

## Engineering Science

*Faculty: Grega, Program Coordinator*

Engineering science is an interdisciplinary program leading to a Bachelor of Science in Engineering Science with a specialization in Engineering Management or Policy and Society. The Engineering Science program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

### Program Educational Objectives

The engineering science program has established the following educational objectives. These objectives outline what TCNJ engineers should be able to accomplish during the first few years after graduation.

- To contribute to the technical, societal, and/or economic development of New Jersey and the nation through the ethical practice of engineering and related fields;
- To become successful in their chosen career path, whether it is in the practice of engineering, in advanced studies in engineering or science, or in other complementary disciplines;
- To assume leadership roles in industry or public service;
- To maintain career skills through life-long learning.

### Engineering Science/Engineering Management Specialization

The engineering management specialization integrates engineering and management education to prepare students for engineering management. This program provides a strong base in a specific field of engineering while also allowing the flexibility to take business courses covering a diverse range of topics such as finance, management, and marketing. A graduate of this program would be capable of acquiring a position that is highly technical in nature, or one that is more business oriented. With a broad set of skills in place, bridging the gap between technology and business becomes a natural transition. Engineering management students must select a mechanical, electrical, or computer option for their studies.

### Engineering Science/Policy and Society Specialization

The Policy and Society specialization prepares students to critically think about the application of engineering on society and the environment. Students will graduate with the skills to work in traditional engineering roles as well as para-technical fields in government agencies; such as FBI, NSA, CIA, NIH, DOE, DOD, and other general agencies. The program also serves students that want to pursue an engineering degree prior to entering law school. Engineering for Policy and Society examines the development of structures, devices, technologies, and methods that address problems relevant to how engineering may be used to improve the lives of people and society at large. Solutions that should contribute to both the protection and promotion of 1) safety and human welfare, 2) equality and social justice, 3) economic development and progress, as well as 4) environmental preservation and sustainability.

## Engineering Science Student Outcomes

The program outcomes listed below are expected of all graduates of the engineering science program. These outcomes outline what TCNJ engineering science graduates are expected to know and be able to do at graduation. These outcomes outline the knowledge, abilities, tools, and skills the program gives the graduates to enable them to accomplish the program educational objectives.

Engineering science graduates will have:

- (1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (3) An ability to communicate effectively with a range of audiences.
- (4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- (5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- (7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Academic Policies and Standards

A student may repeat any course without seeking approval. However, if a student wishes to repeat a course more than once, permission must be obtained from the chair of the department or coordinator of the program of study and, if appropriate, the chair of the department offering the course. Permission to repeat a major course more than once will be granted only in cases of extreme extenuating circumstances, e.g., illness, financial, etc. When an engineering course is repeated, only the most recent earned grade is counted in the grade point average, although all grades earned will appear on the student's transcript.

Seniors pursuing bachelor of science degrees in an engineering major are required to take the Fundamentals of Engineering Examination for the Professional Engineer's License.

Given the nature of the engineering curricula, it is extremely important to follow the recommended course sequence. Violations of this guideline may delay time to graduation.

## Program Entrance, Retention, and Exit Standards

Every major program at the College has set standards for allowing students to remain in that program, to transfer within the College from one program to another, and to graduate from a program. The following are the standards for engineering majors. Minimum grades are noted in parentheses.

- Retention in the engineering programs is based on the following performance standards in these “critical content courses”: PHY 201 (C–); MAT 127 (C–), MAT 128 (C–). A student who does not achieve these minimum performance standards, earns a grade of F, and/or has a cumulative GPA of less than 2.0 will be placed on the Engineering Programs Retention List. Placement on the Retention List for two consecutive semesters or three non-consecutive semesters will result in dismissal from the major. Students dismissed from the major may appeal for re-entry into the major.
- To ensure academic success, first year, sophomore, and first-semester junior students will not be permitted to take more than 4.5 course units unless they have a GPA of 2.75 or greater. Upper class students can register for 5.5 course units if they are in good academic standing.
- Entrance (internal transfer) into the engineering programs from another program within the College is based upon the following performance standards in these “foundation courses”: PHY 201 (C); MAT 127(C). Students must also be in good academic standing. Students who have not completed these foundation courses will be admitted as a Pre-Major and must complete them by the following semester. Internal transfer within engineering programs will be considered as long as enrollment limits are not exceeded.
- Graduation requires an in-major cumulative GPA of 2.0.

