

Indian Institute of Technology Roorkee
Department of Mechanical and Industrial Engineering

MI-557 Finite Element Methods (Autumn 2019-20)

Instructor: Dr. Manish M. Joglekar (Office: #136, Email: mmj81fme@iitr.ac.in, Phone: +91 1332 284769)
(Please schedule a prior appointment; preferably by email)

Course Time-table:

- 3 Lectures (Monday, Thursday: 04:05 pm to 05:00 pm; Friday : 05:05 pm -06:00 pm, Room# SR2)
- 1 Tutorial (Thursday: 11:05 am to 12:00 noon, Room# SR2, MIED)

Course Evaluation (Credits: 04)

50%: End-term 25%: Mid-term 25%: In-semester quizzes/tutorials/project

Course Website:

URL to the course website: http://www.mmjoglekar.weebly.com/min557_2019

(Students are expected to monitor the website regularly for updates, notices, and announcements).

Course Contents:

Variational calculus, principle of virtual work, stationarity of energy functional, weak and strong forms of the governing differential equations in 1D linear elasticity, boundary conditions, weighted residual methods of finding approximate solutions, Galerkin finite element method, one dimensional finite elements in elasticity (axial rod, beam) and heat transfer, linear and higher order shape functions, 2D scalar and vector field problems, governing differential equations and the associated boundary conditions, 2D finite elements, coordinate transformation, numerical integration, axisymmetric elements, introduction to 3D finite elements, dynamic analysis using finite elements, consistent and lumped mass matrices, time-integration techniques, transient analysis of 1D problems.

Self-Study: As assigned by the Instructor

References:

There is no 'prescribed text-book' for this course. A partial list of reference books is provided below:

- The Finite Element Method in Engineering, S.S. Rao, Elsevier Science
- An Introduction to the Finite Element Method, J.N. Reddy, Tata MacGraw Hill.
- Textbook of Finite Element Analysis, P. Seshu, Prentice Hall India
- Concepts and Applications of Finite Element Analysis, R.D. Cook, John Wiley and Sons.

Rules and Regulations

Attendance:

A minimum of 75% attendance is necessary in order to be able to appear for the end-term examination. Attendance for the quizzes/exams/tutorials is mandatory, and no make-up quizzes for the absentees will be offered. All students are expected to come to the class on time; late-comers will not be allowed to enter the class. You are expected to attend the classes/tutorial sessions regularly to keep pace with the syllabus being covered. Do not make frantic requests toward the end of the course for securing a pass-grade. The Instructor is not available 24x7 to attend to your queries and concerns. Please schedule a prior appointment by email. Mobile phone is a personal asset and MUST be used as the last resort to reach the Instructor. Follow the sequence: Email->Office Phone->SMS before placing a call on the cell phone.

Quizzes/Examinations

Unless stated otherwise, all quizzes and exams will be of closed-book type. Students are expected to be equipped with the necessary stationery items (this includes pen, pencil, eraser, etc.) during the examination, and any exchange of such items will NOT be permitted. Students MUST carry their photo identity card and the subject registration card to the examination hall. Cell phones, alarms, musical instruments MUST be switched-off during the quizzes/exams and the regular class-hours. Any misconduct during the class-hours and quizzes will be penalized. This penalty, especially during the examination, will be imposed for acts which include, but are not limited to: copying, exchange of stationery items, seeking illegal help, denial to return the answer-sheet after the examination period is over, communicating (or attempting to communicate), use of electronic media (other than a non-programmable calculator), etc. Both; benefactor and beneficiary in such cases will be penalized equally. *The minimum penalty for such cases is a zero-score on the respective quiz/examination.* If you are not sure about the authenticity of your action(s), please seek Instructor's/Invigilator's permission before carrying them out. You are advised to carefully go through the ordinances and regulations available on <http://www.iitr.ac.in/academics/> to have a better idea of the disciplinary measures exercised by the Institute.

Re-grade Requests

A separate re-grade policy will be administered for this course. Students having queries related to the evaluated answer scripts have to fill in the re-grade request form (available online). The re-grade requests should reach the Instructor the same day on which the answer-scripts are distributed. Late requests, no matter how genuine, will not be entertained. Upon filing the re-grade request, the entire answer-script may be subjected to re-evaluation, which may possibly reduce the score obtained earlier.

Professional Conduct:

You are expected to maintain a professional conduct and etiquettes in the classroom. It is the responsibility of everyone to treat all members of the academic community with respect. Disruptive and frivolous acts will invite penalties and/or disciplinary actions.