

Elective Focus Area in Mechanical Engineering

Design

The Design EFA provides students with enhanced education in computational methods in modeling, analysis, synthesis, simulation, and optimization of mechanical, thermal, and fluid systems as needed to be successful for careers in engineering design. Finite element and computational fluid dynamics software packages have become very important tools for mechanical engineering design, providing engineering solutions for a wide range of industries, such as aerospace, automotive, civil, biomedical, chemical process, HVAC, semiconductor, turbomachinery, and engineering art for movie industries. Developing fundamental understanding of how design/analysis software packages work and gaining working knowledge of some commonly used packages forms the centerpiece of this EFA.

| Semester | Course | Session | SH | Pre-/Co-Requisites |
|------------|---|-----------|--------|--------------------|
| 4 (Spring) | 22M:072 Elementary Numerical Analysis, <i>or</i> 58:111 Numerical Calculations | F, S S | 3 3 | 22M:032 22M:034 |
| 5 (Fall) | Elective | | 3 | |
| 6 (Spring) | Elective | | 3 | |
| 7 (Fall) | Elective | | 3 | |
| 7 (Fall) | Elective | | 3 | |
| 8 (Spring) | 58:186 Enhanced Design Experience | S | 3 | 58:086 |
| 8 (Spring) | Elective | | 3 | |

| Design Electives (minimum of 2 required) | Session | SH | Pre-/Co-requisites |
|--|---------|----|--------------------|
| 58:110 Computer Aided Engineering | S | 3 | 57:019, 58:052 |
| 58:112 Engineering Design Optimization | S | 3 | 22M:033, 59:007 |
| 58:115 Finite Element I | F,S | 3 | 57:019 |
| 58:143 Computational Fluid and Thermal Engineering | F | 3 | 58:045 |
| General Electives | Session | SH | Pre-/Co-Requisites |
| Flexible Elective – Choose one from: (i) engineering courses that are required in another (non-ME) program, (ii) engineering courses at the 100-level, (iii) mathematics, physics or chemistry courses at a more advanced level than those required in the ME curriculum, or (iv) independent investigation in a mechanical engineering subject area | Any | 3 | |
| 56:054 Engineering Economy | S | 3 | /22S:039 |
| 58:136 Digital Human Modeling | S | 3 | None |
| 58:145 Intermediate Heat Transfer | F | 3 | 58:045 |
| 58:150 Intermediate Mechanics of Deformable Bodies | F | 3 | 57:019 |
| 58:153 Fundamentals of Vibrations | S | 3 | 57:019 |
| 58:154 Intermediate Kinematics and Dynamics | F | 3 | 57:010/58:052 |
| 58:158 Fatigue/Durability in Design | S | 3 | 58:055 or 58:150 |
| 58:159 Fracture Mechanics | S | 3 | 58:055 or 58:150 |
| 58:160 Intermediate Fluid Mechanics | F | 3 | 57:020, 58:040 |

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