### **Bachelor of Science in Engineering Science—Engineering Management Specialization, Computer Preference**

#### **First Year**

##### **Fall**

|     |  |               |
|-----|--|---------------|
| CHE | 201/General Chemistry I                | 1 course unit |
| ENG | 142/Fundamentals of Engineering Design |               |
|     | <i>or</i>                              |               |
| CSC | 215/Computer Science I                 | 1 course unit |
| ENG | 095/Introduction to Engineering        | 0 course unit |
| ENG | 091/Engineering Seminar I              | 0 course unit |
| FYW | 102/First-Year Writing                 | 1 course unit |
| MAT | 127/Calculus A                         | 1 course unit |
| PHY | 201/General Physics I                  | 1 course unit |

##### **Spring**

|     |  |               |
|-----|--|---------------|
| CSC | 215/Computer Science I                 |               |
|     | <i>or</i>                              |               |
| ENG | 142/Fundamentals of Engineering Design | 1 course unit |
| ENG | 092/Engineering Seminar II             | 0 course unit |
| MAT | 128/Calculus B                         | 1 course unit |
| PHY | 202/General Physics II                 | 1 course unit |
| FYS | 16x/First-Year Seminar                 | 1 course unit |
| TST | 161/Creative Design                    | 1 course unit |

#### **Sophomore Year**

##### **Fall**

|     |  |                |
|-----|--|----------------|
| CSC | 250/Accelerated Computer Science I, II | 1 course unit  |
| ECO | 101/Principles of Microeconomics       | 1 course unit  |
| ENG | 212/Circuits Analysis                  | 1 course unit  |
| ENG | 214/Circuits Analysis Laboratory       | .5 course unit |
| ENG | 232/Manufacturing Processes            | 1 course unit  |

ENG 272/Advanced Engineering Mathematics I 1 course unit

### Spring

ACC 201/Financial Accounting and Reporting 1 course unit  
 ECO 102/Principles of Macroeconomics 1 course unit  
 ENG 222/Statics 1 course unit  
 ENG 312/Digital Circuits and Microprocessors 1 course unit  
 MAT 229/Multivariable Calculus 1 course unit

### Junior Year

#### Fall

BUS 200/Legal and Regulatory Environment of Business 1 course unit  
 ELC 451/Computer Architecture and Organization 1 course unit  
 ELC 363/Computer Engineering Laboratory I .5 course unit  
 ENG 093/Engineering Seminar III 0 course unit  
 MEC 321/Numerical Analysis 1 course unit  
 MKT 201/Marketing Principles .5 course unit  
 MGT 201/Managing in the 21<sup>st</sup> Century .5 course unit  
 ENG 372/Engineering Economy 1 course unit

#### Spring

ENG 094/Engineering Seminar IV 0 course unit  
 ENG 152/Engineering Material Science 1 course unit  
 ENG 262/Dynamics 1 course unit  
 ENG 342/Advanced Engineering Mathematics II 1 course unit  
 ENG 452/Project Management 1 course unit  
 ENG 348/Systems Engineering .5 course unit  
 IDS 252/Society, Ethics, and Technology 1 course unit

### Senior Year

#### Fall

ELC 495/Senior Project I .5 course unit  
 ENG 099/Senior Professional Seminar 0 course unit  
 ENG 322/Thermodynamics I 1 course unit  
 ENG 352/Control Systems 1 course unit  
 ENG 354/Control Systems Laboratory .5 course unit  
 FIN 201/Fundamental Financial Methods .5 course unit  
 Liberal Learning Elective\* 1 course unit

#### Spring

ELC 496/Senior Project II .5 course unit  
 ENG 098/Fundamentals of Engineering Review 0 course unit  
 ELC 463/Computer Engineering Laboratory II .5 course unit  
 Computer Engineering Elective\* 1 course unit  
 Management Elective\* 1 course unit  
 Liberal Learning Elective\* 1 course unit

**Total course units**

**39 course units**

*\*By advisement only.*

Computer Engineering Electives

CSC345 Operating Systems  
 ELC321 Signals and Systems  
 ELC453 Digital Control Systems  
 ELC470 Special Topics (by advisement)

