SUMMER SCHOOLS
**SUMMER SCHOOL IN BIOREFINING**

- **3 weeks - July 5th - 25th, 2018 - ects credits : 6**
- **Deadline registration : March 18th, 2018**

Biorefineries and, nowadays, more broadly, the bio-economy concepts propose interesting approaches to produce commodity products by finding alternative solutions from conventional petrochemical routes. The bioeconomy has been identified as a major theme at European and International levels for the development of processes and products using less fossil carbon. The European Commission defines the bio-economy as « an economy that encompasses the production of renewable biological resources and their conversion into products for human food and animal feed, bio-based products and bioenergy through efficient and innovative technologies » (definition EFIB2017). Therefore, the value chain in bio-economy requires complementary multidisciplinary skills combining economics, biotechnology, green chemistry, and life cycle analysis, process innovation for intensive and eco-engineered bioprocesses.

**DESCRIPTION AND CONTENTS:**

- Courses and lectures will cover the following topics:
  - Kinetics and reactions, enzymology, microbial engineering, life cycle analysis, green chemistry, bioproducts and separation techniques, by lectures, tutorials and practical works.
  - Initiation to documentary research (bibliography) and Development of a personal research project

**PRACTICAL WORKS AND WORKSHOPS:**

- Practical works are proposed in order to apply the theoretical aspects seen during the lessons/lectures. They also make it possible to work in conditions close to those encountered in our research laboratories, during research initiation projects or for PhD thesis preparation.
  - TP1: enzymatic kinetics (sucrose and/or cellulose hydrolysis, pulp case)
  - TP2: microbiology, discovery of microorganisms producing chemical synthons
  - TP3: life cycle analysis (as a board game)
  - TP4: manufacture of a bioplastic

Green chemistry workshop deals with small framed projects regarding bioenergy production, bioplastics, biosolvents etc... These workshops and practical works lead to oral presentation to evaluate the training.

This school will propose to each student to develop and to prepare a personal research project (PRP) related to the scientific themes of our home laboratories. These PRP will be evaluated at the end of the school by a Jury, in conditions close to the doctoral scholarship competition.

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**REGISTRATION FEES**

- Students: 200€ / University members: 250€
- Industry delegate: 350€ /One day delegate: 100€

**REGISTRATION DEADLINE : JULY 5, 2018**

**CONTACT:**

contact-cps2018@laas.fr
For more details, please visit https://cps2017.sciencesconf.org/
SUMMER SCHOOL IN APPLIED MATHEMATICS

Optimization for Machine Learning
1 week (20-30h courses)
May, 14th - 18th, 2018
ects credits: 2 to 3
Deadline registration: March 18th, 2018

The aim of this series of Lectures is to provide the basic background for dealing with Optimization issues in deterministic and stochastic environment. More specifically, we address the main features of smooth optimization algorithms with and without constraints: in addition to the theoretical material, we describe deterministic and stochastic gradient algorithms, Newton-type algorithms, least square algorithms. This part will be completed by an introduction to nonsmooth optimization algorithms (subgradient algorithms and proximal algorithms). All these optimization algorithms will be implemented during practice classes with application to image processing. The second part of the Lectures will be devoted to actual Statistical issues related to Machine Learning.

CONTENTS:
- Optimality conditions
- Algorithms for differentiable optimization without constraints
  a. Gradient algorithms
  b. Stochastic gradient algorithm
  c. Newton-type algorithms
d. Least squares issues
- First algorithms for nondifferentiable optimization
  LASSO, proximal algorithm.
- Introduction to Statistical Learning: Ridge Regression, Lasso, Support Vector Machines
- Imaging applications: image registration, compressive sampling, dictionary training...

SUMMER SCHOOL IN BIOCHEMICAL ENGINEERING

Enzyme, molecular biology and Microbial Engineering
2 weeks (20h-25h courses)
June, 4th - 15th, 2018
ects credits: 2 to 3
Deadline registration: March 18th, 2018

The course combines grounding in the field of life sciences (molecular biology, biochemistry, enzymology and microbiology) and in engineering sciences (biochemical engineering). The objectives of the proposed courses deal with the understanding of the most modern concepts in molecular biology as well as mastering the concepts of biocatalysis (enzymatic and microbial) for industrial developments.

COURSE 1 - ENZYME KINETICS (3-4 HOURS)
Objectives: to give basic knowledge concerning the measurement of the enzymatic reaction rate and the associated mechanisms, to establish the rate equations of complex enzymatic reactions.
(Enzyme classification, reaction mechanism, initial reaction rate/enzymatic activity, Michaelis-Menten equation, Inhibition/activation, Effect of temperature and pH, Allosteric enzymes)

COURSE 2. GENE EXPRESSION REGULATION (4-6 HOURS)
At the end of this course, the student will have understood and be able to explain (main concepts): (1) nucleic acids properties, genome organization and DNA replication and (2) gene transcription, RNA processing and messenger RNA translation leading from DNA to proteins. Proteins folding and modifications will also be briefly described and key elements of gene expression regulation will also be given. Thus, the student will be able to define and describe the main molecular elements allowing genome organization and gene expression. The aim of this course is to provide the molecular biology and gene regulation knowledge that is required to master biotechnology tools for optimizing and/or modifying microorganism of industrial interest.

COURSE 3. BIOCHEMICAL AND MICROBIAL ENGINEERING (4-6H COURSES / 6-8H LABWORKS / 2H TUTORIALS)
(metabolism of industrial microbes, microbial kinetics and biochemical engineering).

SUMMER SCHOOL IN APPLIED PHYSICS

Initiation to computer based instrumentation
2 weeks (40h courses)
May, 22nd - 31st, 2018
ects credits: 4
Deadline registration: March 18th, 2018

The general objectives are to acquire knowledge in the field of the measurement and data acquisition using computers and to determine the important parameters of a measurement chain. This training is mainly focused on practical work.

SKILLS TO BE ACQUIRED:
- How to choose the sensor, equipment, method adapted to solve a measurement problem.
- To Develop software under LabVIEW environment
- To Communicate with a data acquisition card or an instrument using RS-232 and GPIB buses.
- To Understand and use the main parameters during the use of data acquisition cards.
- To Develop data acquisition system with open source hardware

CONTENTS:
- LabVIEW Initiation (4h course; 8h practical works)
- Sensors (3h course)
- Stand-alone instrument (2h course; 5h practical works)
- Open-source instrumentation (4h course; 6h practical works)
- Data acquisition card (2h course; 6h practical works)
The essential set to ease your installation in Toulouse!

Settling down in a new city to study or complete a research program is an extremely enriching experience that can also be stressful and complicated when we don’t have a single clue about the area, the mandatory formalities, the habits or the customs.

In order to ease your arrival and make your installation stress free, the University of Toulouse provides you with a personalized reception service, very complete and specifically created to allow you to easily get acquainted with your new environment and anticipate your steps at the very most. Several packages available for international students and researchers: a welcome pack, a housing pack, a language courses pack, an airport / train station pack.

A complete set of tools for the students and researchers who are looking to easily settle in Toulouse! toubox.univ-toulouse.fr/

INSA TOULOUSE: A STATE INSTITUTE OF SCIENCE AND ENGINEERING

With over 15,000 engineering graduates working in all sectors of the economy, the Institut National des Sciences Appliquées of Toulouse, an international and multidisciplinary state engineering school, is recognized for the excellence of its five-year education curriculum which attracts students of a high academic level.

In addition to initial engineering education, INSA Toulouse’s missions include continuing education for engineers, scientific research and its valorization. It also offers Research Masters which give access to PhD studies.

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