

**DREXEL UNIVERSITY**  
**Department of Mechanical Engineering & Mechanics**  
**Applied Engineering Analytical & Numerical Methods II**  
**MEM 592 - Winter 2015**

**General Information**

Class hours: Thursday, 6:30-9:20 PM, Curtis 340

Web Site: <https://learn.dcollege.net>

**Instructor**

Dr. Antonios Kontsos, P.C. Chou Endowed Assistant Professor in Mechanical Engineering, [akontsos@coe.drexel.edu](mailto:akontsos@coe.drexel.edu), (215) 895 2297  
Office hours: Wednesday 5:00-6:00 PM, Alumni Engineering Labs (Building 4) 172A or by appointment

**Teaching Assistant**

Ian Baskt, [inb27@drexel.edu](mailto:inb27@drexel.edu)

Office hours: Monday 5:00-6:00 PM and Tuesday 12:30-1:30 PM, MEM UG Laboratory, Alumni Engineering Lab 174 or by appointment

**Objectives**

This course emphasizes the use of numerical methods to solve initial and boundary value problems involving ordinary and partial differential equations (ODEs and PDEs). For ODEs specific emphasis is given in presenting analytical solutions for first and second order equations with particular interest in finding solutions for frequently encountered cases in mathematical modeling of engineering problems. Numerical techniques including explicit, implicit, 1-step, multi-step, shooting, finite difference, spectral and finite element methods are discussed. Analytical and numerical techniques to solve characteristic types of PDEs are further presented. Homework problems and exams aim at the comparative evaluation of the various schemes discussed in class.

**Programming**

A major goal of the course is to assist the students develop scientific programming capabilities in addition to their analytical skills. Although the material presented in class will be suitable for implementation using any programming language, MATLAB will be preferred.

**Grading**

Homework	30%
Midterm	35%
Final	35%

**Homework and Exams**

Homework will be assigned (almost) every week after class. Late homework will not be graded. This is a graduate level course and students are expected to develop high professional ethics standards. Any case of plagiarism or copying will automatically result to penalties and can lead to a failing grade in class. One midterm exam will be assigned in-class and during regular class hours on 02/05/15. One non-cumulative final exam will be given at the same time and location with regular class meetings on 03/19/15.

**Books-References**

There is a required textbook for this class: Kreyszig, E., *Advanced Engineering Mathematics*, 10th edition, Wiley, 2011. For further reading, use any of the books of the following list that have been also reserved in Hagerty Library. Inquire by course or instructor's name.

1. Trefethen, L. N. and Bau, D. III, *Numerical Linear Algebra*, SIAM, 1997
2. Süli, E. and Mayers, D. F., *An Introduction to Numerical Analysis*, Cambridge, 2003
3. Greenberg, M. D., *Foundations of Applied Mathematics*, Prentice-Hall, 1978
4. Korn, G. A. and Korn, T. M., *Mathematical Handbook for Scientists and Engineers*, Dover, 2000

*Student with disabilities requesting accommodations and services at Drexel University need to present a current accommodation verification letter (AVL) to faculty before accommodations can be made. AVL's are issued by the Office of Disability Services (ODS). For additional information, contact ODS at [www.drexel.edu/ods](http://www.drexel.edu/ods), 3201 Arch St., Street, Suite 210, Philadelphia, PA 19104, 215.895.1401 (V), or 215.895.2299 (TTY).*