

## Technological Studies

*Faculty:* Karsnitz, *Chair;* Edelbach, Finkral, J. Hutchinson, Weber.

*TIES Magazine:* R. Todd, *Publisher and Senior Research Professor;* P. Hutchinson, *Editor-in-Chief;* K. Maskell, *Editor*

We live in a technological age. Technology is the study of the human quest for solutions. The impacts of technology on the individual, society, and environment are great. Society needs professionals who understand technological forces and are prepared to help people manage those forces. Students study a variety of themes including historical development, problem-solving techniques, design, communication, systems, and impacts. Emphasis is placed on developing design problem-solving skills. Courses are conducted in one of the 10 modern laboratories housed in the School of Engineering.

Students in the Department of Technological Studies with a teacher-education specialty receive provisional certification to teach in technology education programs in New Jersey schools. Most states recognize teacher candidates from this NCATE nationally accredited program. Students graduating from the program also take positions in business and industry such as manufacturing design and prototyping, industrial sales, training and development, or become entrepreneurs. Some students choose to pursue this program to prepare for positions in higher education or government service.

### Requirements for the Technology Education Major (ETTC)

Forty-six credits in technological studies (TSNG) courses, 26 credits in technology education (TCED) courses and 56 credits in general education, professional courses, and state certification.

### Entrance, Retention, and Graduation 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 technology education. Minimum grades are noted in parentheses:

- Retention in the program is based on the following performance standards in these “critical content courses”:  
TSNG 171/Introduction to Human Technological Behavior (B–); TCED 292/Introduction to Teaching Technology Education (C+).
- Transfer in the program from another program within the College is based upon the following performance standards in these “foundation courses”:  
TSNG 171/Introduction to Human Technological Behavior (B–);  
TCED 292/Introduction to Teaching Technology Education (C+).

### Technology Education Major (ETTC)

Candidates for a teacher-education certificate must have a 2.75 cumulative grade point average to successfully complete their teacher education program. They also must meet the state hygiene/physiology requirement, and pass the appropriate Praxis examination before the New Jersey State Department of Education will issue the appropriate certificate. Teacher-education candidates will receive a “certificate of eligibility with advanced standing” which requires a candidate to be provisionally certified for his or her first year of teaching. After one year of successful teaching, the candidate is eligible for a permanent certificate. The teacher candidate will also have to pay a fee during his or her first year of teaching. Students should consult with their departmental advisers in planning their academic program. These plans should take into account requirements for the major, general education, professional courses, and state certification.

### Suggested Course Sequence

*During academic year 2003-2004, The College of New Jersey is in the process of transformative curricular change. Therefore only the course of study for first-year students entering in 2003-2004 is set out below. These students should consult their advisors when planning courses for future years. Supplements to this online bulletin also will be available on an ongoing basis.*

#### Freshman Year

TSNG	100/Department Seminar	1
STEC	161/Creative Design	3
TSNG	111/Engineering Graphics	3
TSNG	171/Intro. to Human Technological Behavior	3
TSNG	181/Materials and Processes in Design	3
WRI	102/Academic Writing	4
PSY	101/General Psychology	4
IDSC	151/Athens to New York	3

*or*

FSP	101/First Year Seminar	4
STAT	115/Statistics I	3

Select one of the following courses:

IDSC	105B/Applying Computing to Mathematical Problem Solving (Logo)	3
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or

MAT	127/Calculus A	4
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**Total for year** 31

**Elementary Education M/S/T (ELST)**  
**Early Childhood Education M/S/T (ECST)**  
**Deaf and Hard of Hearing M/S/T (DHST) with a Technology Specialization**

This interdisciplinary major integrates formal study in mathematics, biology, chemistry, physics, and technology. Students electing a technology specialization will complete 42 credits of “core” requirements including Calculus (MATH 127), Statistics (STAT 115), Principles of Biology (BIOL 181–182), Principles of Chemistry (CHEM 101–102), College Physics (PHYS 191–192), Introduction to Human Technological Behavior (TSNG 171), Principles of Structures and Mechanisms (TSNG 211), and an M/S/T-approved elective. The technology specialization consists of a minimum of 21 credits including the core technology courses, TSNG 201/Energy Systems and TSNG 261/Technological Design I, and three technology elective courses at the 300 level or higher.

