ARTS AND SCIENCE-ENGINEERING CURRICULA

- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Mechanical Engineering

This five-year program leads to the degree of Bachelor of Arts or Bachelor of Science and the degree of Bachelor of Chemical, Civil, Electrical, or Mechanical Engineering.

The Arts-Engineering Program serves both to broaden the engineer’s knowledge of the liberal arts and provide him or her with additional professional expertise. Many employers recognize the utility of hiring engineers who have extra proficiency in the language arts, the social sciences, and the humanities. Increasingly they search for employees with knowledge in some field that is interrelated with modern engineering, for example, economics, law, communication, mathematics and computer science and many of the biological and physical sciences. Yet some Arts-Engineering students have opted for this five-year program mainly for the personal satisfaction it can provide. These students, while committed to engineering as a profession, seek to enrich their nonworking hours with artistic or cultural knowledge acquired while in the College of Arts and Science.

In this program, students pursue courses in both the College of Arts and Science and the College of Engineering. It has attracted all kinds of students, among them freshmen who are undecided between a career in engineering or some field in Arts and Science. After sampling courses in both colleges, they can decide to continue in the program or switch to a four-year engineering or Arts and Science program. Conversely, a significant number of students who graduate as Arts-Engineers transferred into the program at some later time in their college career, either seeking to enrich their engineering studies or, if they were originally Arts and Science majors, deciding to become engineers.

The five-year Arts and Science-Engineering program assumes that all requirements will be fulfilled in the engineering department of the student’s choice. A minimum of thirty additional credits in Arts and Science is required. The additional courses are selected in consultation with an Arts and Science adviser in such a way as to fulfill all requirements in that college. Since many courses taken as part of the engineering curricula are also applicable to Arts and Science degrees, all requirements for both degrees can usually be met within the framework of the “bachelor’s-plus-30.”

For his or her degree in the College of Arts and Science the student must fulfill the following requirements.

Second Writing Course: Must be passed with a grade of C or better; the course may also simultaneously fulfill one of the group or elective courses listed below.

Language: Must pass in an intermediate-level language course or pass a proficiency test at the intermedi-
Group Requirements

Group A: Analysis and appreciation of the creative arts and humanities (12 credits, in at least two departments or programs).

Group B: The study of culture and institutions over time (12 credits in at least two departments or programs).

Group C: Empirically based study of human beings and their environment (12 credits in at least two departments or programs).

Group D: The study of natural phenomena through experiment and analysis. Automatically satisfied by means of the engineering curriculum.

Consult the latest listing of courses fulfilling group requirements available at the Arts and Science Dean's Office, 127 Memorial Hall.

NOTE: The above groups differ from General Education groups of the College of Engineering. (See College General Education Program in the College of Engineering section.) This requires the student to make careful course selection in order to have courses that satisfy both curricula simultaneously.

Area of Concentration: 15 credits of Arts and Science electives to be used for acquiring some depth of knowledge in a field chosen by the student in consultation with an Arts and Science adviser. It is recognized that the 15 credits designated for specialization may well be insufficient to qualify the student for an official major in most departments of the College of Arts and Science. Hence no major is required. Arts-Engineers whose "Area of Concentration" falls short of a major will graduate with a B.A. from the College of Arts and Science.

However, some students do manage to major in an Arts and Science department either by taking more than the minimum number of Arts and Science courses, or by specializing in a scientific or mathematical field, several of whose courses are also required for their engineering program. Some science departments give B.A. and B.S. degrees. Arts-Engineers majoring in such a department can attain either degree by following the appropriate departmental requirements. But there is one exception. While a few departments do not require a language proficiency for a B.S., nevertheless all Arts-Engineers must fulfill the language requirement.

DEGREE: BACHELOR OF ARTS or BACHELOR OF SCIENCE
—BACHELOR OF CHEMICAL ENGINEERING
MAJOR: NONE REQUIRED—CHEMICAL ENGINEERING

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing ................. 3.5
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content #

ARTS AND SCIENCE COLLEGE REQUIREMENTS

Skill Requirements

Writing: 
A writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content.

Foreign Language: ........................................ 0-12
Completion of the intermediate-level course (107 or 112) in a given language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

Breadth Requirements (See page 80)

Group A 
Understanding and appreciation of the creative arts and humanities. Twelve credits representing at least two areas.

