

ME 202 | Numerical Methods

Instructor: Dr. Dilip Srinivas Sundaram

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Instructor's Office: 6/356

Lecture room: 1/103

Lecture hours: Monday and Thursday (10:05-11:00 AM), Wednesday (9:05-10:00 AM)

Tutors: Dr. Dilip Srinivas Sundaram, Mr. Shivam Dhama, Mr. Rahul Kumar, Mr. Kamalesh Saha, Mr. Pranjal Srivastava

Tutorial hours: Friday (2-4 PM)

Tutorial rooms: 1/103, 7/204, 7/206, 7/209, 7/210

Teaching assistants: Mr. Sk Hossen Ali, Mr. Malay Vyas, Mr. Chirag Anilkumar, Mr. Roshith Mittakolu, Mr. Vaibhavkumar Tandel

About the course

This is the second half of the undergraduate Mathematics course, MA 202. The course will provide exposure to and understanding of some of the important numerical methods currently used by practicing engineers and scientists. The course will have a strong applied flavor and students will be expected to write their own computer programs as well as to use available software to solve engineering problems.

Course contents:

- Introduction, Mathematical Modeling, Errors: Definition, Round-off & Truncation Errors
- Calculating Roots of Equations – Graphical Methods, Bisection Method, Newton-Raphson Method, Secant Method, System of Equations
- Solving Linear Algebraic Equations, Gauss Elimination, Gauss Jordan, LU decomposition, Gauss Siedel Method
- Interpolation, Divided Differences, Lagrange Interpolation
- Numerical Differentiation and Integration, Trapezoidal Rule, Simpson's Rules, Gauss Quadrature
- Solution of Ordinary Differential Equations, Runge-Kutta Methods

Text

Steven C. Chapra and Raymond P. Canale, *Numerical Methods for Engineers*, 7th edition, McGraw Hill (Note: Indian edition of the book is available).

Grading

Assignments - 40 %

Tutorials* – 10 %

Project - 40 %

Class participation – 10 %

* *Tutorial worksheets should be submitted by the end of the tutorial session. No late submission will be accepted, except for genuine reasons such as medical or family emergency.*

Attendance and class participation:

Class participation will help you stay on course and develop a better sense of understanding and appreciation of the subject. As a result, attendance will be taken during lectures. Attendance and class participation make up 10 % of your total score. Your actual score will be based on the percentage of lectures attended. Note that lectures may also involve in-class exercises and these need to be completed satisfactorily to meet the attendance requirement. Physical presence is necessary but not sufficient.

In case of genuine reasons such as medical/family emergency, a leave may be sanctioned by the instructor or concerned tutor on a case-by-case basis. However, permission needs to be taken beforehand for the leave to be approved. In case of illness, a doctor report also needs to be submitted. If the leave is approved, it will not negatively affect your attendance record. To seek prior approval/permission for leave, you are required to e-mail the instructor and concerned tutor in a single e-mail giving valid reasons and copying all teaching assistants on the same e-mail.

Assignment policy

Students can work together to solve assignment problems. However, each student must submit own independent write up. Assignments have to be submitted by the due date and time to avoid any late submission penalty. The late submission penalty is as follows:

- a. For submissions past the due time on the due date, a penalty of 10 % will be applied.
- b. For submission after midnight of the due date, a penalty of 25 % will be applied.
- c. For submissions past 24 hours after the midnight of the due date, a penalty of 50 % will be applied and so forth.

Assignment format

Assignments are important means of learning during coursework. A clear organized solution of a problem is more important than the final numerical answer.

1. Begin each problem on a new page.
2. Clearly state the problem, listing the knowns and unknowns.
3. Use schematics and drawings wherever necessary.
4. List all assumptions and approximations.
5. Approach the problem from fundamentals and solve it in a systematic manner.
5. Pay more attention to the procedure than the final answer.
6. Write what you learnt from the problem.

Honor code

Students are expected to adhere to the IIT Gandhinagar honor code.