**Technology Minor**

The minor consists of 21 credits:

TSNG 171/Introduction to Technological Behavior	3
TSNG 201/Energy Systems in Contemporary Society	3
TSNG 211/Principles of Structures and Mechanisms	3
TSNG 261/Technological Design I	3
Technology Options (approved by the chair)	9

At least two of the courses making up this minor must be 300 level or higher. No more than three courses can be transferred into the minor.

**TSNG 111/Engineering Graphics** 3 cr.

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisite:* STEC 161

Engineering drawing as a language and a tool of industry. Freehand drawing, orthographic projection and basic descriptive geometry, axonometric drawings, developments, and intersections. Basic dimensioning and reproduction of working drawings. Introduction to CAD.

**TSNG 171/Introduction to Human Technological Behavior** 3 cr.

(2 class hours, 3 lab hours)

(annually—fall)

An introduction to the study of how humans shape and modify their world to satisfy basic physiological needs as well as higher-level needs and wants. Students will study how the use of knowledge, tools and materials, and human-developed systems of technology has brought both benefit and risk to ourselves and our world. A design approach will be employed to provide an overview of basic technological knowledge, processes, and artifacts, including structures, mechanisms, and control.

**TSNG 181/Materials and Processes in Design** 3 cr.

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisite:* TSNG 171

An introduction to materials, their characteristics, and the common practices used to change their form and/or properties in order to expand their usefulness in meeting human needs and wants. Development of the ability to understand materials processing and the use of materials-processing tools and machines. The importance of safety and its relationship to materials processing will be stressed.

**TSNG 182/Advanced Materials and Processes** 3 cr.

(2 class hours, 3 lab hours)

(annually—fall)

*Prerequisite:* TSNG 181

An in-depth experience with materials and advanced techniques used to process them. Includes testing techniques for determining material properties, processing of natural and synthetic materials, and an analysis of past, present, and future material resources. A research-based activity will document contemporary developments in materials, science, and appropriate applications.

**TSNG 201/Energy Systems in Contemporary Society 3 cr.**

(2 class hours, 3 lab hours)

(annually—fall)

The study of energy technologies in contemporary society with emphasis on the resources, processes, conversion systems, use patterns, and future reserves. Explores the social, economic, and political implications as well as environmental consequences of particular energy options.

**TSNG 211/Principles of Structures and Mechanisms 3 cr.**

(2 class hours, 3 lab hours)

(annually—fall)

*Prerequisite:* TSNG 171

This course is intended to develop knowledge and capability related to two fundamental building blocks of our technological world. Students will study structural and mechanical systems, underlying scientific principles, applications, and techniques and skills used in the design and development of these systems. Emphasis on knowledge of how these systems impact society, and skills to solve new problems with structural and mechanical systems.

**TSNG 221/Information Technology 3 cr.**

(2 class hours, 3 lab hours)

(annually—fall)

A study of the systems used to encode, transmit, receive, decode, and store information. The study will include significant world communication endeavors, resources, and impacts of contemporary communication practices on this and other cultures. Major emphasis is on the mass print and mass electronic systems.

**TSNG 231/Production Systems 3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisite:* TSNG 182

A study of the structure, function, and impacts of producing artifacts, systems, and environments. Includes world manufacturing endeavors, resources, and the social and economic impacts of manufacturing on a global scale.

**TSNG 261/Technological Design I 3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisites:* TSNG 171, STEC 161

This course is intended to promote the competencies, skills, and sensibilities needed for the successful development and realization of contemporary commercial products. A design/problem-solving model will include elements of design and appearance, ergonomics, idea modeling, research, evaluation and management of resources, material selection, and processing, construction, and testing. Emphasis on documentation of design work, appreciation of stylistic traditions, and development of aesthetic sensibilities in design and realization.