Group B 
The study of culture and institutions over time. Twelve credits representing at least two areas.

Group C 
Empirically based study of human beings and their environment. Twelve credits representing at least two areas.

The above groups differ from the General Education groups of the College of Engineering. This requires careful course selection in order to have courses that satisfy both curricula simultaneously.

AREA OF CONCENTRATION REQUIREMENTS

Area of Concentration: 
Fifteen credits of Arts and Science electives to be used for acquiring some depth of knowledge in a field chosen in consultation with an Arts and Science adviser.

Arts-Science Courses Completed ........................................ 15

The liberal arts component is listed as 51 credit hours. The absolute minimum required to satisfy the requirements listed above is 45; this assumes that the foreign language requirement is satisfied from high school work, the writing course is in one of the Groups A, B, or C, and that nine credits of the Area of Concentration are also from one of the Groups A, B, or C. Thus, students without language skills and concentrating in science or mathematics will need more than 51 credit hours to complete all of these requirements.

ENGINEERING COLLEGE REQUIREMENTS

Mathematics

MATH 241 Analytic Geometry and Calculus A ............ 4.5
MATH 242 Analytic Geometry and Calculus B ............ 4.5
MATH 243 Analytic Geometry and Calculus C ............ 4.5
MATH 302 Ordinary Differential Equations ............. 3.5

*Superior figures indicate semester (fall or spring) and/or years in which the course is normally taken, i.e., **fall of freshman year, **spring of sophomore year, etc.

#This requirement may be fulfilled through a course taken to complete major, group, breadth, or elective requirements. See page 27.
MAJOR REQUIREMENTS

External to the College

Biology
BISC 207 Introductory Biology I ........................................... 4

Chemistry
CHEM 111 General Chemistry ........................................... 3
CHEM 119 Quantitative Chemistry ........................................... 3
CHEM 112 General Chemistry ........................................... 3
CHEM 120 Quantitative Chemistry ........................................... 3
CHEM 443 Physical Chemistry ........................................... 3
CHEM 444 Physical Chemistry ........................................... 3
CHEM 521 Inorganic Chemistry ........................................... 3
CHEM 332 Organic Chemistry ........................................... 3
CHEM 333 Organic Chemistry Laboratory I ........................................... 1

Computer Science
CISC 106 General Computer Science for Engineers ..................... 3

Within the College
MASC 302 Material Science for Engineers ........................................... 4

Within the Department
CHEG 009 Chemical Engineering Freshman Seminar ..................... 0
CHEG 112 Introduction to Chemical Engineering ......................... 3
CHEG 231 Chemical Engineering Thermodynamics ......................... 3
CHEG 341 Fluid Mechanics ........................................... 3
CHEG 342 Heat and Mass Transfer ........................................... 3
CHEG 325 Chemical Engineering Thermodynamics ......................... 3
CHEG 332 Chemical Engineering Kinetics ........................................... 3
CHEG 345 Chemical Engineering Laboratory I ........................................... 3
CHEG 443 Mass Transfer Operations ........................................... 3
CHEG 445 Chemical Engineering Laboratory II ........................................... 3
CHEG 432 Chemical Process Analysis ........................................... 3

Technical Electives

Technical Election
The purpose of the technical electives is to advance the student's scientific or engineering background in the intermediate (300-400) level. The technical electives program is a minimum of six credits taken from courses in the following list, normally two courses. Students should select their technical electives in the spring of sophomore year to avoid scheduling conflicts. Students should formulate an academic plan for their technical and chemical engineering electives with the assistance of their academic advisor.

