

PhD. Programme in

Sustainable Chemistry



STARTING SCHOOL IN SUSTAINABLE CHEMISTRY 2013

Programme and Schedule

January 21-25, 2013

Chemistry Department
Faculdade de Ciências e Tecnologia
Universidade Nova de Lisboa

Class Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 - 10:00	Reception PDQS	ISC Topic I	ISC Topic III	ISC Topic V	Seminar Preparation
10:00 - 11:00	ISC Presentation				
11:00 - 12:00	CS-I T				
12:00 - 13:30	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
13:30 - 14:30	CS-I TP Student presentations	ISC Topic II	ISC Topic IV	ISC Topic VI	Seminars
14:30 - 15:30					
15:30 - 16:30					Closure
16:30 - 18:30	Group work	CS-I and Group work	Group work	Group work	

Programme

Reception PDQS

Eurico J. Cabrita / José Ferreira Gomes

Presentation of the PhD Programme in Sustainable Chemistry

Introduction to Sustainable Chemistry (ISC) - Presentation

Maria Manuel B. Marques

The 12 principles of Green Chemistry

CS-I (Communication Skills I)

Eurico J. Cabrita

1. Communicating Scientific Information
2. Preparing a Scientific Presentation
3. Introduction to scientific writing

Grading:

Seminar + Abstract writing

ISC (Introduction to Sustainable Chemistry)

Topic I - Green Metrics

Svetlozar Velizarov

1. What are "Green" Metrics?
Main concepts and indicators for measuring "Greenness" of chemical reactions and processes.
2. Are Mass and Energy Good Enough Indicators of Environmental Impact?
3. Basic Tools and Strategies for Developing Eco-efficient Chemical Processes and Clean Technologies.
4. Life Cycle Assessment (LCA).

Topic II - REACH

Manuela Pereira

1. What is REACH?
2. REACH objectives, regulation and obligations. Impacts on the chemical industry.
3. REACH processes: pre-registration, data-sharing, registration, evaluation, authorization, restriction, classification and labeling.
4. Communication in the supply chain.
5. Chemicals covered. Methods and Tools. Actors.

Topic III - Renewable Resources

Paulo Lemos

1. Renewables for Energy
 - Greenhouse gas effect and the future
 - Renewable energy sources: biomass
 - Biofuels: bioethanol, biobutanol, biodiesel
 - Other renewable energy sources: solar thermal, solar photovoltaic, wind power, hydro power, fuel cells
2. Renewables for the Chemical Industries
 - Crops as renewables
 - Fatty acids
 - Polymers: PLA, PHA
 - Other chemicals: furans, levulinic acid, adipic acid

Topic IV - Synthesis and Catalysis

Maria Manuel Marques

1. Sustainable Organic Synthesis
 - Introduction: the current status of chemistry; design of chemical systems; atom and energy economy;
 - New selective and efficient synthetic methods
 - New techniques using alternative resources
 - Use of non-conventional media
2. Catalysis: New efficient and selective catalytic processes:
 - asymmetric catalysis;
 - catalysis in water;
 - biphasic catalysts;
 - green catalytic oxidations;

- photocatalysis;
 - green acid catalysis.
3. Perspective of pharmaceutical industry on the search for a sustainable synthesis
 4. Responding to synthetic challenges in the future

Topic V - Alternative Solvents

Teresa Casimiro

1. What is an alternative solvent?
2. Assessing “greenness” of solvents- EHS indicator Environment, Hazardous, safety & LCA.
3. Advantages and disadvantages for alternative solvents
4. Examples and industrial applications
 - Solvent-less processes
 - Supercritical fluids
 - Water and supercritical water
 - Ionic liquids
 - Gas-expanded liquids
 - Biphasic fluorinated solvents
 - Combined processes
5. Visit to SFE pilot plant

Topic VI – Real-time green monitoring technologies

João Lopes

1. Green monitoring technologies
 - Real-time and in-situ monitoring
 - Spectroscopic based technologies - a review
 - (Bio)Chemical processes and products based monitoring (PAT concepts)
 - Analytical chemistry applications
 - Data handling (chemometrics)
 - Discussion
2. Practical cases (0,5 hours)
 - Engineering applications (case study; pharmaceutical production process)
 - Health science applications (case study: identification of bacterial strains)
3. Hands-on (1 hour)

Grading System:

Seminar + Written assignment

Written assignments are individually graded: to be delivered by the 25th February 2013

Participants

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