

# Textile Chemistry (TC)

## **TC 530 The Chemistry Of Textile Auxiliaries** (3 credit hours)

Industrially important textile chemicals used for enhancing fiber and fabric properties such as durable press, water repellency, anti-soiling, flame retardancy, softness, stiffness, lubricity and other uses. Correlation of effect with structure, end-use influences, interaction with fabric and fibers, sources and synthetic routes, economic and environmental considerations.

Prerequisite: One yr. of organic chemistry

*Typically offered in Spring only*

## **TC 560 Fiber Manufacturing Technology** (3 credit hours)

TE/TC 598 is a 3-credit, intermediate course on fiber manufacturing technologies for the major classes of polymeric and inorganic fibers. The course explores innovations in fiber spinning that were necessitated by advances in polymer chemistry, the need for advanced material properties, as well as socio-economic concerns. The chemistry of polymers is discussed in terms of its role on fiber manufacturing by melt and solution spinning technologies. The microstructure and performance properties of fibers are discussed in context of the manufacturing technology.

R: Senior or Graduate Student Standing

*Typically offered in Fall only*

## **TC 561/MSE 561 Organic Chemistry Of Polymers** (3 credit hours)

Principles of step reaction and addition polymerizations; copolymerization; emulsion polymerization; ionic polymerization; characterization of polymers; molecular structure and properties.

Prerequisite: TC 461 and CH 231 or CH 431

*Typically offered in Fall only*

## **TC 565 Polymer Applications and Technology** (3 credit hours)

Poly(olefins), poly(vinyl chloride), poly(vinyl acetate), poly(urethanes), epoxies, silicones, styrene copolymers used as textile finishes, nonwoven binders, fabric coatings, composites, adhesives, foams, carpet backing adhesives. Emphasis upon synthesis, industrial processes, properties and products.

Prerequisite: One yr. of organic chemistry, TC 461

*Typically offered in Spring only*

## **TC 567 Biobased Textile Materials and Processes** (3 credit hours)

Advances in biotechnology allow us to: better understand the biosynthetic origins of textile materials from agricultural, animal and microbial sources; apply biotechnology, such as enzyme treatment, for textile modification and waste management; and, develop new types of biobased textiles using biocatalytic and fermentation technologies. In the context of this course, biobased textile materials include materials of biological origin used as textiles (e.g. fibers, monomers and fiber-forming biopolymers) or used during the production of textiles (e.g. enzymes, microorganisms, dyes and chemicals). The origins and properties of biobased textile materials are explored in a manner that bridges the fields of polymer chemistry, biochemistry and fiber science, with emphasis on chemical composition, properties, processes, analytics and mechanisms important to using these materials for textile applications. Sustainability attributes of biobased materials are discussed throughout the course.

Prerequisite: One semester of undergraduate organic chemistry (CH 220 or CH 221 or CH 225 or similar) or permission of instructor

*Typically offered in Fall only*

## **TC 589/TE 589/TMS 589 Special Studies In Textile Engineering and Science** (1-4 credit hours)

New or special course on developments in textile engineering and science. Specific topics and prerequisites identified vary. Generally used for first offering of a new course.

Prerequisite: Senior standing or Graduate standing

*Typically offered in Fall, Spring, and Summer*

## **TC 601 Seminar** (1 credit hours)

Discussion of scientific articles and presentations; review and discussion of student papers and research problems.

*Typically offered in Fall and Spring*

## **TC 630 Independent Study** (1-3 credit hours)

*Typically offered in Fall, Spring, and Summer*

## **TC 685 Master's Supervised Teaching** (1-3 credit hours)

Teaching experience under the mentorship of faculty who assist the student in planning for the teaching assignment, observe and provide feedback to the student during the teaching assignment, and evaluate the student upon completion of the assignment.

Prerequisite: Master's student

*Typically offered in Fall only*

## **TC 689 Non-Thesis Master Continuous Registration - Full Time Registration** (3 credit hours)

For students in non-thesis master's programs who have completed all credit hour requirements for their degree but need to maintain full-time continuous registration to complete incomplete grades, projects, final master's exam, etc. Students may register for this course a maximum of one semester.

Prerequisite: Master's student

*Typically offered in Fall, Spring, and Summer*

## **TC 690 Master's Examination** (1-9 credit hours)

For students in non thesis master's programs who have completed all other requirements of the degree except preparing for and taking the final master's exam.

Prerequisite: Master's student

*Typically offered in Fall, Spring, and Summer*

## **TC 693 Master's Supervised Research** (1-9 credit hours)

Instruction in research and research under the mentorship of a member of the Graduate Faculty.

