Student Syllabus, MAD 5932–01, Fall 2006

INSTRUCTOR: Dr. Raúl Tempone.
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CLASS SCHEDULE: Tue. (in LOV 0200) from 11.00am to 12.15 hs and Thurs. from 11.00am to 12.15 hs (in room Dirac 152). Starts on Tuesday August 29 2006 in LOV 0200 (the place of Tuesdays class may be changed later to access SCS facilities).

OFFICE HOURS: Tuesday, Thursday, from 10:00 to 11:0 hrs at Dirac 442. Additional office hours may assigned by appointment.

ELIGIBILITY: The course is organized by the department of Mathematics and the School of Computational Science. It is open for both graduate and undergraduate students. It is the student's responsibility to check and prove eligibility.

PREREQUISITES: The prerequisite for the course is knowledge of basic courses in mathematics and numerical analysis, or the equivalent. Some experience of computer programming and the use of UNIX/LINUX/WINDOWS systems or personal computers is assumed. The homework and computer laboratories constitute a very important part of the course. Computer assignements will be done in MATLAB with existing software for the student to modify and experiment with. Enrolled students will have access to computer facilities with MATLAB at SCS if needed. The students will have to fill a web form request to obtain access to those facilities.

TEXT: The text for the course is the lecture notes:
Stochastic and Partial Differential Equations with Adapted Numerics, authored among others by the teacher. We will use additional material as well.

COURSE OBJECTIVES: The goal of this course is to give basic knowledge of treatment of stochastic differential equations and their numerical solution, useful for scientific and engineering modeling, guided by some problems in applications in financial mathematics, material science, geophysical flow problems, turbulent diffusion, control theory and Monte Carlo methods. We will discuss basic questions for solving stochastic differential equations, e.g. to determine the price of an option is it more efficient to solve the deterministic Black and Scholes partial differential equation or use a Monte Carlo method based on stochastics. The course treats basic theory of stochastic differential equations including weak and strong approximation, efficient numerical methods and error estimates, the relation between stochastic differential equations and partial differential equations, stochastic partial differential equations, variance reduction, etc.

GRADING: The final exam will be held Dec 15:th, in room LOV 0200.

The grading consists of three parts: Homework problems, oral presentations and a written exam. The homework and the presentations are carried out by *groups of students*. Each group hands in a report for each of the assignments, including the final presentation.

Concerning presentations: Homework problems and final projects are presented by lab groups according to a certain schedule. Prepare a 20 minutes presentation with overhead material including the formulation of the problem, theoretical analysis, results from computer simulations, conclusions, open questions etc. Take the presentation seriously and use it as an opportunity of getting some practical training in the difficult art of oral presentation. Remember that presenting a material in a clear and convincing way requires quite a bit of preparation and training to be successful. We all need practice and positive criticism in this respect, both teachers and students.

Concerning Homework:

Each group should hand in a written solution. The homework has two purposes: it poses an exercise on a new mathematical concept or method and gives the opportunity to practice written presentations of solutions. This means that a solution with just formulas is not acceptable. The solution should resemble the lecture note's presentation of an example and not the teacher's shortened version of it when he presents on the blackboard.

The presentation shall be prepared in such a way that a fellow student who who has been away for two weeks should be able to understand and be satisfied with it. Describe the formulation of the problem, the theoretical background the results and some eventual conclusions.

A solution that does not have an acceptable grade can be completed and resubmitted within one week after the corresponding oral presentation.

Numerical course grades will be determined according to the formula

Total Score = (30* (Final Exam) + 50 * (Average Homework) + 20 * (Final Presentation))/100

Letter grades will be determined from numerical grades as follows: A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: 0-59. Plus or minus grades may be assigned in a manner consistent with standard University practice. A grade of I will not be given to avoid a grade of F or to give additional study time. Failure to process a course drop will result in a course grade of F.

EXAM POLICY: No tests or quizzes will normally be given. Acceptable medical excuses must state explicitly that the student should be excused from class. Students must bring FSU ID cards to all tests.

HONOR CODE: The Academic Honor System of The Florida State University is based on the premise that each student has the responsibility 1) to uphold the highest standards of academic integrity in the student's own work, 2) to refuse to tolerate violations of academic integrity in the University community, and 3) to foster a high sense of integrity and social responsibility on the part of the University community. Please

note that violations of this Academic Honor System will not be tolerated in this class. Specifically, incidents of plagiarism of any type or referring to any unauthorized material during examinations will be rigorously pursued by this instructor. Before submitting any work for this class, please read the "Academic Honor System" in its entirety (as found in the FSU General Bulletin and in the FSU Student Handbook and ask the instructor to clarify any of its expectations that you do no understand.

AMERICAN DISABILITIES ACT: Students with disabilities needing academic accommodations should: 1) register with and provide documentation to the Student Disability Resource Center (SDRC); 2) bring a letter to the instructor from SDRC indicating you need academic accommodations. This should be done within the first week of class.