**TSNG 290/History of Technological Development 3 cr.**

(3 class hours)

(occasionally)

A course exploring and comparing technological development from early civilization to the present and beyond. Emphasizes the technology humans have developed to satisfy basic needs and the effect of this technology on societal institutions. Places technological change within the context of political, cultural, and economic developments.

**TSNG 331/Control Systems 3 cr.**

(2 class hours, 3 lab hours)

(annually—fall)

*Prerequisites:* TSNG 171, TSNG 211

Study of electronic, fluid, and electro-mechanical systems including sensors, control and output devices, and impacts of these systems on contemporary society. Introduction to control logic, switching, timing and other control devices and systems. Analysis of circuits and use of instrumentation.

**TSNG 341/Biotechnical Systems 3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisite:* TSNG 171

A study of the techniques, processes, and consequences of human manipulation of natural systems. Includes topics such as agriculture, food production, waste disposal, bio-energy, medical applications, and genetic manipulation. Students will study significant world biotechnology endeavors, the necessary resources, and the social and ethical impacts of biotechnology on our culture and other cultures around the world. Team taught with faculty from the Department of Biology.

**TSNG 351/Computer Systems 3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisites:* TSNG 171, TSNG 211, TSNG 331

Since the computer is considered an essential technological system, this course will introduce the fundamentals of computing through an integrated approach of programming through lessons and activities targeting the control of computer outputs and inputs. Such outputs and inputs include the control and sensing of motors, steppers, solenoids, temperature, light, movement, and other physical characteristics. Laboratory activities are included.

**TSNG 361/Technological Design II** **3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisites:* STEC 161, TSNG 171, TSNG 261

An advanced course in design/problem solving. Emphasis on research techniques, product development including human factor engineering and material specification, and advanced testing and evaluation. Case studies used to understand trade-offs and risks to the individual, society, and the environment associated with selected design solutions. Uses a thematic approach to selecting a problem.

**TSNG 400/Problems in Construction** **3 cr.**

(2 class hours, 3 lab hours)

(occasionally)

*Prerequisites:* TSNG 211, selection must be approved by faculty adviser

Research-oriented course in problem solving and development of educational media relating to residential construction. This course involves individualized selection and completion of a project by the student while using the faculty member as a resource person.

**TSNG 410/Problems in Communications** **3 cr.**

(2 class hours, 3 lab hours)

(occasionally)

*Prerequisites:* TSNG 221, selection must be approved by faculty adviser

Research-oriented course in problem solving in the field of communications. An individualized project developed through student initiative in consultation with a faculty member as an application, or an extension of material offered through formal courses in the communications sequence.

**TSNG 430/Problems in Manufacturing** **3 cr.**

(2 class hours, 3 lab hours)

(occasionally)

*Prerequisites:* TSNG 231, selection must be approved by faculty adviser

A research and development-oriented advanced course in problem solving in the area of manufacturing. To evolve around an individualized project initiated by a student or faculty member to extend the knowledge and skill of the student relative to problems unique to manufacturing technology.

**TSNG 444/Problems in Transportation** **3 cr.**

(2 class hours, 3 lab hours)

(occasionally)

*Prerequisites:* TSNG 201, selection must be approved by faculty adviser

A research-oriented course in problem solving in the field of power, energy, and transportation. An individualized project developed through student initiative in consultation with a faculty member from the area of power, energy, and transportation. The course will provide an extension to or an application of materials offered through transportation technology.

**TSNG 466/Workshop in Technological Studies** **1–6 cr.**

(annually)

*Prerequisites:* Recommendation of faculty adviser, approval of department chair

Advanced course dealing with topics in technological studies.

**TSNG 480/Senior Design Project** **3 cr.**

(6 lab hours)

(annually—spring)

*Prerequisites:* STEC 479; approved senior project proposal

Implementation of the research proposal developed in the advanced writing course. Students will design, model, test, and evaluate the proposed solution(s) to the identified problem. A written report summarizing the results of the study will be completed and submitted along with associated models and/or media.

**TSNG 497/Independent Study in** **1–6 cr.**

**Technological Studies**

(every semester)

*Prerequisites:* Permission of instructor and dean of School of Engineering

For advanced students wishing to pursue a special area of interest. Topic developed in consultation with a faculty adviser.