Biology
BISC 301 Cellular and Molecular Biology ........................................... 4
BISC 303 Genetic and Evolutionary Biology ........................................... 4
BISC 305 Cell Biology ........................................... 4
BISC 306 General Physiology ........................................... 4
BISC 4xx Biology course chosen with the approval of the adviser ......................... 3-4

Chemistry
CHEM 334 Organic Chemistry Majors Laboratory II ......................... 2
CHEM 457 Inorganic Chemistry ........................................... 3
CHEM 527 Introductory Biochemistry ........................................... 3
CHEM 6xx Chemistry course chosen with the approval of the adviser ......................... 3
CHEM 8xx Chemistry course chosen with the approval of the adviser ......................... 3

Computer Science
CISC 300 Introduction to Scientific Computation ........................................... 3

Mathematics
MATH 349 Elements of Linear Systems ........................................... 3
MATH 389 Discrete Mathematics ........................................... 3
MATH 426 Introduction to Numerical Analysis and Algorithmic Computation ........................................... 3
MATH 427 Approximation Theory ........................................... 3
MATH 428 Algorithmic and Numerical Solution of Differential Equations ........................................... 3
MATH 5xx Mathematics course chosen with the approval of the adviser ......................... 3
MATH 6xx Mathematics course chosen with the approval of the adviser ......................... 3

Mechanical Engineering Applied Mathematics
MEEG 361 Applied Engineering Analysis ........................................... 3
MEEG 483 Engineering Analysis ........................................... 3
MEEG 864 Engineering Analysis ........................................... 3

Physics
PHYS 419 Analytical Mechanics ........................................... 3
PHYS 420 Analytical Mechanics ........................................... 3
PHYS 6xx Physics course chosen with the approval of the adviser ......................... 3

Statistics
STAT 450 Statistics for the Engineering and Physical Sciences ........................................... 3
STAT 6xx Statistics course chosen with the approval of the adviser ......................... 3

Electronic Materials
(please note prerequisites)
ELEG 314 Electronics and Instrumentation ........................................... 4
ELEG 340 Solid State Electronics ........................................... 3
ELEG 4xx Solid State Fabrication Laboratory ........................................... 1
ELEG 626 Integrated Circuits ........................................... 3
ELEG 629 Digital Structures ........................................... 3

Polymeric Materials
MEEG 410 Experimental Mechanics for Composite Materials ........................................... 3
MEEG 415 Finite Element Analysis ........................................... 3

Chemical Engineering Technical Electives
The curriculum provides three chemical engineering technical electives in the senior year. These courses are intended to provide some flexibility in selecting a chemical engineering program at the advanced level. Students should decide with the assistance of their advisor if they should conduct a program of independent research and then choose their course elective(s).

Chemical engineering technical electives are defined as follows: Any Chemical Engineering course numbered between 470 and 499; any 400- or higher-level Materials and Metallurgy course; UNIV 491–UNIV 492 Senior Thesis; any 600- or 800-level course in Chemical Engineering. Courses at the 400 level and 600 level are graduate courses open, with the consent of the instructor, to advanced students in senior standing.

Concentrations
The technical electives and chemical engineering electives can be coupled to provide a more intense concentration in an area of interest. The groupings below are some examples of this approach.

Applied Mathematics
MATH 426 Introduction to Numerical Analysis and Algorithmic Computation ........................................... 3
MATH 389 Discrete Mathematics ........................................... 3
CHEG 827 Chemical Engineering Problems ........................................... 2

*Students may enter Chemical Engineering after completing the eight-credit freshman Chemistry sequence, CHEM 103-104. However, an additional three-credit Chemistry course will be required.
The study of culture and institutions over time. Twelve credits representing at least two areas

*Superior figures indicate semester (fall or spring) and/or years in which the course is normally taken, i.e., 1 fall of freshman year, 2 spring of sophomore year, etc.

Area of Concentration: Fifteen credits of Arts and Science electives to be used for acquiring some depth of knowledge in a field chosen in consultation with an Arts and Science advisor.

The liberal arts component is listed as 51 credit hours. The absolute minimum required to satisfy the requirements listed above is 45; this assumes that the foreign language requirement is satisfied from high school work, the writing course is one of the Groups A, B, or C; and that nine credits of the Area of Concentration are also from one of the Groups A, B, or C. Thus, students without language skills and concentrating in science or mathematics will need more than 51 credit hours to complete all of these requirements.