**Bachelor of Science in Engineering Science—Engineering Management Specialization, Electrical Preference****First Year****Fall**

|     |  |               |
|-----|--|---------------|
| CHE | 201/General Chemistry I                | 1 course unit |
| ENG | 142/Fundamentals of Engineering Design |               |
|     | <i>or</i>                              |               |
| CSC | 215/Computer Science I                 | 1 course unit |
| ENG | 095/Introduction to Engineering        | 0 course unit |
| ENG | 091/Engineering Seminar I              | 0 course unit |
| FYW | 102/First-Year Writing                 | 1 course unit |
| MAT | 127/Calculus A                         | 1 course unit |
| PHY | 201/General Physics I                  | 1 course unit |

**Spring**

|     |  |               |
|-----|--|---------------|
| CSC | 215/Computer Science I                 |               |
|     | <i>or</i>                              |               |
| ENG | 142/Fundamentals of Engineering Design | 1 course unit |
| ENG | 092/Engineering Seminar II             | 0 course unit |
| MAT | 128/Calculus B                         | 1 course unit |
| PHY | 202/General Physics II                 | 1 course unit |
| FYS | 16x/First-Year Seminar                 | 1 course unit |
| TST | 161/Creative Design                    | 1 course unit |

**Sophomore Year****Fall**

|     |  |                |
|-----|--|----------------|
| ECO | 101/Principles of Microeconomics         | 1 course unit  |
| ENG | 212/Circuits Analysis                    | 1 course unit  |
| ENG | 214/Circuits Analysis Laboratory         | .5 course unit |
| ENG | 232/Manufacturing Processes              | 1 course unit  |
| ENG | 272/Advanced Engineering Mathematics I   | 1 course unit  |
| ENG | 312/Digital Circuits and Microprocessors | 1 course unit  |

**Spring**

|     |   |                |
|-----|---|----------------|
| ACC | 201/Financial Accounting and Reporting  | 1 course unit  |
| ECO | 102/Principles of Macroeconomics        | 1 course unit  |
| ELC | 251/Electronics                         | 1 course unit  |
| ELC | 321/Signals and Systems                 | 1 course unit  |
| ELC | 333/Electrical Engineering Laboratory I | .5 course unit |
| MAT | 229/Multivariable Calculus              | 1 course unit  |

**Junior Year****Fall**

|   |                |
|---|----------------|
| ENG 372/Engineering Economy                 | 1 course unit  |
| ELC 341/Communications Systems              | 1 course unit  |
| ENG 093/Engineering Seminar III             | 0 course unit  |
| ENG 222/Statics                             | 1 course unit  |
| ENG 342/Advanced Engineering Mathematics II | 1 course unit  |
| MEC 321/Numerical Analysis                  | 1 course unit  |
| MKT 201/Marketing Principles                | .5 course unit |

**Spring**

|  |                |
|--|----------------|
| ENG 094/Engineering Seminar IV                   | 0 course unit  |
| ENG 152/Engineering Material Science             | 1 course unit  |
| ENG 262/Dynamics                                 | 1 course unit  |
| ENG 452/Project Management                       | 1 course unit  |
| MGT 201/Managing in the 21 <sup>st</sup> Century | .5 course unit |
| Liberal Learning Elective                        | 1 course unit  |
| IDS 252/Society, Ethics, and Technology          | 1 course unit  |

**Senior Year****Fall**

|                                       |                |
|---------------------------------------|----------------|
| ELC 495/Senior Project I              | .5 course unit |
| ENG 099/Senior Professional Seminar   | 0 course unit  |
| ENG 352/Control Systems               | 1 course unit  |
| ENG 354/Control Systems Laboratory    | .5 course unit |
| FIN 201/Fundamental Financial Methods | .5 course unit |
| Electrical Engineering Elective*      | 1 course unit  |
| ENG 322/Thermodynamics I              | 1 course unit  |

**Spring**

|  |                |
|--|----------------|
| ELC 496/Senior Project II                            | .5 course unit |
| ENG 098/Fundamentals of Engineering Review           | 0 course unit  |
| BUS 200/Legal and Regulatory Environment of Business | 1 course unit  |
| Management Elective*                                 | 1 course unit  |
| Liberal Learning Elective*                           | 1 course unit  |

