Paris Math Spring 2013
Course Offerings

Course 1 (Weeks 1-3): Math 29513: Computability Theory

Instructor: Robert Soare

In 2012 we are celebrating the one hundredth birthday of Alan Turing, the main founder of computability theory and we are now celebrating roughly seventy-five years since the epochal results of Godel, Turing, Church, and Turing brought the definitions and formalisms for computable functions in 1931--1936. Outside of this mathematical subject the society was rapidly changing. In 1936 ``computer'' meant a person sitting at a desk with a mechanical calculator to do small computations. In the 1960's ``computer'' meant a large machine in the basement of a university building where one brought punched IBM cards and a couple hours later picked up the output printed on long white sheets of paper fastened together. In 1981 IBM introduced the IBM PC model 5150, which led to laptop computers.

The seventy-five years of development of computability and a myriad of publications has produced a common core of computability results. The term ``common core'' in the liberal arts is the implementation of the Great Books program at the University of Chicago by President Robert Maynard Hutchins and philosophy professor Mortimer Adler in the 1940's. It is based on the principles of secular perennialism, that something ``lasts an indefinitely long time, recurs again and again, and is self-renewing.''

In this course we stress the common core elements of computability which are perennial, absolute, recurring, and pervasive. It is not sufficient that the theorems and proofs be correct. They must be elegant and must reveal the inherent beauty of the subject. They must be the right theorems, in the right order, with the right proofs so that the reader will finish with a sense of esthetic appreciation of the permanence and beauty of these notions.

Course 2 (Weeks 4-6): Math 29512: Introduction to p-Groups

Instructor: Diane Herrmann

This course is an introduction to p-groups, which play an important role in solvable groups and Lie Algebras. Beginning from the Sylow structure of groups, we will study commutators, the Frattini subgroup, automorphisms, and central products. The course will include a project. The level of difficulty of the project chosen will determine whether this course may be substituted for Math 25600 or Math 25900 in the BS program. Prerequisite: Math 25500 or Math 25800.

Week 7 is a break week for excursions and explorations in Paris and elsewhere.

Course 3 (Weeks 8-10): Math 29511: Introduction to Stochastic Processes

Instructor: Greg Lawler

Stochastic or random processes study the evolution of systems that have a certain amount of randomness in them. We will study a number of different processes, in both discrete and continuous time and discrete and continuous space. Topics include: Markov chains (discrete and continuous time), branching (population) models, birth and death processes, optimal stopping, martingales, and an introduction to Brownian motion. The text will be my book, Introduction to Stochastic Processes. While exposure to probability will be useful, it will not be a prerequisite for the course.

To apply, go to the foreign studies website (http://study-abroad.uchicago.edu/) and fill out the on line form for Paris Math Spring 13. There is no need to get a recommendation; we do not require them for this program. We will evaluate your application by considering your math background and your overall transcript. To be eligible to take these math courses, you must have completed any analysis sequence and either Math 25800 or Math 25500.