

# Mechanical Engineering Stem & Technical Electives

Catalog #140: 2017-2018

(rev. May 2017)

## Stem Courses (6 hours)

Select two (2) of the following 3 courses

- ◆ MEEN 421 – Thermo-Fluids Analysis and Design. Prerequisites: MEEN 461; MEEN 315; junior or senior classification.
- ◆ MEEN 431 – Advanced System Dynamics and Controls. Prerequisites: MEEN 364; junior or senior classification.
- ◆ MEEN 475 – Materials in Design. Prerequisites: CVEN 305; MEEN 360.

## Technical Electives (9 hours)

At least 3 hours must be from the MEEN Technical Electives below

### MEEN Technical Electives

#### **Materials and Manufacturing**

- ◆ MEEN 430 – Nanomaterials. Prerequisites: Junior or senior classification or approval of instructor.
- ◆ MEEN 448 – Fundamentals of Nondestructive Testing. Prerequisite: MEEN 360.
- ◆ MEEN 451<sup>◇</sup> – Viscoelastic Materials. Prerequisite: CVEN 305.
- ◆ MEEN 455 – Engineering with Plastics. Prerequisite: MEEN 222 or approval of instructor.
- ◆ MEEN 458 – Processing and Characterization of Polymers. Prerequisite: MEEN 222.
- ◆ MEEN 460 – Corrosion Engineering. Prerequisite: MEEN 360 or equivalent.
- ◆ MEEN 467<sup>◇</sup> – Mechanical Behavior of Materials. Prerequisite: MEEN360.
- ◆ MEEN 471<sup>◇</sup> – Elements of Composite Materials. Prerequisites: MEEN 368 and 360 or approval of instructor.
- ◆ MEEN 475\* – Materials in Design. Prerequisite: MEEN 360; CVEN 305
- ◆ MEEN 476 – Nanoscale Issues in Manufacturing. Prerequisites: MEEN 222 or approval of instructor; junior or senior classification.
- ◆ MEEN 477 – Air Pollution Engineering. Prerequisite: CVEN 305.

#### **Dynamics and Controls**

- ◆ MEEN 408<sup>◇</sup> – Introduction to Robotics. Prerequisite: MEEN 364 or equivalent; junior or senior classification.
- ◆ MEEN 411 – Mechanical Controls. Prerequisite: MEEN 364.
- ◆ MEEN 431\* – Advanced System Dynamics and Controls. Prerequisite: MEEN 364; junior or senior classification.
- ◆ MEEN 433<sup>◇</sup> – Mechatronics. Prerequisite: MEEN 364 or equivalent.
- ◆ MEEN 432 – Automotive Engineering. Prerequisite: MEEN 363.
- ◆ MEEN 434<sup>◇</sup> – Dynamics and Modeling of Mechatronic Systems. Prerequisite: MEEN 364.

#### **Thermo-fluid and Energy Systems**

- ◆ MEEN 410<sup>◇</sup> – Internal Combustion Engines. Prerequisites: MEEN 344 or equivalent or approval of instructor.
- ◆ MEEN 414<sup>◇</sup> – Principles of Turbomachinery. Prerequisite: MEEN 421 or approval of instructor; junior or senior classification.
- ◆ MEEN 421\* – Thermal-Fluids Analysis and Design. Prerequisites: MEEN461; MEEN 315; junior or senior classification.
- ◆ MEEN 436 – Principles of Heating, Ventilation and Air Conditioning. Prerequisite: MEEN 461 or equivalent.
- ◆ MEEN 437 – Principles of Building Energy Analysis. Prerequisite: MEEN 315 or equivalent; junior or senior classification.
- ◆ MEEN 439 - Solar Energy Engineering. Prerequisite: MEEN 315.
- ◆ MEEN 463<sup>◇</sup> – Cogeneration Systems. Prerequisite: MEEN 421.
- ◆ MEEN 469<sup>◇</sup> - Alternative Energy Conversion. Prerequisite: MEEN 315.
- ◆ MEEN 472 – Gas Dynamics. Prerequisite: MEEN 344.

