COURSE DESCRIPTION:
MATHEMATICAL TOOLS FOR
ENGINEERING PROBLEM SOLVING
EGR/MA 265–6C, FALL 2019

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 twofold:

- 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 26, 2019.
Course Instructors:

**Dr. Pasquale Cinnella:** Office BEC 257B  
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Office Hours: make an appointment by using BlazerNET (look for Mechanical Engineering advisors), daily availability

**Dr. Shannon Starr:** Office UH 4008  
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Office Hours: Mon through Thu, 10am to 11am, or by appointment

**Mr. Mohammed Darras:** Office UH 4027  
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**Ms. Ashton Moore (TA):** BEC 359A  
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Office Hours: Mon/Wed/Fri 11am to 1:30pm, Thu 5pm to 7:30pm

**Ms. Stephanie Mover (TA):** BEC 359A  
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Office Hours: Mon and Fri 5pm to 8pm, Tue and Thu 2:30pm to 4:30pm

Meeting times: Monday and Wednesday 12:20pm to 2:10pm  
Meeting location: EB 145  
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.  
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 Holiday:** Monday, September 2
- **Last day to add/drop:** Tuesday, September 3
- **Last day to withdraw:** Friday, October 18
- **Fall/Thanksgiving Break:** Week of November 25 (Classes resume Monday December 2)
- **Last day of class:** Wednesday, December 4
- **Last day to withdraw for the term:** Friday, December 6 (must withdraw from all courses!)
- **In-Class Tests:** Two 75-minute tests will be given. Tentative dates are October 9 and November 20. At least one week notice will be given for the exact test dates.
- **Final exam:** Wednesday, December 11, 10:45am to 1:15pm, EB 145

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)

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 on Fridays right before midnight. Online homework contributes 15% to the course average. The two lowest weekly homework grades will be dropped.
• Three “mini projects” will be assigned during the term. These projects will focus mostly on applications of the course material in physics and engineering. Reports on the projects will have to be turned in on paper. The projects will contribute $3 \times 5\% = 15\%$ to the course average.
• Two 75-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 class notes. The tests will also check on knowledge of important engineering applications. Each test contributes 20% to the course average, for a total of 40%.
• A 150-minute comprehensive final examination will be given. The final contributes 30% to the course average.

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 sub-score from the relevant material. You have to advise the instructors of such circumstances at the earliest possibility.
• 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.

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 on Canvas. We will also post other course materials there, such as copies of in-class 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
Then login using your blazerID for your username. **Your UAB strong password is NOT used here.** The initial password is your B-number: the letter "B" followed by the number, no spaces. You should immediately change your password upon logging into WeBWorK.

**DSS Accessibility Statement:**

UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact DSS to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call 934-4205 or visit [http://www.uab.edu/dss](http://www.uab.edu/dss) or Hill Student Center Suite 409.

**Title IX Statement:**

The University of Alabama at Birmingham is committed to providing an environment that is free from sexual misconduct, which includes gender-based assault, harassment, exploitation, dating and domestic violence, stalking, as well as discrimination based on sex, sexual orientation, gender identity, and gender expression. If you have experienced any of the aforementioned conduct we encourage you to report the incident. UAB provides several avenues for reporting. For more information about Title IX, policy, reporting, protections, resources and supports, please visit [http://www.uab.edu/titleix](http://www.uab.edu/titleix) for UAB's Title IX Policy, UAB's Equal Opportunity, AntiHarassment Policy and Duty to Report and Non-Retaliation Policy.