Area of Concentration Requirements

CIEG 301 Cellular and Molecular Biology.......................... 4
CHEM 527 Introductory Biochemistry.................................. 3
CHEG 620 Biochemical Engineering.................................. 3

Chemistry

CHEM 457 Inorganic Chemistry...................................... 3
CHEM 527 Introductory Biochemistry................................. 3
CHEG 606 Introduction to Catalysis.................................. 3
CHEG 610 Industrial and Engineering Chemistry..................... 3
CHEG 836 Applied Chemical Kinetics................................ 3

Electronic Materials

ELEG 414 Electronics and Instrumentation.......................... 4
ELEG 540 Solid State Electronics..................................... 3
ELEG 4xx Solid State Fabrication Laboratory......................... 1
CHG 667 Solid State Device Fabrication............................... 3

Polymeric Materials

MEG 213 Principles of Mechanics I.................................. 4
MEG 415 Finite Element Analysis.................................... 3
MEG 410 Experimental Mechanics for Composite Materials............. 3
CHEG 601 Structure and Properties of Polymer Materials.............. 3
CHEG 603 Polymerization Reaction Engineering......................... 3
CHEG 602 Polymer Process Analysis and Design........................ 3
CHEG 604 Introduction to Polymer Science and Engineering II....... 3

CREDITS TO TOTAL A MINIMUM OF........................................160
One of:
CIEG 431 Water Supply Engineering .................................. 3.45
or
CIEG 432 Wastewater Engineering .................................. 3

One of:
CIEG 441 Hydrology ....................................................... 3.48
or
CIEG 442 Hydraulic Engineering ........................................ 3

Technical Electives
Technical Electives ........................................................ 12.54
Four courses: Three additional design points must be satisfied; see current department technical elective listing.

Credits to total a minimum of ...................................... 161

Degree: Bachelor of Arts or Bachelor of Science
—Bachelor of Electrical Engineering
Major: None Required—Electrical Engineering
Curriculum
Credits*

University Requirements
ENGL 110 Critical Reading and Writing .......................... 3.15
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content.

Arts and Science College Requirements
Skill Requirements
Writing ............................................................... 3
A writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content.

Foreign Language: .................................................. 0-12
Completion of the intermediate-level course (107 or 112) in a given language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

Broadth Requirements (See page 80)
Group A ................................................................. 12
Understanding and appreciation of the creative arts and humanities. Twelve credits representing at least two areas.

Group B ................................................................. 12
The study of culture and institutions over time. Twelve credits representing at least two areas.

Group C ................................................................. 12
Empirically based study of human beings and their environment. Twelve credits representing at least two areas.

The above groups differ from the General Education groups of the College of Engineering. This requires careful course selection in order to have courses that satisfy both curricula simultaneously.

Area of Concentration Requirements
Area of Concentration:
Fifteen credits of Arts and Science electives to be used for 15 acquiring some depth of knowledge in a field chosen in consultation with an Arts and Science adviser.

Arts-Science Courses Completed .................................. 1-5
The liberal arts component is listed as 51 credit hours. The minimum required to satisfy the requirements listed above is 45; this assumes that the foreign language requirement is satisfied from high school work, the writing course is in one of the Groups A, B, or C, and that nine credits of the Area of Concentration are also from one of the Groups A, B, or C. Thus, students without language skills and concentrating in science or mathematics will need more than 51 credit hours to complete all of these requirements.

Engineering College Requirements
Physics
PHYS 207 General Physics ............................................. 4.15
PHYS 208 General Physics ............................................. 4.25

Major Requirements
External to the College
Mathematics
MATH 242 Analytic Geometry and Calculus B .................... 4.15
MATH 243 Analytic Geometry and Calculus C .................... 4.15
MATH 341 Differential Equations & Linear Algebra I ............. 3.15
MATH 342 Differential Equations & Linear Algebra II .......... 3.15

Chemistry
CHEM 105 General Chemistry ..................................... 4.15

CISC 180 Introduction to Computer Science I .................... 3.15
CISC 181 Introduction to Computer Science II ................. 3.15
ENGL 301 Problems in Composition ................................ 3.15
PHIL 367 Ethics in the Engineering Profession ................... 1.15

