

TES 201 three credits **S**

Properties of Materials

Prerequisite: Sophomore standing

The molecular structure and morphologies of materials with a focus on soft materials. A foundation is provided for understanding the physical, chemical, and mechanical properties and behavior of materials. Production processes and applications are also examined.

TES 252 one credit

Materials Seminar

Prerequisite: Sophomore standing

Discussions and presentations on materials, processes and products. Students learn to interrelate knowledge from all forms of materials, their processing and applications. Outside speakers, faculty and student lectures will provide an overview of the continuity from course to course in the Textile Sciences Programs.

TES 255 One credit

Biology for Engineers

A survey of tissue properties and tissue-materials interactions for materials students. The concept of biocompatibility will be explored. The functions of the clotting system, of macrophage action and of the immune system will be covered.

TES 262 three credits **S**

Microscopy

Various microscopic techniques in fiber identification and structure, composition of blends, physical, chemical, and biological conditions of fibers and yarns. Students are taught the principles of various microscopic and photomicroscopic techniques—scanning electron, optical, polarized light, atomic force, and so on—as well as introduced to the principles of image analysis.

TES 298 one to six credits

Experiential Learning

Prerequisites: At least sophomore standing; permission of the instructor, department chairperson, and college dean

Work experience at an elective level supervised for academic credit by a faculty member in an appropriate academic field. Conditions and hours to be arranged.

Graded CR/NC. For specific procedures and regulations, see selection of catalogue on Other Learning Experiences.

TES 300 four credits

Textile Structures and Properties

3 hours lecture, 3 hours laboratory

Prerequisite: TES 105, upper-division standing

A study of the design, properties of yarns and fabric structures. A foundation is provided for understanding the physical, chemical and mechanical properties and behavior of fibrous structures. An engineering approach to textile structures will be presented._

TES 301 four credits

Materials Processing I

3 hours lecture, 3 hours laboratory

Prerequisite: TES105, Upper-division standing

The thermodynamics and kinetics of melt, solid and vapor-phase processing of materials. Relationships between processing parameters and structure. Applications to casting, forming, powder processing, molding, extrusion, spinning, rolling and forging.

TES 303 three credits S

Dyeing, Printing and Finishing I

Prerequisite: TES 201

The principles of dyeing, printing, and finishing of textile materials. Basic characteristics of dyes, chemical structure of dyes and fibers, detergent and scouring, classification of dyes and fibers, color and chemical composition are studied. Dyeing equipment and the specific dyes and procedures used to dye textiles are also examined.

TES 304 three credits

Optical Properties of Materials

Prerequisite(s) TES 201 ,Upper-division standing

An introduction to optical properties of materials and color. Refraction, dispersion, scattering, diffraction will be discussed. The relationships between color and atomic and molecular structures will be covered. The applications of the principles will be presented as well as the latest technological development in the optical materials area.

TES 305 four credits

Materials Analysis

3 hours lecture, 3 hours laboratory

Prerequisites: TES 201, Upper-division standing

An introduction to the analytical methods for characterizing materials. Instrumentation to determine chemical, mechanical, thermal and electrical properties of materials are considered. Process/product evaluation by physical, chemical and microscopic methods are also discussed with help of case studies.

TES 310 three credits

Statistical Quality Control

Prerequisite: TES 105, Upper-division standing

The vision of never-ending improvement in quality. Statistical quality control charts are developed for implementing and maintaining economic control of processes. Diagnostic techniques for determining faults are explored.

TES 321 three credits

Transport Properties of Solids and Fluids

Prerequisite: TES201, Upper-division standing

The rheology of fluids in processing, properties of fluid materials such as gels, pastes and suspensions and applications in industries such as food, paint and cosmetics. The main focus of the course is to familiarize the student with the structure and properties of soft and fluid materials for a wide range of applications.

TES 322 three credits

Electronic Properties of Materials

Prerequisite: Upper-division standing

An introduction to conducting and semiconducting properties of inorganic, organic and composite materials. Applications of the concepts to various electronic devices, including microelectronics, batteries, fuel cells, antennae, sensors and actuators, are also discussed.

TES 331 three credits

Textile Technology

A course designed for Textile Design students that covers the theory and procedures employed in the processing of raw materials into yarns and fabrics, including natural and manufactured fibers.

TES 350 three credits **E**

Environmental Science and Industry Compliance

Prerequisite: Upper division standing

A study of environmental science, technology, and compliance issues relevant to modern industrial manufacturing practice.

The applied science of environmental pollution remediation technology is reviewed in the context of laws, regulations, and ethics. Issues of importance to the textile, chemical product, and related manufacturing

industries are emphasized.

TES 352 three credits

Prerequisite: Upper-division standing

Seminar

A program designed to improve oral communication skills by learning and using concepts in materials and textile sciences. Students attend seminars presented by outside speakers, faculty, and graduate students and then each student prepares a seminar for the class.

