinary normative discourse.



# THANK YOU FOR YOUR INTEREST AND ATTENTION!