Math/Engr/Phys 428 and Math 529/Phys 528 **Spring 2022**

Course:	**Numerical Methods**
Professor:	Lyudmyla Barannyk
Office:	317 Brink Hall
Phone:	(208) 885-6719
e-mail:	barannyk@uidaho.edu
Office Hours:	MW 1-2 pm PDT, Th 8-9 pm PDT or by appointment via Zoom
Book:	*A Friendly Introduction to Numerical Analysis* by Brian Bradie, Prentice Hall
Time:	MWF 11:30 am - 12:20 pm
Location:	JEB 026

Course website: http://www.webpages.uidaho.edu/~barannyk/Teaching/Math428.html contains written lecture notes, handouts and other course related information. Homework, exam and other information is available in Canvas.

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

Office Hour Zoom info: https://uidaho.zoom.us/j/86803027778
Meeting ID: 868 0302 7778; Passcode: 861906

Exams: *Midterm Exam*: March 25
Final Exam: Monday, May 9, 10:15 am - 12:15 pm in class JEB 026
for on-campus (section 01) students

due by Thursday, May 12 for EO (section 10) students

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 12 roughly weekly homework assignments with 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. Please scan your assignments and attach m.files of your programs. Homework is available in Canvas. A single

.pdf file for each homework assignment should be uploaded in Canvas. There is a 3 business day grace period. After that late homework will not be accepted. Students are encouraged to study together and may talk to each other about the homework problems, but each student should write up and submit their own solutions without copying another student's solutions.

Class Policy: Students are encouraged to ask questions in class, office hours, and by email.

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:

Midterm Exam:	25%
Final Exam:	35%
Homework:	40%

Project for Math 529/Phys 528: There is an individual computational project in which you can explore any advanced simulation topic that is of interest to you. The topic does not to 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, Fast Fourier Transform. A written report up to 5 pages is required.

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

Course Grade for Math 529/Phys 528:

Midterm Exam:	25%
Final Exam:	35%
Homework and Project:	40%

For Your Information:
Websites for help with Matlab.

- **http://www.mathworks.com/**
- **Brief notes on using Matlab:**
  http://www.webpages.uidaho.edu/∼barannyk/Teaching/Notes_Matlab.pdf
- **http://www.math.ufl.edu/help/matlab-tutorial/**
- **http://www.engin.umich.edu/caen/technotes/matlab.pdf**
- **http://www.me.pdx.edu/∼gerry/MATLAB/**
- **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.