**Total course units****39 course units***\*By advisement only.***Electrical Engineering Electives**

|                                       |
|---------------------------------------|
| ELC 361/Digital Signal Processing     |
| ELC 383/Electronics II                |
| ELC 411/Embedded Systems              |
| ELC 431/RF/Microwave Engineering      |
| ELC 441/Digital Systems Engineering   |
| ELC 453/Digital Control Systems       |
| ELC 483/Robotics                      |
| ELC 492/Independent Study             |
| ENG 472/Special Topics in Engineering |
| ENG 412/Process & Quality Control     |

## Bachelor of Science in Engineering Science—Engineering Management Specialization, Mechanical Preference

### First Year

#### Fall

|     |  |               |
|-----|--|---------------|
| CHE | 201/General Chemistry I                | 1 course unit |
| ENG | 142/Fundamentals of Engineering Design |               |
|     | <i>or</i>                              |               |
| CSC | 215/Computer Science I                 | 1 course unit |
| ENG | 095/Introduction to Engineering        | 0 course unit |
| ENG | 091/Engineering Seminar I              | 0 course unit |
| FYW | 102/First-Year Writing                 | 1 course unit |
| MAT | 127/Calculus A                         | 1 course unit |
| PHY | 201/General Physics I                  | 1 course unit |

#### Spring

|     |  |               |
|-----|--|---------------|
| CSC | 215/Computer Science I                 |               |
|     | <i>or</i>                              |               |
| ENG | 142/Fundamentals of Engineering Design | 1 course unit |
| ENG | 092/Engineering Seminar II             | 0 course unit |
| MAT | 128/Calculus B                         | 1 course unit |
| PHY | 202/General Physics II                 | 1 course unit |
| FYS | 16x/First-Year Seminar                 | 1 course unit |
| TST | 161/Creative Design                    | 1 course unit |

### Sophomore Year

#### Fall

|     |  |                |
|-----|--|----------------|
| ECO | 101/Principles of Microeconomics       | 1 course unit  |
| ENG | 212/Circuits Analysis                  | 1 course unit  |
| ENG | 214/Circuits Analysis Laboratory       | .5 course unit |
| ENG | 222/Statics                            | 1 course unit  |
| ENG | 232/Manufacturing Processes            | 1 course unit  |
| ENG | 272/Advanced Engineering Mathematics I | 1 course unit  |

#### Spring

|     |                                  |                |
|-----|----------------------------------|----------------|
| ECO | 102/Principles of Macroeconomics | 1 course unit  |
| ENG | 152/Engineering Material Science | 1 course unit  |
| ENG | 262/Dynamics                     | 1 course unit  |
| MAT | 229/Multivariable Calculus       | 1 course unit  |
| MEC | 251/Strength of Materials        | 1 course unit  |
| MEC | 236/Mechanical Engineering Lab 1 | .5 course unit |

### Junior Year

#### Fall

|     |   |               |
|-----|---|---------------|
| ENG | 093/Engineering Seminar III             | 0 course unit |
| ENG | 322/Thermodynamics I                    | 1 course unit |
| ENG | 342/Advanced Engineering Mathematics II | 1 course unit |
| ENG | 372/Engineering Economy                 | 1 course unit |
| MEC | 311/Mechanical Design Analysis I        | 1 course unit |
| MEC | 321/Numerical Analysis                  | 1 course unit |

**Spring**

|  |                |
|--|----------------|
| ENG 094/Engineering Seminar IV                   | 0 course unit  |
| ENG 452/Project Management                       | 1 course unit  |
| MEC 361/Fluid Mechanics                          | 1 course unit  |
| ACC 201/Financial Accounting                     | 1 course unit  |
| MGT 201/Managing in the 21 <sup>st</sup> Century | .5 course unit |
| Liberal Learning Elective*                       | 1 course unit  |

\* By advisement only.