#### **Design**

- ◆ MEEN 440 – Bio-Inspired Design. Prerequisite: MEEN 368 or BMEN 361 or BAEN 375.
- ◆ MEEN 441 – Design of Mechanical Components and Systems. Prerequisite: MEEN 368 or approval of instructor.
- ◆ MEEN 442<sup>◇</sup> – Computer Aided Engineering. Prerequisite: MEEN 363 and MEEN 368.
- ◆ MEEN 444 – Finite Element Analysis in Mechanical Engineering. Prerequisite: MEEN 357 and MEEN 368 or equivalents.
- ◆ MEEN 445<sup>◇</sup> – Engineering Applications of Solid Mechanics. Prerequisite: CVEN 305 and MEEN 368.
- ◆ MEEN 459<sup>◇</sup> – Mechanical Vibrations. Prerequisites: MEEN 363; MATH 308.

#### **Special Topics – One time course offerings in a new interest area**

- ◆ MEEN 489 – Special Topics in Mechanical Engineering
  - Check Howdy for current offerings

\* MEEN Stem course will qualify as a MEEN technical elective only after a student has taken at least two MEEN Stem courses prior.

◇ May be offered stacked with a graduate course and taken as part of the Fast Track Program. See advisor for more details.

**Non-MEEN Technical Electives described on next page (backside)**

### **NON-MEEN Technical Electives (no more than 6 hours)**

Students may take non-MEEN courses, either within or outside the College of Engineering, to satisfy technical elective requirements. All non-MEEN technical electives must be approved by the Undergraduate Advising Office, using the following set of criteria: 1. Course has a discipline-specific prerequisite, 2. Course content requires advanced math skills (i.e., Math 251), 3. Course uses formal analytical methods and requires quantitative coursework, and 4. Course material provides a deep understanding in a specific technical discipline.

Based on previous practice, the following courses are pre-approved as non-MEEN technical electives:

- ◆ **Engr Project Management Minor:** 300 or 400-level engineering courses: <http://catalog.tamu.edu/undergraduate/engineering/engineering-project-management-minor/>
- ◆ **Energy Engineering Certificate:** 300 or 400-level engineering courses: <http://engineering.tamu.edu/academics/certificates/energy>
- ◆ **Polymer Specialty Cert:** 300 or 400-level engineering or science courses: <http://engineering.tamu.edu/academics/certificates/polymer>
- ◆ **Safety Engineering Specialty Cert:** 300 or 400-level engineering courses: <http://engineering.tamu.edu/academics/certificates/safety>
- ◆ ENGR 410 only when coupled with International Certificate: <http://engineering.tamu.edu/international/certificate>
- ◆ **Aerospace Engineering:** AERO 303, 321
- ◆ **Architecture:** ARCH 619 (N.B., requires graduate credit approval form; see advisor for details).
- ◆ **Astronomy:** ASTR 314
- ◆ **Biological & Agricultural Engineering:** BAEN 412, 422 (cross-listed with CHEN 422)
- ◆ **Biochemistry:** BICH 410
- ◆ **Biomedical Engineering:** BMEN 458
- ◆ **Chemistry:** CHEM 227, 228, 315, 322.
- ◆ **Chemical Engineering:** CHEN 422 (cross-listed with BAEN 422)
- ◆ **Civil Engineering:** CVEN 322
- ◆ **Computer Science:** CSCE 312, 313, 314
- ◆ **Electrical Engineering:** ECEN 314, 325, and 441.
- ◆ **Electronic Systems Engineering Technology:** ESET 369
- ◆ **Geology:** GEOL 404
- ◆ **Industrial & Systems Engineering:** ISEN 430, 440 (prerequisite MATH 304)
- ◆ **Material Science:** MSEN 310, 420
- ◆ **Mathematics:** MATH 304, 311, 323, 401, 407, 409, 411, 412, 414, 425, 433
- ◆ **Nuclear Engineering:** NUEN 301
- ◆ **Physics:** PHYS 222 (only if NOT taken as part of a Physics Minor)
- ◆ **Petroleum Engineering:** PETE 310, 311, 325, 353
- ◆ **Safety Engineering:** SENG 455.
- ◆ **Statistics:** STAT 211, 414
- ◆ **CO-OP:** 3 hours of ENGR 385 may be used.
- ◆ Any (MEEN or non-MEEN) **485/491** (possibly up to 3 hours each) upon approval by Advising Office. Proposal required for review and approval by Advising Office before the first week of class; see an advisor for details. Both 485 and 491 can be reviewed and approved as 485H and 491H.