

# ICS Summer School 2016

Scientific Trends at the Interfaces  
Scientific Visualization – Data Science

Organisers: Pascal Frey, Patrick Gallinari,  
Agathe Guilloux, Sylvie Thiria, Julien Tierny

July 18th – August 12th, 2016, Roscoff - France





Science at the  
interfaces



# A multidisciplinary way of learning

Improve your curriculum

Discover the challenges of tomorrow

## Welcome to ICS Summer School

Experience a multidisciplinary way of learning, explore areas outside your major and enjoy international campus life at the UPMC Marine Station in Roscoff.

Ideally located on the Northern Brittany coast, the renowned research and training centre is jointly operated by the French National Centre for Scientific Research (CNRS) and the Pierre & Marie Curie University (UPMC).

Read more on the Summer Schools at:

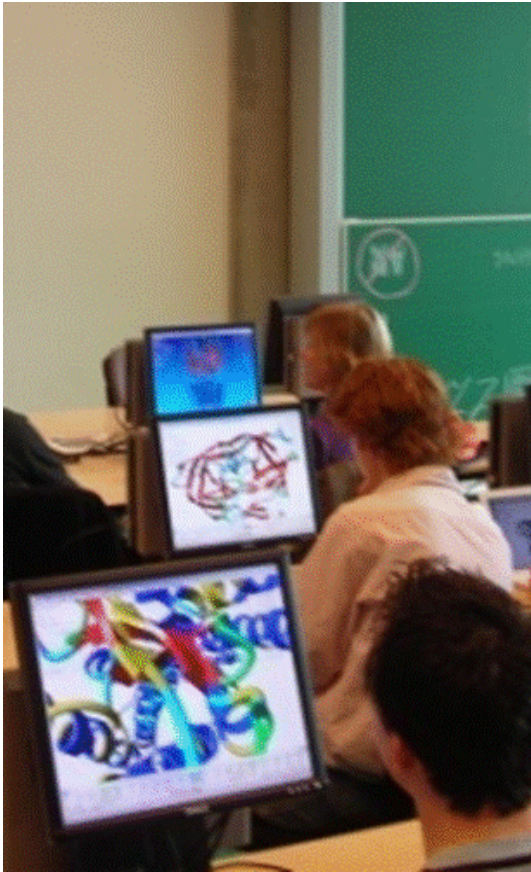
[ics.sorbonne-universites.fr/formation/ecole-dete.html](https://ics.sorbonne-universites.fr/formation/ecole-dete.html)

## ICS Commitment to Teaching

For talented undergraduate and graduate students who wish to broaden their experience, our unique four weeks summer program offers challenging opportunities.

We are committed to provide the best level of teaching and academic environment in view of creating a community beyond the classroom and build life lasting friendships.

Full sponsorship may be provided thanks to French state funds awarded to CALSIMLAB under the *Investissements d'Avenir* programme, reference ANR-11-IDEX-0004-02



Students working on an educational task with YASARA software (Wikimedia Commons)

“Interdisciplinary programmes are a unique opportunity to achieve scientific breakthroughs in numerical simulations”

Pascal Frey,  
Programme Director, ICS Summer School

## A stimulating experience

ICS invites motivated undergraduate and graduate students to apply.

We select students with excellent academic results and who wish to experience a different style of learning with world-class faculty.

The Summer School Programme allows students to enlarge their curriculum and explore areas at the interfaces between disciplines that are making extensive use of scientific computing and simulation.

Morning classes, afternoon tutorials/projects and seminars by worldwide speakers are scheduled.

## Eligibility

The Summer School is for advanced Bachelor’s and Master’s degree (L3 to M2 levels). To apply, students should have completed at least three years of university studies.

## Scholarships

A limited number of full/partial scholarships is available. A full scholarship covers tuition fees, accommodation in Roscoff.

## Language requirements

Students from all over the world are encouraged to apply.

All courses are taught in English, depending on the audience. Applicants are expected to be fluent in either language in order to follow the lectures and participate to classrooms discussions.

## Accommodation

All Summer School students have the opportunity to live on campus hotel. Breakfast, lunch and evening meals (except on Saturdays and Sundays) are included.