**Senior Year****Fall**

|  |                |
|--|----------------|
| ENG 099/Senior Professional Seminar            | 0 course unit  |
| ENG 352/Control Systems                        | 1 course unit  |
| ENG 354/Control Systems Laboratory             | .5 course unit |
| FIN 201/Fundamental Financial Methods          | .5 course unit |
| MKT 201/Marketing Principles                   | .5 course unit |
| IDS 252/Society Ethics & Technology            | 1 course unit  |
| MEC 495/Senior Project I                       | 0 course unit  |
| Mechanical Engineering or Management Elective* | 1 course unit  |

**Spring**

|  |               |
|--|---------------|
| ENG 098/Fundamentals of Engineering Review     | 0 course unit |
| ENG 312/Digital Circuits and Microprocessors   | 1 course unit |
| BUS 200/Legal Regulatory Environment           | 1 course unit |
| MEC 496/Senior Project II                      | 1 course unit |
| Mechanical Engineering or Management Elective* | 1 course unit |
| Liberal Learning Elective*                     | 1 course unit |

**Total course units****39 course units**

\* By advisement only.

**Mechanical Engineering Electives**

MEC 343/Biomechanics  
 MEC 371/Thermodynamics II  
 MEC 411/Heat Transfer  
 MEC 421/Kinematics and Mechanisms

MEC 431/Mechanical Design Analysis II  
 MEC 441/Vibration Analysis  
 MEC 453/Digital Control Systems  
 MEC 465/Aerodynamics  
 MEC 471/Compressible Fluid Mechanics  
 MEC 481/Advanced Strength of Materials  
 MEC 483/Robotics  
 MEC 492/Independent Study  
 ENG 470/Special Topics in Engineering  
 ENG 412/Process and Quality Control



**Bachelor of Science in Engineering Science—Policy and Society Specialization****First Year****Fall**

|     |  |               |
|-----|--|---------------|
| CHE | 201/General Chemistry I                | 1 course unit |
| ENG | 142/Fundamentals of Engineering Design |               |
|     | <i>or</i>                              |               |
| CSC | 215/Computer Science I                 | 1 course unit |
| ENG | 095/Introduction to Engineering        | 0 course unit |
| ENG | 091/Engineering Seminar I              | 0 course unit |
| FYW | 102/First-Year Writing                 | 1 course unit |
| MAT | 127/Calculus A                         | 1 course unit |
| PHY | 201/General Physics I                  | 1 course unit |

**Spring**

|     |   |               |
|-----|---|---------------|
| CSC | 215/Computer Science I                    |               |
|     | <i>or</i>                                 |               |
| ENG | 142/Fundamentals of Engineering Design    | 1 course unit |
| ENG | 092/Engineering Seminar II                | 0 course unit |
| MAT | 128/Calculus B                            | 1 course unit |
| PHY | 202/General Physics II                    | 1 course unit |
| FYS | 16x/First-Year Seminar (Social Sciences)* | 1 course unit |
| TST | 161/Creative Design                       | 1 course unit |

\*By advisement only.

**Sophomore Year****Fall**

|     |  |                |
|-----|--|----------------|
| ECO | 101/Principles of Microeconomics       | 1 course unit  |
| ENG | 212/Circuits Analysis                  | 1 course unit  |
| ENG | 214/Circuits Analysis Laboratory       | .5 course unit |
| ENG | 222/Statics                            | 1 course unit  |
| ENG | 232/Manufacturing Processes            | 1 course unit  |
| ENG | 272/Advanced Engineering Mathematics I | 1 course unit  |

**Spring**

|     |   |               |
|-----|---|---------------|
| ENG | 152/Engineering Material Science          | 1 course unit |
| ENG | 262/Dynamics                              | 1 course unit |
| ENG | 312/ Digital Circuits and Microprocessors | 1 course unit |
| MAT | 229/Multivariable Calculus                | 1 course unit |
|     | Policy and Society Elective*              | 1 course unit |

**Junior Year****Fall**

|     |   |               |
|-----|---|---------------|
| ENG | 093/Engineering Seminar III             | 0 course unit |
| ENG | 342/Advanced Engineering Mathematics II | 1 course unit |
| MEC | 321/Numerical Analysis                  | 1 course unit |
| ENG | 372/Engineering Economy                 | 1 course unit |
|     | Engineering Elective*                   | 1 course unit |
|     | Policy and Society Elective*            | 1 course unit |

**Spring**

|     |                            |               |
|-----|----------------------------|---------------|
| ENG | 094/Engineering Seminar IV | 0 course unit |
| ENG | 452/Project Management     | 1 course unit |

|   |               |
|---|---------------|
| IDS 252/Society, Ethics, and Technology | 1 course unit |
| Engineering Electives*                  | 2 course unit |
| Liberal Learning Elective*              | 1 course unit |

\*By advisement only.

