OR 750: Optimization for Engineering Design

Spring 2012
Innovation Hall, room206
Thursdays 4:30-7:20pm

Professor: Stephen G. Nash
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Office hours: Wednesday/Thursday 3pm-4pm, and by appointment; via e-mail at other times

All course materials will be posted at mymason.gmu.edu

Textbook: There is no textbook for this course. A variety of readings will be used. The overall themes of the course will be based on the report The Opportunities and Challenges of Exascale Computing, available at: http://science.energy.gov/~/media/ascr/ascac/pdf/reports/Exascale_subcommittee_report.pdf

Objectives: This course will provide an introduction to computational strategies for solving large-scale engineering design problems. For complex engineering applications, the focus until recently has been to develop computational models that are *descriptive*, that is, models that can simulate the behavior of the system. As computer power increases, and algorithms improve, the goals are becoming more ambitious, with a desire to *optimize* the behavior of such systems.

The course will discuss applications from such areas as aeronautical design, material design, and energy planning. We will also discuss algorithmic approaches for solving such problems, such as model management, decomposition, and multigrid frameworks.

This is a doctoral-level course, so many of the readings will come from research papers. There will be an opportunity for the students to guide the choice of topics, based on their own research interests.

Students should have some experience in optimization models, such as having taken a course such as OR 641, 642, 643, or 644.

Course Schedule

The topics and schedule for the class will be determined in part by the interests of the students. In the initial classes we will discuss the overall themes of the course, and identify topics to be included in the course. The course will have several modules with the overall themes of (a) applications, (b) algorithms and methodologies, and (c) high-performance computing.

Spring break occurs March 12-16. The final class session will be on May 3. There will be no final exam, but I expect that your final report submission will have a due date during the exam period.

Grading:

25%	Class participation
35%	Class presentations
40%	Report submissions

Policies

Coursework & Grading

Unless otherwise indicated, you are expected to work individually on homework assignments, projects, and exams. Late submissions are not accepted. You can submit homework directly to me (in class or at my office), through the SEOR department office, via email, via fax (703-993-1521), and at http://courses.gmu.edu.

Academic Integrity

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

GMU Email Accounts

Students must use their Mason email accounts to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information. Please *do not* use the email system within http://courses.gmu.edu to contact me, since it is not integrated into the main campus email system.