Prerequisite: Master's student

*Typically offered in Fall and Spring*

## **TC 695 Master's Thesis Research** (1-9 credit hours)

Thesis Research

Prerequisite: Master's student

*Typically offered in Fall and Spring*

## **TC 696 Summer Thesis Research** (1 credit hours)

For graduate students whose programs of work specify no formal course work during a summer session and who will be devoting full time to thesis research.

Prerequisite: Master's student

*Typically offered in Summer only*

**TC 699 Master's Thesis Preparation** (1-9 credit hours)

For students who have completed all credit hour requirements and full-time enrollment for the master's degree and are writing and defending their thesis. Credits arranged

Prerequisite: Master's student

*Typically offered in Fall only*

**TC 704 Fiber Formation--Theory and Practice** (3 credit hours)

Practical and theoretical analysis of the chemical and physical principles underlying conventional methods of converting bulk polymer to fiber; rheology; melt, dry and wet polymer extrusion; fiber drawing; heat setting; general theory applied to unit processes.

Prerequisite: MA 341, PY 208

*Typically offered in Spring only*

**TC 705 Theory Of Dyeing** (3 credit hours)

Mechanisms of dyeing. Application of thermodynamics to dyeing systems. Kinetics of diffusion in dyeing processes.

Prerequisite: CH 433

*Typically offered in Spring only*

**TC 706 Color Science** (3 credit hours)

Basis of modern techniques for color specification, measurement, control and communication. Applications of color science to textiles, plastics, color reproduction, computer-based imaging and display systems. Basic concepts taught by computer color graphics.

Prerequisite: Senior standing or Graduate standing in TC, Corequisite: TC 707

*Typically offered in Fall only*

**TC 707 Color Laboratory** (1 credit hours)

Exercises with modern methods and equipment to aid in understanding color perception, color science and color measurement. Computer color graphics exercises for comprehension of basic concepts. Independent projects in color science. Limited enrollment.

Prerequisite: Senior standing or Graduate standing in TC, Corequisite: TC 706

*Typically offered in Fall only*

**TC 710/FPS 710 Science of Dye Chemistry, Dyeing, Printing and Finishing** (3 credit hours)

The primary course purpose is to gain a strong fundamental understanding of the chemistry and technology of preparation, dyes, dyeing and finishes. Emphasis will be on the chemistry of different bleach activators, surfactants, photophysics and photochemistry of FWAs, modulations of dyes structures to influence color, tinctorial strength, light fastness, wash fastness and aggregation. Chemistry of different dye classes will be studied with emphasis on structure-property relationships and dye-fiber interactions. Dyeing isotherms (Nernst and Langmuir), kinetics of dyeing with emphasis on derivation of Nernst and Langmuir based on thermodynamics and kinetics principles will be covered with practical examples of dyeing at different temperature and how to calculate thermodynamic parameters of dyeing (entropy, standard affinity and isotherm constants of Nernst and Langmuir). Chemistry of different finishes, including soil release, chemistry of flame retardants and mechanisms of flame retardancy, antimicrobial and water and oil repellency, will be covered with emphasis on structure-property relationships.

Prerequisite: Graduate Standing and C or better in CH221 or CH225 and CH223 or CH227

*Typically offered in Fall and Spring*

**TC 720 Chemistry Of Dyes and Color** (3 credit hours)

Correlation of color and chemical constitution, synthetic routes for popular dyes of all important types; electronic mechanisms for reactive dyes; chemistry of dye interactions with light, washing and other in-use influences; economic and environmental considerations.

Prerequisite: (CH 221 or CH 225) and (CH 223 or CH 227)

*Typically offered in Spring only*

**TC 771 Polymer Microstructures, Conformations and Properties** (3 credit hours)

Exploration of connections between microstructures and properties of polymers afforded by analysis of their conformational characteristics. Analysis of NMR spectroscopy and conformational energy estimates to establish polymer microstructures and resultant sizes and shapes of polymer chains, which then related to their unique and rich variety of physical properties.

Prerequisite: CH 220

*Typically offered in Fall only*

*This course is offered alternate even years*

**TC 791 Special Topics In Textile Science** (1-6 credit hours)

Intensive treatments of selected topics in textile, polymer and fiber science.

Prerequisite: Senior standing or Graduate standing

*Typically offered in Fall and Spring*

**TC 792 Special Topics In Fiber Science** (1-6 credit hours)

Study of selected topics of particular interest in various advanced phases of fiber science.

*Typically offered in Fall and Spring*

**TC 896 Summer Dissert Res** (1 credit hours)