### Summer

|  |               |
|--|---------------|
| POL 399/Internship in Public Affairs       | 1 course unit |
| OR   |               |
| POL 401/TCNJ Washington Internship         | 1 course unit |
| POL 402/TCNJ Washington Coursework         | 1 course unit |
| POL 403/TCNJ Washington Leadership Seminar | 1 course unit |

*Students pursuing this option must take at least one Political Science course as part of their Policy and Society electives before their senior year.*

### Senior Year

#### Fall

|                                     |                |
|-------------------------------------|----------------|
| ELC 495/Senior Project I            | .5 course unit |
| ENG 099/Senior Professional Seminar | 0 course unit  |
| ENG 322/Thermodynamics I            | 1 course unit  |
| Policy and Society Electives*       | 2 course unit  |

#### Spring

|  |                 |
|--|-----------------|
| ELC 496/Senior Project II                  | .5 course unit  |
| ENG 098/Fundamentals of Engineering Review | 0 course unit   |
| ENG 352/Control Systems                    | 1 course unit   |
| ENG 354/Control Systems Laboratory         | .5 course unit  |
| Policy and Society Elective*               | 2/0 course unit |
| Liberal Learning Elective*                 | 1 course unit   |

#### Total course units

**39 course units**

\*By advisement only.

### Engineering Electives

#### **3 CU - At least 2 CU must be of the same course prefix (ELC or MEC).**

|                                       |       |
|---------------------------------------|-------|
| ENG 348/Systems Engineering           | (0.5) |
| ELC 251/Electronics                   | (1)   |
| ELC 333/Electronics Laboratory        | (0.5) |
| ELC 321/Systems & Signals             | (1)   |
| ELC 341/Communication Systems         | (1)   |
| ELC 343/Microcomputer Systems         | (0.5) |
| ELC 423/Digital Signal Processing     | (1)   |
| MEC 251/Strength of Materials         | (1)   |
| MEC 263/Mechanical Engineering Lab. I | (0.5) |
| MEC 311/Mechanical Design Analysis I  | (1)   |
| MEC 361/Fluid Mechanics               | (1)   |
| MEC 421/Kinematics                    | (1)   |

### Policy and Society Electives

#### **4 or 6 CU - At least 2 CU must be at the 300 level or above.**

|  |     |
|--|-----|
| PHL 275/Philosophy of Law                            | (1) |
| BUS 200/Legal and Regulatory Environment of Business | (1) |
| BUS 300/Law for Business                             | (1) |

|  |     |
|--|-----|
| BUS 360/International Business Law                   | (1) |
| ECO 102/Principles of Macroeconomics                 | (1) |
| ECO 345/Comparative Economic Systems                 | (1) |
| POL 320/Constitutional Law                           | (1) |
| POL 321/Civil Liberties                              | (1) |
| POL 380/International Political Economy              | (1) |
| POL 355/Political Economy of Natural Resources       | (1) |
| POL 305/American Public Policy                       | (1) |
| POL 200/Political Analysis                           | (1) |
| SOC 345/Inequality, Pollution and the Environment    | (1) |
| HIS 176/American Technology                          | (1) |
| POL 230/International Relations                      | (1) |
| POL 250/Politics and Society in Developing Countries | (1) |
| POL 316/Public Opinion, Voting and Elections         | (1) |
| PHL 240/Political Philosophy                         | (1) |
| SOC 355/Introduction to Urban Planning               | (1) |
| SOC 336/Cultural and Social Change                   | (1) |
| ANT 341/Environmental Anthropology                   | (1) |
| ANT 340/Social Change in Latin America               | (1) |

### Seven-Year BS (Engineering Science – Electrical Preference)/MD

#### Freshman Year

##### Summer

|                             |               |
|-----------------------------|---------------|
| PHY 201/General Physics I*  | 1 course unit |
| PHY 202/General Physics II* | 1 course unit |

