

AE/ME 5830 – Applied Computational Methods (Spring 2021)
Tu/Th 11:00 AM – 12:15 PM CST (Online-Synchronous)

1. Instructor:

Prof. Serhat Hosder, 290B Toomey Hall, hosders@mst.edu, Phone: (573) 341-7239

2. Pre-Requisites:

Comp Sci 1570 or 1970 or 1981; Math 3304; or the consent of the instructor.

3. Catalog Description:

Detailed study of computational methods for efficient solution of selected fluids, structures, thermodynamics, and controls problems in aerospace and mechanical engineering. Besides basic numerical techniques, topics covered include gradient-based optimization and uncertainty quantification.

4. Course Website:

Missouri S&T Canvas System (<http://canvas.mst.edu>)

Announcements, course recordings,, slides, notes, homework etc. will all be posted to the course website on Canvas, so please check the page regularly..

5. Course Delivery Mode:

The course delivery mode will be online-synchronous through Zoom meetings at regular class times (Tu/Th 11:00 AM-12:15 PM CST). The zoom meeting link and information are posted under the Canvas Course website.

6. Office Hours:

Tuesday and Wednesday 4:00 PM-5:00 PM or by appointment through Zoom meeting. The zoom meeting link and information for the office hours are posted under the Canvas Course website.

7. Textbook:

Numerical Methods for Engineers 7th Edition, Steven C. Chapra and Raymond P. Canale, McGraw Hill Publications, 2014. (6th edition is also fine)

8. Grading:

Homework 34%, Tests (2) 33 % each

Final letter grade distribution based on the overall points obtained from tests and assignments:

For graduate students: **A:** 100 – 90 **B:** 89 – 80 **C:** 79 – 70 **F:** Below 70

For undergraduate students: **A:** 100 – 90 **B:** 89 – 80 **C:** 79 – 70 **D:** 69 – 60 **F:** Below 60

9. Policy on missing tests and late homework:

No make-up test will be given for the missed tests unless the student has a credible, documented excuse on the test date or an emergency, which should be also approved by the instructor.

No late homework will be accepted unless the student has a credible excuse approved by the instructor.

10. Policy on academic dishonesty:

You are encouraged to discuss the homework questions with your fellow classmates, however **the final submitted work must be yours. No copying from other students or other unauthorized sources are allowed during the tests and preparation of the homework. Students who violate this rule on a particular assignment will receive zero credit from that assignment or test; and will be reported to the appropriate university department.** For the student honor code, please refer to <http://stuco.mst.edu/honor-code/> and refer page 22 of the Student Academic Regulations handbook (<http://registrar.mst.edu/academicregs/index.html>) for the details about the university policy on academic dishonesty on graded work (homework and tests).

11. Accessibility and Accommodations:

It is the university's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please contact Disability Support Services at (573) 341-6655, dss@mst.edu, or visit <http://dss.mst.edu/> for information, or go to mineraccess.mst.edu to initiate the accommodation process.

12. Title IX statement:

Missouri University of Science and Technology is committed to the safety and well-being of all members of its community. US Federal Law Title IX states that no member of the university community shall, on the basis of sex, be excluded from participation in, or be denied benefits of, or be subjected to discrimination under any education program or activity. Furthermore, in accordance with Title IX guidelines from the US Office of Civil Rights, Missouri S&T requires that all faculty and staff members report, to the Missouri S&T Title IX Coordinator, any notice of sexual harassment, abuse, and/or violence (including personal relational abuse, relational/domestic violence, and stalking) disclosed through communication including but not limited to direct conversation, email, social media, classroom papers and homework exercises. Missouri S&T's Title IX Coordinator is chief diversity officer Neil Outar. Contact him (naoutar@mst.edu; (573) 341-6038; 203 Centennial Hall) to report Title IX violations. To learn more about Title IX resources and reporting options (confidential and non-confidential) available to Missouri S&T students, staff, and faculty, please visit <http://titleix.mst.edu>

OUTLINE

1. Root Finding (Notes and Chapters 5-8)
2. Solving System of Linear Equations (Notes and Chapters 9-12)
3. Solving System of Nonlinear Equations (Notes)
4. Gradient-Based Optimization Techniques (Notes and Chapters 13-16)
Test 1
5. Interpolation and Function Approximation (Notes and Chapters 18-20)
6. Numerical Differentiation and Integration (Notes and Chapters 21-24)
7. Numerical Solution of Ordinary Differential Equations (Notes and Chapters 25-28)
8. Introduction to Uncertainty Quantification Methods (Time permitting, Notes)
Test 2