

Communication of Chemistry: foundations, ethics and actual challenges

Prof. Valentina Domenici

Synopsis:

- 1) The Image of Chemistry in the Society: state of the art and recent studies about perception of chemistry. Activity related to the topic "Common ideas about Chemistry";
- 2) Discussion about fundamental features of Chemistry and some ethical issues related to the Communication of Chemistry. Practical activity starting from some fake news about chemical topics and researches;
- 3) Public Understanding of Chemistry versus Public Awareness of Chemistry. Communication of Chemistry in formal and non-formal context: roles and potentialities. A cooperative learning activity;
- 4) Languages of Chemistry. Examples of a good Communication of Chemistry to the lay public. Practical activities about the preparation of a short communication for a specific media and for a specific target. Collective discussion.

[calendar to be established with the teacher, contact valentina.domenici@unipi.it]

Membrane and membrane processes: fundamentals and applications

Prof. Antonio Comite (Dipartimento di Chimica e Chimica Industriale, Università di Genova)

Course description:

A membrane is usually defined as a barrier allowing the separation of the different components in a fluid mixture. Several types of membrane processes can be configured and their applications in the daily life, industrial, environmental and energy fields is constantly growing.

The course will provide an overview on membrane science and technology describing both conventional and emerging membrane processes for industry and environmental applications and examining concepts of membrane reactors. The course will begin discussing the fundamentals, membrane materials, properties and characterization. The main separation mechanism in membranes will be described along with the principles of conventional and emerging membrane processes. Some applications for water and wastewater treatments will be discussed. Finally, the concept of membrane reactor will be reviewed.

[January-February 2020]

Emission spectroscopies: bases and modern applications

Dott. Francesco Zinna

Synopsis:

- 1) Fluorescence principles: fluorescence/phosphorescence difference, photophysics of excited states, radiative/non-radiative lifetime (and harnessing thereof: time-gated detection) and luminescence quenching pathways. Emission from excimers, aggregates, aggregation induced emission, thermally activated delayed fluorescence;
- 2) Examples and applications of electroluminescence, chemiluminescence, electrochemiluminescence, triboluminescence;
- 3) Lanthanide emission features and peculiarities;
- 4) Circularly polarized luminescence.

[calendar to be established with the teacher, contact francesco.zinna@unipi.it]

Introduction to classical Molecular Dynamics simulations

Dott. Lorenzo Cupellini

Synopsis:

- 1) Basic introduction to classical molecular dynamics (MD); Force Fields; Thermostats; Setting up a MD simulation; Basic MD protocols;
- 2) Analysis of MD trajectories; Comparison with experimental observables; Assessing the quality and reproducibility of results;

- 3) Time scales accessible to MD; Enhanced sampling techniques; The curse of dimensionality; Estimating Free Energies;
 - 4) Modern applications of MD simulations; Practical examples.
- [calendar to be established with the teacher, contact lorenzo.cupellini@unipi.it]