Within the Department
ELEG 210 Introduction to Combinational Logic ................... 2.25
ELEG 211 Introduction to Sequential Circuits .................... 2.25
ELEG 285 Linear Circuit Theory .................................... 4.25
ELEG 290 Microprocessor Based Systems I ....................... 3.25
ELEG 309 Electronic Circuit Analysis I ......................... 4.35
ELEG 221 Microprocessor Based Systems II ...................... 2.35
ELEG 302 Electrical Properties of Materials .................... 4.35
ELEG 305 Signal Processing I ....................................... 3.35
ELEG 312 Electronic Circuit Analysis II ......................... 4.35
ELEG 329 Field Theory .............................................. 3.35
ELEG 306 Signal Processing II ...................................... 4.35
ELEG 310 Random Signals and Noise ............................. 3.35
ELEG 340 Solid State Electronics .................................... 3.35
ELEG 417 Feedback Control Systems ............................... 3.35
ELEG 413 Field Theory ............................................... 4.35
ELEG 453 Energy Systems ............................................ 3.35

ELEG 310 may be taken in the senior year (s) and ELEG 418 and/or ELEG 453 in the junior year (s) when appropriate to a plan for a technical concentration.

Design Requirement
In addition to the design content of the normal program, every student must take at least one course in their senior year in which one design project is at least 50% of the coursework. Regularly offered courses that presently meet this requirement are ELEG 420, 422, 650 and 664. The design requirement may also be met with special projects carried out in conjunction with faculty research with the prior approval of the Departmental Undergraduate Representative. Students must consult with their advisers for the proper selection of design courses.

Superior figures indicate semester (fall or spring) and/or year or years in which the course is normally taken, i.e., 15, fall of freshman year, 25, spring of sophomore year, etc.

*This requirement may be fulfilled through a course taken to complete major, group, breadth, or elective requirements. See page 27

The technical elective program is under constant review by the faculty. An updated list is available in the department office. Students should check with their advisers before selecting courses and should be aware that a formal mechanism exists to provide additional flexibility in selection of their Technical Elective courses.
Technical Electives

Each student must select a concentration to structure their technical elective program. Four concentrations are now defined (computer engineering, systems and signals engineering, electronic devices and materials engineering, and power systems engineering). Students with a special interest may define their own concentrations in conjunction with their adviser. With some exceptions, upper-level engineering, computer science, physics, science and mathematics courses are acceptable technical electives. However, students planning their own programs of concentration should realize that there must be a theme holding together at least most of the courses chosen. Any special concentrations must be approved by the Departmental Undergraduate Representative prior to the start of the senior year.

Each of the four regular concentrations specifies 15, or more, of the 21 technical elective credits in the core program. Students should note that the requirement for a senior design project will, in some cases, further constrain the choice of technical electives.

The technical electives must be chosen from an area of concentration. The four concentrations follow:

**Technical Electives—Computer Engineering**

- CISC 220 Data Structures ........................................... 3
- CISC 360 Computer Architecture .................................. 3
- ELEG 323 Digital System Design I ................................ 3
- ELEG 422 Digital System Design II ................................ 3

- or ELEG 618 Modern Control Engineering ......................... 3

- Technical electives chosen with the approval of an adviser. 6

**Technical Electives—Systems and Signals Concentration**

- CISC 220 Data Structures ........................................... 3
- MAIH 420 Introduction to Numerical Analysis and Algorithmic Computation ........................................... 3
- ELEG 403 Communication Systems Engineering .................. 3
- ELEG 618 Modern Control Engineering ............................ 3
- ELEG 631 Digital Signal Processing ................................ 3

- Technical electives chosen with the approval of an adviser. 6

**Technical Electives—Devices and Materials Concentration**

Students whose primary interest is in the Devices and Materials Engineering concentration should take:

- PHYS 209 General Physics ........................................... 3
- PHYS 313 Physical Optics ............................................. 3
- ELEG 623 Electronic Properties of Matter ......................... 3

- Students whose primary interest is in optoelectronics and electro-optics should take:

- ELEG 640 Optoelectronics ........................................... 3

- and ELEG 642 Special Topics in Electrooptics ..................... 3

- Technical electives chosen with the approval of an adviser. 6

**Technical Electives—Power Systems Concentration**

- MEEG 307 Thermodynamics I ....................................... 3
- ELEG 412 Introduction to Power Systems Analysis ............... 4

- Technical electives chosen with the approval of an adviser. 6

**Courses must be taken as a sequence, ELEG 640 and ELEG 642 or ELEG 626 and ELEG 650.**

**District: Bachelor of Arts or Bachelor of Engineering**

**Major: Selected Arts and Science Major**

**Mechanical Engineering**

- Engineering concentration should take:

- MEEG 408 Power Generation System Design ....................... 3

- or ELEG 323 Digital Systems Design I ............................. 3

- Technical electives chosen with the approval of an adviser. 6

**Credits to total a minimum of** 158

**Degree: Bachelor of Arts or Bachelor of Engineering**

**Major: Mechanical Engineering**

**Credits**

- Writing ................................................................. 3

- A writing course involving significant writing experience including two papers with a composed minimum of 3,000 words to be submitted for extended faculty critique of both composition and content.

