**Math 5900 – Seminar on Monte Carlo Methods – Spring 2011**

**Professors**: Dr. Jesse Frey and Dr. Klaus Volpert

**Dr. Frey’s Contact Information:**

**Office:** St. Augustine Center for the Liberal Arts, Room 375

**Phone:** (610) 519 - 7350

**E-mail:** jesse.frey@villanova.edu

**Office Hours:** Monday: 5-6 pm; Tuesday: 4-5 pm; Thursday: 10-11 am and 1-2 pm.

**Webpage:** <http://www19.homepage.villanova.edu/jesse.frey/>

**Dr. Volpert’s Contact Information:**

**Office:** St. Augustine Center for the Liberal Arts, Room 374

**Phone:** (610) 519 - 4670

**E-mail:** klaus.volpert@villanova.edu

**Office Hours:** Monday through Thursday: 10-11 am.

**Webpage:** http://www41.homepage.villanova.edu/klaus.volpert/

**Textbook**: *Explorations in Monte Carlo Methods*, by Shonkwiler and Mendivil. This textbook is available for **free** through the Falvey Library as an e-book. Visit either instructor’s webpage for a link to this book.

**Course Topics:** This course deals with Monte Carlo methods, which are methods for answering questions via computer simulation. We will discuss generation of random variables, the design of Monte Carlo studies, and methods for appropriately assessing the error in a Monte Carlo estimate. We’ll make heavy use of the statistical computing package R, and we’ll pay special attention to applications of Monte Carlo methods in finance.

**Course Expectations** This course is a seminar. We, *all* of us, create this class. Thus, your active participation in all aspects of the class is essential.  Your willingness to engage with the topic, your ability to think of good questions, your initiative to pursue those questions and your creativity will determine much of the success of the class. Much is asked of you.
 This high level of expectations is balanced, though, with a high level of freedom of choice. You have a great opportunity to pursue what you like. There exists a large range of diverse problems that can be approached via Monte Carlo simulations. It can be really exciting and rewarding to find answers to questions you created in a field that you like. Who knows, you might discover things nobody else has discovered before. Even if it is not brand-new what you find, the search is still exciting, as the topic becomes *yours*, something you can be proud of.

**Course Structure**: We’ll spend the first half of the course discussing the main ideas involved in using Monte Carlo methods. This discussion is guided by us professors. Almost from the get-go, though, you should listen for –and possibly independently look for- a research topic. The sooner you create interesting questions the better.
The intent is that each student will make an in-depth study of one specific topic related to Monte Carlo methods. Each student will make two class presentations: a preliminary presentation and a final presentation. Each student will also turn in a paper that summarizes the results of this in-depth study.

**Project Topics:** We have a list of several possible topics that you might choose from. We are also happy to work with you to develop other topics that might interest you. We hope to meet with each student several times during the course of the semester.

**Grading**: Your grade will be determined by your participation and attendance (15%), your homework average (15%), your grade on a midterm test (20%), your grade for your in-class presentations (30%), and your grade on the paper (20%).

**Computing:** Monte Carlo methods are usually implemented using a computer. In our class, we will use the statistical computing package R, which can be downloaded from <http://www.r-project.org/>. We’ll discuss R in class, and sample R code will be made available on each instructor’s course webpage.

**Project-related Deadlines:**

February 15 – Project topics should be chosen by this date.

March 17 – Preliminary presentations start.

April 5 – Final presentations start and drafts of papers due.

May 3 – Final versions of papers due.

**Other Important Dates**:

March 1 and March 3 (Spring Break) – No classes.

April 21 (Easter Break) – No class.

April 26 – We don’t meet since classes follow a Friday schedule.

**Academic Integrity**: All work that you submit must be your own. Violations of the

university code of academic integrity will be addressed in accordance with the university-wide procedure.

**Students with disabilities**: Appropriate accommodations will be made for students

with disabilities. Before we can make these accommodations, however, you must contact the Office of Learning Support Services at (610) 519-5636. It is a good idea to do this early in the semester.