Elective Options for the Engineering Program

See the concentration-specific Model Program Worksheets to determine which electives are required. Please note that not all courses on this list are offered every year (see catalog for details).

1) The Basic Science elective can be any course from the list below. Other courses of 3 SH or greater in the major or minor programs of astronomy, biology, chemistry, geology, nursing, or physics may be considered for substitution – contact the department chair to obtain approval. The basic science elective options are:

- **FALL**
  - BIOL 141 – Cell Biology and Genetics (also SP)
  - BIOL 161 – Cellular and Genetic Systems (also SP)
  - CHEM 210 – Analytical Chemistry (also SP)
  - CHEM 241 – Organic Chemistry I
  - GEO 120 – Earth Systems (also SP)
  - GEO 151 – Introduction to Geology (also SP)
  - GEO 325 – Hydrogeology
  - PHYS 132 – Matter, Light, and Energy
  - PHYS 335 – Classical Mechanics
  - PHYS 345 – Electromagnetics

- **SPRING**
  - BIOL 160 – Ecological and Evolutionary Systems (also FA)
  - BIOL 364 – Global Health, Environment, and Sustainability (also FA)
  - ASTR 211 – Planetary and Stellar Astronomy
  - ASTR 212 – Galactic Astronomy and Cosmology
  - CHEM 102 – General Chemistry II
  - CHEM 205 – Human Anatomy (also FA)
  - CHEM 102 – General Chemistry II
  - CHEM 230 – Essential Inorganic Chemistry
  - CHEM 242 – Organic Chemistry II
  - PHYS 246 – Waves, Optics and Optical Technology
  - PHYS 306 – Intro to Quantum Mechanic

Note: The Advanced Science Elective for the chemical engineering concentration is limited to BIOL 141, BIOL 160, BIOL 161, CHEM 210, CHEM 270, CHEM 320, CHEM 321, CHEM 340, or CHEM 330.

2) The Advanced Mathematics elective can be any 300-level course that has at least Math 172 as a prerequisite. Options include:

- **FALL**
  - MATH 305 – Geometry and Topology of Manifolds
  - MATH 312 – Logic, Computability, and Complexity
  - MATH 331 – Nonlinear Dynamics and Chaos
  - MATH 333 – Partial Differential Equations
  - MATH 361 – Real Analysis I
  - STAT 343 – Probability and Statistics

- **SPRING**
  - MATH 335 – Numerical Analysis
  - MATH 355 – Advanced Linear Algebra
  - MATH 365 – Complex Variables
  - STAT 341 – Computational Bayesian Statistics
  - STAT 344 – Mathematical Statistics

Note: For a mathematics minor the following are required: 171, 172, 231, 271 and two 300 level courses. Students planning for a math minor should take MATH 271 rather than MATH 270.

3) The Statistics requirement can be met by the following courses:

- STAT 241 – Statistics for Engineers (most typical)
- AP Statistics (from high school)
- STAT 145 - Biostatistics
- STAT 243 – Statistics
- STAT 343 AND STAT 341 or 344

4) The Engineering elective can be any course of 3 SH or greater from the appropriate concentration-specific lists below. Consult the catalog to determine prerequisites needed for these courses:

**Civil & Environmental Engineering Concentration**

- **FALL**
  - ENGR 220 – Introduction to Computer Architecture
  - ENGR 303 – Chem Engr Principles and Thermodynamics
  - ENGR 307 – Electrical Signals and Systems
  - ENGR 315 – Control Systems
  - ENGR 319 – Introduction to Thermal Sciences
  - ENGR 327 – Structural Design

- **SPRING**
  - ENGR 304 – Fundamentals of Digital Systems
  - ENGR 308 – Environmental Engineering Design
  - ENGR 314 – Vibration Analysis
  - ENGR 318 – Soil Mechanics and Foundation Design
  - ENGR 321 – Hydraulic Engineering Design
  - ENGR 322 – Machine Design
  - ENGR 334 – Dynamics of Machinery
  - ENGR 338 – Traffic Engineering
  - ENGR 342 – Process Dynamics, Modeling, and Control
Electrical & Computer Engineering Concentration

**FALL**
- ENGR 303 – Chem Engr Principles and Thermodynamics
- ENGR 305 – Mechanics of Materials
- ENGR 306 – Principles of Environmental Engineering
- ENGR 315 – Control Systems
- ENGR 319 – Introduction to Thermal Sciences

**SPRING**
- ENGR 314 – Vibration Analysis
- ENGR 318 – Soil Mech and Foundation Design
- ENGR 334 – Dynamics of Machinery
- ENGR 342 – Process Dynamics, Modeling, and Control

Mechanical Engineering Concentration

The first engineering elective is limited to:
- ENGR 315 – Control Systems
- ENGR 314 – Vibration Analysis
- ENGR 342 – Process Dynamics, Modeling, and Control

A second engineering elective can come from any of the courses listed above that are not already required as part of the mechanical engineering concentration.

5) The Technical Elective can be any course from the list below. Other courses of 3 SH or greater that have significant mathematical or scientific content may be considered for substitution – contact the department chair to obtain approval. Technical elective options are:

**FALL**
- CS 112 – Introduction to Data Structures (ME/C&E only)
- CS 212 – Data Structures and Algorithms
- CS 232 – Operating Systems and Networking
- GEOG 261 – Geographic Info Systems and Cartography
- KIN 212 – Anatomical Kinesiology

**SPRING**
- CS 214 – Programming Language Concepts
- GEOG 261 – Geographic Info Systems and Cartography
- KIN 213 – Biomechanics

Optional Designations

**International Designation**

Students may receive an international designation by completing two of the following three international engineering items:

- An international engineering interim course
- The Engineering Summer Program in Germany
- An international internship demonstrating some ability to speak the language of the internship country

Other activities may qualify for the international designation. For additional details, please contact the engineering department international designation coordinator.

**Sustainability Designation**

Students may receive a sustainability designation by completing all of the following:

1. ENGR 184 – Sustainability Challenges
2. A 3 or 4- semester hour sustainability-themed course
3. ENGR 384 – Analysis of Sustainability Engineering Systems
4. A sustainability-related practical experience such as senior design project or internship

The courses currently approved as sustainability-themed courses are:

- ENGR Wxx – Sustainable Energy Systems
- ENGR Wxx – Advanced Topics in Chemical Engineering
- ENGR 306 – Principles of Environmental Engineering
- ECON 232 – Sustainability Economics
- ECON 233 – Economics of Energy and Sustainability
- BIOL 364 – Global Health, Environment, and Sustainability
- ENST 210 – Human Impacts on the Environment
- GEO 352 – Urban Planning for Sustainable Communities
- HIST 274 – Environmental History

For additional details, please contact the engineering department sustainability designation coordinator.

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