**TCED 292/Introduction to Teaching Technology**            **3 cr.**  
**Education**

(1 class hour, 3 lab hours)  
(annually—fall)

A professional field-based experience to give an early introduction to teaching. This introduction will include observations of classroom activities, teachers, school administrative functions, and visits to various types of schools. Membership in ITEA and TEANJ is required.

**TCED 392/Junior Professional Experience in**            **3 cr.**  
**Technology Education**

(1 class hour, 3 lab hours)  
(annually—spring)

*Prerequisites:* TCED 292, junior status, 2.5 GPA–2.75 major

Observation and limited participation as a teacher aide in local public school technology education programs. Emphasis on systematic observation of teaching, planning for teaching, modes of instruction, teacher-pupil interaction analysis and lab planning, management, and controls. Field trips may be required at student expense. Continued membership in ITEA and TEANJ is required.

**TCED 398/Content and Methods in**                      **4 cr.**  
**Technology Education**

(4 class hours)  
(annually—fall)

*Prerequisite:* TCED 392

General overview of curriculum and methodology in technology education. Emphasis on development of instructional programs and materials, methodology, evaluation and facilities organization, and management in technology education. Also includes Red Cross First Aid course. Continued membership in ITEA and TEANJ is required.

**TCED 466/Workshop in Technology Education**        **1–6 cr.**  
(annually)

*Prerequisites:* Recommendation of faculty adviser, approval of department chair  
Advanced course dealing with topics in technology education.

**TCED 490/Student Teaching in**                        **10 cr.**  
**Technology Education**

(16 weeks)  
(annually—fall)

*Prerequisites:* TCED 392, 2.5 GPA–2.75 major

Student teaching during the senior year under direct supervision of public or private school teachers and a college supervisor. Experience includes observation, participation, and responsible teaching within the school along with familiarization with both the school management system and community makeup.

**TCED 497/Independent Study in**                      **1–6 cr.**  
**Technology Education**

(every semester)

*Prerequisites:* Permission of instructor and dean of School of Engineering

For advanced students wishing to pursue a special area of interest. Topic developed in consultation with a faculty adviser.

**TCED 498/Seminar in Technology Education**        **2 cr.**

(2 class hours)  
(annually—fall)

*Corequisite:* TCED 490

Planning for and analysis of student teacher's role in school and community. Assistance in preparing for postgraduate activities. Individual and group assignments to strengthen student teacher's preparation. Completion no earlier than successful completion of student teaching. Continued membership in ITEA and TEANJ is required.

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**Other Offerings from the School of Engineering**

**STEC 161/Creative Design**                              **3 cr.**

(2 class hours, 3 lab hours)  
(every semester)

Perspectives on the World: Fine and Performing Arts

Design elements and principles as related to consumer goods. Cultivation of respect for design as a creative and pleasing solution to problems involving industrial tools, materials, and processes. Available to students in any curriculum.

**STEC 215/Computer-Aided Drafting****3 cr.**

(2 class hours, 3 lab hours)

(occasionally)

An introduction to the utilization of computer technology for drafting; to create or modify engineering and architectural designs in the production of a product. The course is laboratory-oriented covering topics such as sketching, dimensioning, hatching, isometric drawings, basic drawing entities, layering, digitizing, blocking, and plotting.

**STEC 374/Technological Literacy****3 cr.**

(2 class hours, 3 lab hours)

(annually—spring)

*Prerequisites:* TSNG 171, TSNG 211

An introduction to research and contemporary issues concerning the national focus on technological literacy. The course will deal specifically with concepts of design-based inquiry, history, principles and processes of technology including engineering, and the impact of technological activity on the individual, society, and the environment.

**STEC 479/Advanced Writing in****3 cr.****Technology Education**

(3 class hours)

(annually—spring)

Development of a written research proposal dealing with a contemporary technological system or problem. Written proposal to include statement of the problem, literature review via library/computer search, procedures to be followed in the study, timeline, and evaluation plan. Completed proposal to be reviewed and approved for implementation in the senior project course, via a faculty evaluation committee.