Engineering Science

Faculty: Adegbege, *Program Coordinator*

Engineering science is an interdisciplinary program leading to a Bachelor of Science in Engineering Science with a specialization in Engineering Management. 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 skillls 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 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 degree in engineering science 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 Academic Warning List. Placement on the Engineering Programs Academic Warning 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	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	
or		
CSC	220/Computer Science I: Computer Problem Solving	1 course unit
ENG	095/Introduction to Engineering	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	220/Computer Science I: Computer Problem Solving	
or		
ENG	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	1 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	230/Computer Science II: Data Structures	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/Numerial Analysis	1 course unit
MKT	201/Marketing Principles	.5 course unit
MGT	201/Managing in the 21st 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
	College Core 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
	College Core 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	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	
or		
CSC	217/Computer Science I for Science and Engineering	1 course unit
ENG	095/Introduction to Engineering	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	217/Computer Science I for Science and Engineering	
or		
ENG	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	1 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/Numerial 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 21st Century	.5 course unit
College Core 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
	College Core 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	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	
or		
CSC	217/Computer Science I for Science and Engineering	1 course unit
ENG	095/Introduction to Engineering	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	217/Computer Science I for Science and Engineering	
or		
ENG	144/Fundamentals of Engineering Design &	
MEC	145/Introduction to Computer Aided Design	1 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 Calucus	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/Numerial 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 21st Century	.5 course unit
	College Core 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 Regulartory Environment	1 course unit
MEC	496/Senior Project II	1 course unit
	Mechanical Engineering or Management Elective*	1 course unit
	College Core 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