##### Fall

|  |               |
|--|---------------|
| CHE 201/General Chemistry I                | 1 course unit |
| ENG 142/Fundamentals of Engineering Design | 1 course unit |
| ENG 095/Introduction to Engineering        | 0 course unit |
| ENG 091/Engineering Seminar I              | 0 course unit |
| FYS 16x/First-Year Seminar                 | 1 course unit |
| ENG 222/Statics                            | 1 course unit |
| ENG 272/Advanced Engineering Mathematics I | 1 course unit |

##### Spring

|   |               |
|---|---------------|
| BIO 201/Foundations of Biological Inquiry | 1 course unit |
| CHE 202/General Chemistry II              | 1 course unit |
| ENG 092/Engineering Seminar II            | 0 course unit |
| MAT 229/Multivariable Calculus            | 1 course unit |
| ENG 262/Dynamics                          | 1 course unit |
| CSC 215/Computer Science I                | 1 course unit |

#### Sophomore Year

##### Fall

|  |               |
|--|---------------|
| ENG 232/Manufacturing Processes              | 1 course unit |
| ENG 342/Advanced Engineering Mathematics II  | 1 course unit |
| ENG 312/Digital Circuits and Microprocessors | 1 course unit |
| ENG 093/Engineering Seminar III              | 0 course unit |
| ECO 101/Principles of Microeconomics         | 1 course unit |
| ENG 212/Circuits Analysis                    | 1 course unit |

ENG 214/Circuits Analysis Laboratory .5 course unit

### Spring

ELC 251/Electronics 1 course unit  
 ELC 333/Electrical Engineering Laboratory I .5 course unit  
 ELC 321/Signals and Systems 1 course unit  
 ENG 152/Materials Science 1 course unit  
 ENG 094/Engineering Seminar IV 0 course unit  
 ENG 322/Thermodynamics 1 course unit  
 IDS 252/Society, Ethics and Technology 1 course unit

### Junior Year

#### Summer

CHE 331/Organic Chemistry I 1 course unit  
 CHE 332/Organic Chemistry II 1 course unit

#### Fall

ENG 352/Control Systems 1 course unit  
 ENG 354/Control Systems Laboratory .5 course unit  
 ELC 495/Senior Project I .5 course unit  
 ENG 099/Senior Professional Seminar 0 course unit  
 BIO 211/Biology of the Eukaryotic Cell 1 course unit  
 ELC 341/Communication Systems 1 course unit  
 Electrical Engineering Elective\*\* 1 course unit

#### Spring

ENG 372/Engineering Economy 1 course unit  
 TST 161/Creative Design 1 course unit  
 ELC 496/Senior Project II .5 course unit  
 ENG 098/Fundamentals of Engineering Review 0 course unit  
 Liberal Learning Elective\*\* 2 course unit  
 Electrical Engineering Elective\*\* 1 course unit

#### Total course units at TCNJ

**35.5 course units**

*\* Students entering the program must hold advanced placement credit in Calculus A and B. Alternatively, students must hold advanced placement credit for General Physics I and II, and complete Calculus A and B during the summer prior to their first semester at TCNJ.*

*\*\* By advisement only.*

### Seven-Year BS (Engineering Science – Mechanical Preference)/MD

#### First Year

##### Summer

PHY 201/General Physics I\* 1 course unit  
 PHY 202/General Physics II\* 1 course unit

##### Fall

CHE 201/General Chemistry I 1 course unit  
 ENG 142/Fundamentals of Engineering Design 1 course unit  
 ENG 095/Introduction to Engineering 0 course unit  
 ENG 091/Engineering Seminar I 0 course unit

|     |  |               |
|-----|--|---------------|
| FYS | 16x/First-Year Seminar                 | 1 course unit |
| ENG | 222/Statics                            | 1 course unit |
| ENG | 272/Advanced Engineering Mathematics I | 1 course unit |

**Spring**

|     |                                       |               |
|-----|---------------------------------------|---------------|
| BIO | 201/Foundations of Biological Inquiry | 1 course unit |
| CHE | 202/General Chemistry II              | 1 course unit |
| ENG | 092/Engineering Seminar II            | 0 course unit |
| MAT | 229/Multivariable Calculus            | 1 course unit |
| ENG | 262/Dynamics                          | 1 course unit |
| CSC | 215/Computer Science I                | 1 course unit |