TES 401 four credits

Materials Processing II

3 hours lecture, 3 hours laboratory

Prerequisite: Upper-Division Standing

An introduction to processing methods for the electronics industry as a new paradigm of how things are made. Production of electronic products, semiconductors, production of silicon wafers, integrated circuits (IC), thin film deposition, IC component connection, productivity and quality improvement are also discussed

TES 402 three credits

Advanced Materials and Composites

Prerequisites: Upper-division standing

Processes used for producing functionally advanced and intelligent fibrous materials: Lamination, coating, flocking, wet layup, resin transfer molding, sheet molding, pultrusion, and filament winding. Also studied are resins for coating, adhesives and polymeric matrices, and reinforcing fibrous structures and preforms such as prepreg, fabrics, 3-D woven fabrics, nonwovens, nanofibers, braided and knotted structures. Properties of the resulting structures and their application areas such as nanocomposites, biological fibrous composites, medical, military, and other industrial and functional products are considered.

TES 403 three credits

Mechanics of Textile Structures

Prerequisite: Upper-division standing

Study of the basic mechanics of fibrous assemblies. Topics included are geometry and mechanical behavior of twisted, woven, knit, and non-conventional structures under various stress conditions, and end use application.

TES 404, 405 three credits

Processing Dynamics I, II

Prerequisite: Upper-division standing

Theoretical analysis of the dynamics and machine-fiber assembly interaction in textile

fabrication processes. The inter-relationships between mechanics of production and mechanical properties of yarns, fabrics, and other fiber assemblies are studied. Unit operations required to process fibers to the finished products are considered.

TES 406 three credits

Computer Applications in Textiles

Prerequisite: Upper-division standing

A survey of computer applications and computer integrated manufacturing (CIM) systems in textiles. The course covers automatic process control, quality monitoring, and manufacturing data acquisition supported by microprocessors and personal computers. Course involves extensive hands-on assignments using MS-DOS, Spreadsheet (LOTUS 1-2-3), word processing, business graphics, databases, and BASIC programming software.

TES 408 three credits

Jaquard Fabrication

Prerequisites: TES 300, 312; or permission of instructor

The execution of complex woven structures for the high end apparel and home furnishings fabric markets. Artistic and technical skills are combined to produce jacquard woven fabrics which are aesthetically and functionally appealing. Color, yarn selection and design are manipulated and organized on a state-of-the-art CAD system.

TES 410 4 credits

Fiber and Textile Processing

3 hours lecture, 3 hours laboratory

Prerequisite: Upper-division Standing

An examination of the current and emerging systems for the conversion of fibers into yarn and textile structures. The relationships between material/process constraints and product functional quality are studied. Students will design, produce and analyze a yarn/textile product._

TES 411 three credits

Managing Technology

Prerequisite: Senior standing

Understanding the impact of technology on manufacturing and society. The course analyzes the effects of technology on society and various business functions, such as product design, manufacturing processes, marketing strategies, and research and development. Topics include technical innovation, entrepreneurship, and patent protection.

Ethical issues related to technology, including product liability, industrial espionage, and the environment, are discussed.

TES 421 three credits

Biological and Biomedical Materials

Prerequisite: Upper-division standing

Biomedical materials are synthetic materials working in a biological system. This requires an understanding of the similarities and differences between biological and synthetic materials and of the wide range of reactions between them.

TES 460 three credits

Materials Selection and Design

Prerequisite: Upper-division standing

A project-based integrative course taking a component through design, materials selection, finite element analysis, prototyping and testing. Students will use CAD and FEM programs and materials selection systems.

TES 463 three credits **O, W**

Senior Project

Prerequisite: Upper division standing

Exposure to and experience in timely research and development projects either in the laboratory or a real world setting—at companies in the area. Most but not all topics will be in the area of textile sciences: (a) Product Design and Analysis or Reverse Engineering; (b) Plant Design, Marketing, Business Strategy Research based on library work; (c) supervised lab intensive project; (d) Directed/Independent Study with Industrial Internship.

TES 465 three credits

Textile Merchandising and Marketing

Case histories and general discussions of the following subjects: the marketing of textile

fibers, yarns, fabric, and garments; the influence of style and fashions on textile industry products; and price policies and other problems characteristic of the textile industry.

TES 475 three credits

Textile Cost Accounting

Principles and problems basic to textile costing; basic cost concepts, cost problems; materials, labor, and manufacturing costs; textile fiber and supplier purchasing; spinning, weaving, and finishing mill costs; textile marketing costs, and financial statements.

TES 482 three credits

Fabric Design for Function

A case study in the development of textile fabrics that have engineering designs to provide specific properties. Examples include dome structures, geotextiles, bullet-proof vest, artificial turf, and medical fabrics. The course correlates properties of textile materials, engineering principles in textile processing, and the design of fabric structures with the desired properties for a particular functional use.

TES 495 variable credit

Independent Study

Prerequisites: Upper-division standing; permission of instructor, department chairperson, and college dean
Study under the supervision of a faculty member in an area not otherwise part of the discipline's course offerings. Conditions and hours to be arranged.

TES 196, 296, 396, 496 three credits

Directed Study

Prerequisites: Permission of the instructor, department chairperson, and college dean
Study under the supervision of a faculty member in an area covered in a regular course not currently being offered.

Conditions and hours to be arranged.