

**University of Chicago  
Paris Mathematics Program  
Spring 2014  
Course Offerings**

**Course 1 (Weeks 1-3): Math 29507: Geometry of Matrix Groups**

March 31-April 18

Instructor: John Boller

We will discuss the structure of general and special linear groups, orthogonal groups, unitary groups, and symplectic groups. These groups are used throughout algebra, topology, and analysis. We will emphasize the roles of matrix groups in each of these fields, and present examples where the knowledge of these groups leads to the solution of interesting problems. The text for the course is *Matrix Groups*, by Morton Curtis. Instead of a final exam, there will be final projects, and the level of difficulty of the project chosen will determine whether this course may be substituted for Math 25600 or Math 25900 in the B.S. degree program.

**Course 2 (Weeks 4-6): Math 29516: Topics in Partial Differential Equations**

April 21-May 9

Instructor: Takis Souganidis

The course will be an introduction to theory of partial differential equations. The main topics are the Laplace, heat, wave and Hamilton-Jacobi equations. The emphasis will be on the derivation and basic theory (existence, uniqueness, stability, regularity and approximations) of the solutions to these equations as well as some applications. Suggested (but not required) books are Sandro Salsa, *Partial Differential Equations in Action*, L. C. Evans, *Partial Differential Equations*, W. Strauss, *Partial Differential Equations, An Introduction*, and Pinchover and Rubinstein, *An Introduction to Partial Differential Equations*. The only prerequisites are good knowledge of calculus. All these books are advanced for the class and are going to be used only for some of the material. Therefore they are suggested more as references.

**Week 7 (May 12-16): Break Week for excursions in Paris and elsewhere.**

**Course 3 (Weeks 8-10): Math 29506: Advanced Topics in Numerical Analysis**

May 19-June 6

Instructor: Ridgway Scott

The course will involve the analysis of numerical methods used in scientific computing. The emphasis will be on the mathematical properties of the algorithms, but examples of their use will also be presented. The course will provide an introduction to some concepts in functional analysis, in particular, operators and functionals defined on linear spaces of functions. Many of the main developers of the field (Lagrange, Laplace, etc.) were active in Paris, and visits to relevant historical sites will be scheduled. As time permits, we will touch on current open

questions related to the foundations of scientific computation, such as the computability of the Mandelbrot set.

**To apply, go to the foreign studies website (<http://study-abroad.uchicago.edu/>) and fill out the on line form for Paris Math Spring 14. 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.**