COURSE DESCRIPTION:
MATHEMATICAL TOOLS FOR
ENGINEERING PROBLEM SOLVING
EGR/MA 265–6D, FALL 2013

SCHOOL OF ENGINEERING & DEPARTMENT OF MATHEMATICS
UNIVERSITY OF ALABAMA AT BIRMINGHAM

Goals and Contents:

EGR/MA 265 is a course taught jointly by the School of Engineering and the Department of Mathematics. Its contents are the main topics of second year Calculus:

- Introduction to Ordinary Differential Equations
- Multivariable Calculus

The course was developed in close coordination with Engineering faculty to ensure that the most relevant Calculus topics used in upper level Engineering courses are covered, while at the same time giving students a fast-paced option to satisfy their math requirements.

Thus the goals of the course are two-fold:

- Acquire mathematical skills such as
  - solving initial value problems for first order ordinary differential equations
  - learning methods to solve homogeneous and inhomogeneous second order ordinary differential equations with constant coefficients
  - knowing calculus concepts for functions of several variables such as partial derivatives, gradients and line integrals
  - the evaluation of double and triple integrals for functions of several variables

- Use the acquired math skills to solve engineering problems and to critically assess the validity of a mathematical solution in applications. Some of the engineering and science problems to be studied are
  - mechanical motion, exponential growth and decay
  - population dynamics
  - vibrations in mechanical and electrical systems
  - center of mass and moments of inertia
  - work done when moving in a force field, potentials for conservative forces

Date: August 9, 2013.
Course Instructors:

**Dr. Hassan Moore:** Office HOEN 115C, Phone 934-8410
E-mail hmoore@uab.edu, Office Hours: Mon and Wed, 9am to 11am, or by appointment

**Dr. Junfang Li:** Office CH 491, Phone 934-2154
E-mail jfl@uab.edu, Office Hours: Tue and Thu, 11am to 12noon, or by appointment

Meeting times: Monday and Wednesday 2:30pm to 4:20pm
Meeting location: HHB 121
Prerequisite: Grade of C or better in MA 126 or equivalent
Credits: 4 semester hours
Textbook: No textbook purchase is required. Lecture notes with the relevant material will be provided electronically in pdf-format via UAB’s Blackboard Learning System. These lecture notes will be incomplete in that they will not contain solutions to examples worked in class. Thus, it is strongly encouraged that you attend all class meetings to take notes.

Suggested reading (if you prefer to have a book for additional reading and more exercises, but this is not necessary to follow the class):
Zill, A First Course in Differential Equations (used in MA 252), Stewart, Essential Calculus – Early Transcendentals (used in MA 227).

Important dates:
First day of classes: Monday, August 26
Labor day: Monday, September 2
Last day to add/drop: Tuesday, September 3
Last day to withdraw: Friday, October 25
Fall/Thanksgiving Break: Monday, November 25 - Friday, November 29
Last day of class: Wednesday, December 4
In-Class Tests: Three 50-minute tests will be given. At least one week notice will be given for the exact test dates.
Final exam: Friday, December 13, 1:30pm to 4:00pm, HHB 121

Methods of teaching and learning:
- Class lecture
- Active and collaborative learning in class (problem solving sessions)
- Online homework with instant feedback
- Paper-based (and manually graded) mini projects, one before each exam

Assessment procedures:
- Student achievement will be assessed by the following measures:
  - Weekly online homework via the Blackboard Learning System will be given to practice basic math skills. Homework will be due one week after assignment. Online homework contributes 14% to the course average. The two lowest weekly homework grades will be dropped.
  - Before each one of the tests and the final exam (and in time to be graded and returned before the exam) a mini project assignment will be given, requiring detailed solutions carefully written down on paper
for full credit. These mini projects will focus mostly on applications of the course material in physics and engineering. The written mini projects will contribute $4 \times 5\% = 20\%$ to the course average.

- Three 50-minute in-class tests will be given. The contents of tests will be modeled after problems covered in online and written homework, problems worked in class and the review problems provided at the end of every chapter of the online class notes. The tests will also check on knowledge of important engineering applications. Each test contributes 12\% to the course average, for a total of 36\%.

- A 150-minute comprehensive final examination will be given on contents modeled after the tests and problems worked in class and in homework. The final contributes 30\% to the course average.

- Your final grade is determined according to the following table:

<table>
<thead>
<tr>
<th>Course performance</th>
<th>Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>88-100</td>
<td>A</td>
</tr>
<tr>
<td>75-87</td>
<td>B</td>
</tr>
<tr>
<td>62-74</td>
<td>C</td>
</tr>
<tr>
<td>50-61</td>
<td>D</td>
</tr>
<tr>
<td>below 50</td>
<td>F</td>
</tr>
</tbody>
</table>

Course policies:

- If a test is missed due to a serious verifiable circumstance or official university business, the test grade will be replaced with the properly re-scaled final exam score. You have to advise the instructors of such circumstances at the earliest possibility.

- Unless there is a serious verifiable circumstance, there will be no make-ups for missed homework assignments other than the two dropped assignments.

- No calculators will be allowed during any of the tests or the final exam.

- No books or notes will be allowed during any of the tests or the final exam.

- Please make sure that you are able to receive e-mail through your Blazer-ID account. Official course announcements and materials may be sent to that address.

- If you wish to request a disability accommodation please contact DSS at 934-4205 or at dss@uab.edu.

How to access the Blackboard Learning System: Online homework problems, the syllabus, the class notes, class announcements, online discussions may all be found at the following:

http://www.uab.edu/academiccourses

Click on the "Students" link if you want to learn more about Blackboard Learn. If you think that you don’t need this, just login with your BlazerId and go to our course named “EGR 265-6D Math Tools for Engr Prob Solv–Fa2013”.