- Foreign Language .................................................... 0-12

- Completion of the intermediate-level course (107 or 112) in a given language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an examination.

- Breadth Requirements (See page 80)

- Group A ................................................................. 12

- Understanding and appreciation of the creative arts and humanities. Twelve credits representing at least two areas

- Group B ................................................................. 12

- The study of culture and institutions over time. Twelve credits representing at least two areas

- Group C ................................................................. 12

- Empirically based study of human beings and their environment. Twelve credits representing at least two areas

- The above groups differ from the General Education groups of the College of Engineering. This requires careful course selection in order to have courses that satisfy both curricula simultaneously.

**Area of Concentration Requirements**

**Area of Concentration:**

Fifteen technical electives of Arts and Science electives to be used for acquisition of some depth of knowledge in a field chosen in consultation with an Arts and Science adviser. 

**Arts/Science Courses Completed**

The liberal arts component is listed as 51 credit hours. The absolute minimum required to satisfy the requirements listed above is 45; this assumes that the foreign language requirement is satisfied from high school work; the writing course is selected in one of the Groups A, B, or C, and that nine credits of the Area of Concentration are also from one of the Groups A, B, or C.

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*Superior figures indicate semester (fall or spring) and/or year or years in which the course is normally taken, i.e., fall of freshman year, spring of sophomore year, etc.

# This requirement may be fulfilled through a course taken to complete major, group, breadth, or elective requirements. See page 27.

**Courses must be taken as a sequence, ELEG 640 and ELEG 642 or ELEG 626 and ELEG 650.**
Thus, students without language skills and concentrating in science or mathematics will need more than 51 credit hours to complete all of these requirements.

**ENGINEERING COLLEGE REQUIREMENTS**

**Mathematics**
- MATH 241 Analytic Geometry and Calculus A 4  
- MATH 242 Analytic Geometry and Calculus B 4  
- MATH 243 Analytic Geometry and Calculus C 4  
- MATH 302 Ordinary Differential Equations I 3

**Physics**
- PHYS 207 General Physics 4  
- PHYS 208 General Physics 4  

**MAJOR REQUIREMENTS**

**External to the College**

**Chemistry**
- CHEM 103 General Chemistry 4  
- CHEM 104 General Chemistry 4  

**Within the College**
- EGGG 125 Introduction to Engineering (MEEG) 3  
- EGGG 132 Engineering Graphics/Analysis 2  
- MASC 302 Material Science for Engineers 4  
- ELEG 314 Electronics and Instrumentation 4  
- MECH 305 Fluid Mechanics 3  
- MECH 306 Fluid Mechanics Laboratory 1  

**Within the Department**
- MEEG 213 Principles of Mechanics I 3  
- MEEG 214 Principles of Mechanics II 3  
- MEEG 313 Strength of Materials 4

**Technical Electives**

A minimum of twelve credits to be selected from the following courses or substitute other courses in consultation with the adviser:
- MEEG 411 Structural Mechanics for Mechanical and Aerospace Engineering 3
- MEEG 413 Advanced Mechanics of Materials 3
- MEEG 415 Finite Element Analysis 3
- MEEG 432 Aerodynamics 3
- MEEG 435 Propulsion 3
- MEEG 436 Fluid Machinery 3
- MEEG 445 Senior Research 3  
- MEEG 616 Composite Materials Structures 3

**Credits to Total a Minimum of**

161

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*The technical elective program is under constant review by the faculty. An updated list is available in the department office. Students should check with their advisers before selecting courses and should be aware that a formal mechanism exists to provide additional flexibility in selection of their Technical Elective courses.*