Math/Engr/Phys 428 and Math 529/Phys 528

Fall 2020

Engineering Outreach

Course: Numerical Methods
Professor: Lyudmyla Barannyk
Office: 317 Brink Hall
Phone: (208) 885-6719
e-mail: barannyk@uidaho.edu

Book: A Friendly Introduction to Numerical Analysis
by Brian Bradie, Prentice Hall

Course web site: http://www.webpages.uidaho.edu/~barannyk/Teaching/Math428.html

Topics:

- Review, Background and Finite Precision Arithmetic
- Numerical Differentiation
- Nonlinear Equations and Root Finding
- Numerical Linear Algebra
- Polynomial Interpolation
- Numerical Integration
- Initial Value Problems
- Function Approximation
- Eigenvalue, Eigenfunction Approximation
- Boundary Value Problems

Written lecture notes are available on the course website:

http://www.webpages.uidaho.edu/~barannyk/Teaching/Math428.html#lectures

Exams: Midterm Exam, due by Friday, October 16
Final Exam, due by Thursday, December 17

Calculator and Note Sheet Policy: Calculators may be used on exams to perform simple algebraic operations. Students may bring a single sided page of their notes to the midterm exam and a double sided to the final exam.

Homework: There are six homework assignments that are due approximately every other week. There are assigned and suggested problems. The assigned problems will be graded. It is strongly advised to solve the suggested problems as well since material covered in both assigned and suggested problems may be on the tests. Homework is available on the course web site:

http://www.webpages.uidaho.edu/~barannyk/Teaching/Math428.html#schedule
Homework should be submitted by e-mail at barannyk@uidaho.edu. Please scan your assignments and attach m.files of your programs. There is a 3 business day grace period. After that late homework will not be accepted.

**Programming Language:** This course will not teach you how to program, but you will be required to write computer codes. Matlab or any other high level language is recommended because they are easier to work with and have built-in visualization tools. Matlab is available via VLab at http://www.uidaho.edu/its/Labs/vlab. If you have problems with installing or running Matlab, please contact the ITS Help Desk at

Phone: 208-885-4357 (HELP); Email: helpdesk@uidaho.edu

ITS HELP DESK Physical Address: Teaching Learning Center Room 128

**Course Grade for Math/Engr/Phys 428:**

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**Project for Math 529/Phys 528:** There is an individual computational project in which you can explore any simulation topic that is of interest to you. The topic does not have to be related to what we study in class but it needs to be approved by me and must include an analysis and a programming component. Possible topic ideas include molecular dynamic simulations, finite element method, singular value decomposition. The project would have to be devoted to an advanced topic. A written report up to 5 pages is required.

**Math 529/Phys 528 students:** extra homework and exam problems will be included.

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**For Your Information:**

Websites for help with Matlab.

- **Brief notes on using Matlab:**
  - [http://www.webpages.uidaho.edu/~barannyk/Teaching/Notes_Matlab.pdf](http://www.webpages.uidaho.edu/~barannyk/Teaching/Notes_Matlab.pdf)
- [http://www.engin.umich.edu/caen/technotes/matlab.pdf](http://www.engin.umich.edu/caen/technotes/matlab.pdf)
- [http://www.me.pdx.edu/~gerry/MATLAB/](http://www.me.pdx.edu/~gerry/MATLAB/)
- [http://www.engin.umich.edu/class/ctms/basic/basic.htm](http://www.engin.umich.edu/class/ctms/basic/basic.htm)

**Learning Outcomes**

- Understand the mathematics and programming behind algorithms used to solve numerical problems.
- How to use a computer to solve complex problems that have no analytical solution.
- Understand the limitations of commonly used numerical methods, their accuracy and stability.