**Sophomore Year****Fall**

|     |   |                |
|-----|---|----------------|
| ENG | 093/Engineering Seminar III             | 0 course unit  |
| ENG | 232/Manufacturing Processes             | 1 course unit  |
| ENG | 322/Thermodynamics                      | 1 course unit  |
| ENG | 342/Advanced Engineering Mathematics II | 1 course unit  |
| IDS | 252/Society, Ethics and Technology      | 1 course unit  |
| ENG | 212/Circuits Analysis                   | 1 course unit  |
| ENG | 214/Circuits Analysis Laboratory        | .5 course unit |

**Spring**

|     |                                  |                |
|-----|----------------------------------|----------------|
| ENG | 152/Materials Science            | 1 course unit  |
| TST | 161/Creative Design              | 1 course unit  |
| MEC | 251/Strength of Materials        | 1 course unit  |
| MEC | 263/Mechanical Engineering Lab I | .5 course unit |
| MEC | 361/Fluid Mechanics              | 1 course unit  |
| ECO | 101/Principles of Microeconomics | 1 course unit  |
| ENG | 094/Engineering Seminar IV       | 0 course unit  |

**Junior Year****Summer**

|     |                          |               |
|-----|--------------------------|---------------|
| CHE | 331/Organic Chemistry I  | 1 course unit |
| CHE | 332/Organic Chemistry II | 1 course unit |

**Fall**

|     |                                    |                |
|-----|------------------------------------|----------------|
| ENG | 352/Control Systems                | 1 course unit  |
| ENG | 354/Control Systems Laboratory     | .5 course unit |
| ELC | 495/Senior Project I               | 0 course unit  |
| ENG | 099/Senior Professional Seminar    | 0 course unit  |
| MEC | 311/Mechanical Design I            | 1 course unit  |
| BIO | 211/Biology of the Eukaryotic Cell | 1 course unit  |
|     | Mechanical Engineering Elective**  | 1 course unit  |
|     | Liberal Learning Elective**        | 1 course unit  |

**Spring**

|     |  |               |
|-----|--|---------------|
| ENG | 372/Engineering Economy                  | 1 course unit |
| ELC | 496/Senior Project II                    | 1 course unit |
| ENG | 098/Fundamentals of Engineering Review   | 0 course unit |
| ENG | 312/Digital Circuits and Microprocessors | 1 course unit |
|     | Mechanical Engineering Elective**        | 1 course unit |

|  |                          |
|--|--------------------------|
| Liberal Learning Elective**  | 1 course unit            |
| <b>Total course units at TCNJ</b>  | <b>35.5 course units</b> |
| <i>* Students entering the program must hold advanced placement credit in Calculus A and B. Alternatively, students must hold advanced placement credit for General Physics I and II, and complete Calculus A and B during the summer prior to their first semester at TCNJ.</i> |                          |
| <i>** By advisement only.</i>  |                          |

### Minor in Engineering Science

#### Option A—Mechanical Engineering

|                           |                         |
|---------------------------|-------------------------|
| ELE 251/Electronics       | 1 course unit           |
| ENG 212/Circuit Analysis  | 1 course unit           |
| ENG 222/Statics           | 1 course unit           |
| ENG 262/Dynamics          | 1 course unit           |
| Engineering Elective*     | 1 course unit           |
| <b>Total course units</b> | <b>5** course units</b> |

*\* By advisement.*

*\*\* Only one course unit taken as part of the student's major may also be counted toward the student's minor.*

### Minor in Engineering Science

#### Option B—Civil Engineering

|                                 |                         |
|---------------------------------|-------------------------|
| CIV 251/Strength of Materials   | 1 course unit           |
| CIV 311/Structural Analysis     | 1 course unit           |
| CIV 351/Structural Steel Design | 1 course unit           |
| ENG 222/Statics                 | 1 course unit           |
| Engineering Elective*           | 1 course unit           |
| <b>Total course units</b>       | <b>5** course units</b> |

*\* By advisement.*

*\*\* Only one course unit taken as part of the student's major may also be counted toward the student's minor.*