

TOUL'BOX



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!  
[toulbox.univ-toulouse.fr/](http://toulbox.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.

INSA Toulouse is part of the INSA Group with six other institutes: Centre Val de Loire, Lyon, Rennes, Rouen Normandie, Strasbourg and Fes.

#### Location :

Campus of INSA de Toulouse  
[www.insa-toulouse.fr](http://www.insa-toulouse.fr)

**Registration fees :** 400€ / week

**Contact :** [summer-school@insa-toulouse.fr](mailto:summer-school@insa-toulouse.fr)

Special partners have to contact

[summer-school@insa-toulouse.fr](mailto:summer-school@insa-toulouse.fr) before registration

**Registration link :** <https://goo.gl/forms/zy7q3i1qW8Lzrhv1>

For Accommodation,

Rooms can be proposed on demand if available.

**Contact us for information.**

You can also use **Toul'BOX**.

INSA Toulouse  
135, avenue de Rangueil  
31077 Toulouse Cedex 4 - France  
[www.insa-toulouse.fr](http://www.insa-toulouse.fr)

# INSA

INSTITUT NATIONAL  
DES SCIENCES  
APPLIQUÉES  
TOULOUSE

# SUMMER SCHOOLS

## SUMMER SCHOOL ON CYBER PHYSICAL SYSTEMS

►► July 16<sup>th</sup> - 20<sup>th</sup> <https://cps2018.sciencesconf.org/>

Cyber-Physical Systems (CPS) are an emerging topic worldwide encompassing the next generation of engineered systems. They are the major enabler for smart wearable devices, smart homes, smart cities, Factory of the Future, E-Health and overall the Industry 4.0.

Cyber-Physical Systems are intended to connect the physical world by sensing the environment to the virtual world of data analysis and processing.

The summer school will focus on inter-disciplinary subjects covering the development of CPS with a special focus on Industrial Internet of Things.

It will address the main areas of CPS: (i) smart sensors, (ii) communication and networking, (iii) energy harvesting and energy management (iv) security and (v) data mining. All topics will be addressed through lecturers and practical demonstrations, given by internationally recognized researchers. Use cases will be presented by industry experts.

Targeted participants are Ph.D. and Master students, engineers and researchers

### ► REGISTRATION FEES

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

### ► REGISTRATION DEADLINE : JULY 5, 2018

### ► GENERAL CHAIRS :

Daniela DRAGOMIRESCU – INSA Toulouse, LAAS-CNRS  
Florin UDREA - University of Cambridge,  
Fellow of Royal Academy of Engineering

### ► CONTACT :

contact-cps2018@laas.fr  
For more details, please visit <https://cps2017.sciencesconf.org/>



## SUMMER SCHOOLS :

Our spring and summer courses propose a wide variety of scientific topics in relation with our Engineering Bachelor and Master Programs. Our ambition is to contribute to the major societal challenges of tomorrow (Energy transition, industrial renewal, digital transition, sustainable development, transport (aeronautics, trains, automotive) mobility and urban systems...) by adapted educational programs in relation with our associated Research Laboratories.

## SUMMER SCHOOL IN BIOREFINING

►► Biorefining: from raw materials to chemicals

(co-organized with INP-ENSIACET)

3 weeks - July 5<sup>th</sup> - 25<sup>th</sup>, 2018 - ects credits : 6

Deadline registration : March 18<sup>th</sup>, 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

Course of French as a Foreign Language (FLE) could be organized on demand

#### • 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.



## SUMMER SCHOOL IN APPLIED

## MATHEMATICS

►► Optimization for Machine Learning  
1 week (20-30h courses)

May, 14<sup>th</sup> - 18<sup>th</sup>, 2018

ects credits : 2 to 3

Deadline registration : March 18<sup>th</sup>, 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 (sub gradient 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, 4<sup>th</sup> - 15<sup>th</sup>, 2018

ects credits : 2 to 3

Deadline registration : March 18<sup>th</sup>, 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, 22<sup>nd</sup> - 31<sup>st</sup>, 2018

ects credits : 4

Deadline registration : March 18<sup>th</sup>, 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

### ► PREREQUISITES : BASIC IN BASE IN ALGORITHMIC

### ► 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)