## Application and registration

To secure your participation, we advise you to apply as soon as possible.

Application form can be filled online from the ICS web site:

[ics.sorbonne-universites.fr/formation/ecole-dete.html](https://ics.sorbonne-universites.fr/formation/ecole-dete.html)

# 2016 Summer School Programme

The purpose of these 4 weeks of training is to introduce the basics of scientific visualization and data sciences.

Term I - 18-29 July: **Scientific visualization**

Term II – 1-12 August: **Data science**

Summer School Terms I and II are interdisciplinary courses and can be taken independently: students may enrol for either or both, however they are encouraged to take both. The courses consist of morning plenary sessions, afternoon numerical simulation hands-on activities and evening lectures.

**During this training programme, students will discover several aspects of state of the art and current research in scientific visualization and data science and will get a thorough introduction to the underlying mathematical and computational methods applied to these challenging topics.**

**Term I: Scientific visualization is a booming area that helps to advance knowledge at the interfaces of disciplines.**

With nowadays complex numerical simulations, scientists are in need for abstract, general-purpose methods of analysis to improve their understanding of the phenomena that have been simulated. Real-time interactive visualization can serve as interpretation, help building hypothesis and reasoning. Active research areas in this topic involve information theory, computer graphics, mathematics, physics, and cognitive science.

**Term II: Data science is a multidisciplinary emerging field that aims at extracting knowledge from data.**

Data science is based on theories and techniques from mathematics, applied statistical analysis, information science, computer science, including machine learning, information processing, statistical learning,

data mining, etc. It impacts almost all domains and application areas including medical sciences, biological studies, social sciences and humanities.

**This advance training is open to young and brilliant scientist students (undergraduate and graduate) and does not specifically require prior knowledge other than a solid 3-years scientific university background.**

To benefit from this formation, students need to have a strong desire to learn and understand new elements. There will be ample time for filling some gaps in understanding. Instructors will be happy to explain, either in face-to-face discussions or during the tutorial sessions.

**The main areas that will be covered include:**

- Basic information theory
- Mathematical methods for topological analysis
- Computer graphics and advanced rendering techniques
- Basics of statistical data analysis and machine learning
- Deep learning introduction
- Introduction to Python programming

**Keynote Speakers and Supervisors**

**Scientific Visualization**

**Pascal Frey**, *Professor at UPMC*

**Christopher Garth**, *Professor at University of Kaiserslautern*

**Loïc Norgeot**, *Research engineer at UPMC*

**Julien Tierny**, *CNRS Researcher at UPMC*

**Fabien Vivodtzev**, *Senior Researcher at CEA-CESTA*

**Data Science**

**Félix Balazard**, *PhD researcher at UPMC*

**Julien Brajard**, *Professor at UPMC*

**Gabriela Contardo**, *PhD researcher at UPMC*

**Djalel Dilmi**, *PhD researcher at UVSQ*

**Gilles Moyses**, *PhD researcher at UPMC*





## Plenary lectures

Plenary lectures are held every morning on weekday and will propose talks on a wide range of topics of importance for Scientific visualization and Data science: from basic information theory, numerical methods for topological analysis, basic statistical analysis, deep learning methods, etc.

Full details about the lecturers and speakers will appear in the daily timetable you receive upon registration.

## Hands-on simulations

These afternoon sessions are meant to be interactive, educational and, possibly fun.

They will provide various insights and concrete experiences with educational software packages.

Students will be encouraged to develop their intuition and skills by interacting with experienced users in a user-friendly environment. Under the guidance of experts, participants will play and learn by doing.

Students are encouraged to assist and participate actively.

## Evening lectures

During the sessions, a few topic-related lectures will take place on evenings, given by invited speakers and faculty members.

These sessions are aimed to enhance your understanding and enjoyment of the programme. Speakers are experts in their field: senior figures from within and beyond the University, Course Directors, and Guest Lecturers from industrial research centres.



## Institute for Scientific Computing and Simulation

Université Pierre et Marie Curie  
Case courrier 380  
4, place Jussieu, 75005 Paris cedex 05, France  
[ics.sorbonne-universites.fr](http://ics.sorbonne-universites.fr)

