COURSE DESCRIPTION:
MATHEMATICAL TOOLS FOR
ENGINEERING PROBLEM SOLVING
EGR/MA 265–6D, FALL 2016

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 16, 2016.
Course Instructors:

**Dr. Hassan Moore:** Office BEC 259D, Phone 934-8412
E-mail hmoore@uab.edu, Office Hours: Monday, Wednesday 9am-11am, or by appointment

**Dr. Nikita Selinger:** Office CH 495A, Phone 934-2154
E-mail selinger@uab.edu, Office Hours: Monday, Wednesday 10:30-11:15am, or by appointment

Meeting times: Monday and Wednesday 12:20pm to 2:10pm.
Meeting location: HHB 104
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 Canvas 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 29
- **Last day to add/drop:** September 6
- **Labor Day Holiday:** Monday, September 5
- **Last day to withdraw:** April 1
- **Fall/Thanksgiving Break:** November 21 to 25
- **Last day of class:** Wednesday, December 7
- **In-Class Tests:** Three 50-minute tests will be given. Tentative dates are Oct 3, Oct 31 and Nov 30. At least one week notice will be given for the exact test dates.
- **Final exam:** Wednesday, Dec 14 10:45am to 1:15pm, HHB 104

Methods of teaching and learning:
- Class lecture
- Active and collaborative learning in class (problem solving sessions)
- Online homework with instant feedback
- “Mini projects” (self-guided homework assignments on applied topics related to the course contents, one before each test)

Assessment procedures: Student achievement will be assessed by the following measures:
- Weekly online homework via WeBWorK will be given to practice basic math skills. Homework will generally be due one week after assignment. Online homework contributes **15%** to the course average. The two lowest weekly homework grades will be dropped. The first homework set, named ‘HW 000’ and assigned in the first week of class, asks you to review important
techniques from precalculus and calculus which you need to know for this class.

- Before each one of the three tests a “mini project” will be assigned. These projects will consist of a self-guided assignment and focus mostly on applications of the course material in physics and engineering. Reports on the projects will have to be done manually and individually on paper. The projects will contribute $3 \times 5\% = 15\%$ 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 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 14% to the course average, for a total of 42%.

- 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 28% to the course average.

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

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

Materials available on Canvas:

A copy of this syllabus as well as the class notes (in two different formats, large and small) can be found in your Canvas folder for this class under “Files”. We may also post other course materials there (such as copies of assignments, materials for test preparation, etc).

How to access the WeBWorK online homework system: Online homework for this class will be delivered via the WeBWorK system of the Mathematical Association of America. To access the HW, go to

http://meat.craml.uab.edu/webwork2

Then link to ‘EGR265_14’ and login using your blazerID for your username and B00 number for the password. (Note: Your UAB strong password is NOT used here.) You should immediately change your password upon logging into WeBWorK.