Many people take coatings for granted. However, a $100 billion industry exists to supply coatings worldwide that decorate, protect and provide function to autos, buildings, furniture, appliances, bridges, medical devices, magnetic tapes and disks, and countless other objects. Performance of these coatings depends critically upon specially tailored polymers, which form coating films. Thus, good coatings scientists must be good polymer scientists. Other scientific disciplines are also important to the coatings scientist, such as organic chemistry, rheology, surface chemistry, chemical analysis, photochemistry, mathematics and several branches of engineering and materials science.

Background Information
North Dakota State University started offering polymer and coatings chemistry courses in 1905. Of the few universities that offer training that focuses on special polymers used in coatings, NDSU has the longest and most extensive experience. Over the decades, the Department of Coatings and Polymeric Materials has established a worldwide reputation for education and research. In doing so, we have enhanced international diversity through interactions between students and staff with leading companies and universities in the United States and abroad. Today, there is a growing shortage of polymer scientists at all degree levels, therefore providing polymers and coatings science graduates with abundant job opportunities. NDSU graduates are especially sought after by coating and chemical industries and are employed by major coatings, polymer, chemical and petroleum companies, with many graduates attaining upper management positions. At the undergraduate level, Bachelor of Science degrees in science and engineering with a coatings and polymeric materials minor are offered. Master’s and doctorate degrees are available at the graduate level. These programs attract many students and provide numerous opportunities for undergraduate research.

Students acquire a sound foundation in polymeric materials science which can be applied in a number of related fields—plastics for microelectronics, engineering, communications, aerospace and others.

The Faculty
Currently, the department consists of five faculty, three postdoctoral researchers and 20 graduate students, along with undergraduate researchers. The faculty includes individuals with extensive experience in the coatings and chemical industries, who have theoretical and practical expertise in polymer characterization, polymer rheology, corrosion, coating design, surface chemistry, organic chemistry of reactive polymers and polymer synthesis. Faculty members are in demand as consultants and speakers in America, Europe and Asia.

Advisory Board
The department works closely with the coatings and chemical industries and with their suppliers and customers to assure relevance of the programs. An advisory board composed of prominent industry individuals meets annually with staff and students. Its members critique the program and provide assistance ranging from technical information to job placement advice. Every year, all students have opportunities to meet with the board members.

COATINGS and POLYMERIC MATERIALS

Organizations represented on the board include DuPont, Eastman Chemical, 3M, Valspar, Allnex, Dow, Toyota, Akzo, Bayer, BASF, Sherwin-Williams, PPG, Tecton, Air Products, Boeing, the Air Force and other major coatings producers.

Research Opportunities
Materials science, corrosion and polymer synthetic projects are funded by a wide variety of organizations, including the Navy, U.S. Department of Agriculture, the Army and industry. Many undergraduate students may find employment and challenging research opportunities during the academic year and summer months. The North Dakota Center of Excellence in Surface Protection together with the department forms the only corrosion and coatings research center in North America.

Career Opportunities
Demand for polymer expertise exceeds the supply, and NDSU graduates are especially sought after by the coatings and chemical industries. Alumni are now employed in professional and managerial positions at most of the major coatings producers and at many other companies that produce or use polymers.

The coatings industry and its suppliers need new polymers to respond to pressures for improved performance and reduced environmental impact. Producers of electronics, computers, electric insulators, communication and aerospace equipment and packaging materials have all become heavily involved in polymer science.

The Program
Undergraduates in science and engineering are candidates for the Bachelor of Science degree with a minor in coatings and polymeric materials. The program for chemistry majors is an American Chemical Society accredited program. The option includes technical elective courses concentrated in the areas relating to the use of polymers and coatings, and provides excellent preparation for professional employment. Courses in coatings and polymeric materials may be taken starting in the junior year. These courses include lectures on theoretical aspects of the subject and laboratories stressing the practical aspects of polymer synthesis and of preparation and testing of coatings. Courses on other subjects also are offered. Graduate-level courses may be taken by undergraduates who have the appropriate prerequisites.
Related Experiences

The Cooperative Education Program assists students in finding summer jobs in the laboratories of industrial companies. Many students find such experiences rewarding. The Department of Coatings and Polymeric Materials at NDSU offers an Undergraduate Research Program for chemistry, materials science, engineering majors and related fields for students who have completed their junior year. This program has a long history of success since its conception in 1978. Summer research appointments are available each year for students in chemistry, materials science, engineering and related fields, between their junior and senior years, who intend to pursue graduate studies and have an interest in polymers and coatings science. Students are awarded a stipend of $4,000 for 10 weeks. The program provides students with an opportunity to become involved with research in polymers and coatings science. Cutting edge research is performed by the students and is supported by experienced faculty. The final goal of the program is to produce publishable results.

The Corporate Scholarship Program

About 25 four-year scholarships of $500 to $2,500 per year are available to undergraduates through the Coatings and Polymeric Materials Corporate Scholarship program. High school seniors and transfer students who plan to enter NDSU and who are interested in this field are encouraged to apply through the NDSU Office of Admission. Scholarships are renewable for up to four years depending on continued interest, satisfactory progress in course work and availability of funds.

The Curriculum

To earn a minor in coatings and polymeric materials, a student must complete 16 credits from the list of approved courses.

Credits

*CHEM. 341, 341L - Organic Chemistry and Lab I ......................... 4
*CHEM. 342, 342L - Organic Chemistry and Lab II ..................... 4
CPM 451 - Laboratory, Chemical, Radiation, and Biological Safety ........................................................................ 1
CPM 472 - Environment and Chemical Industries ......................... 2
CPM 473 - Polymer Synthesis ....................................................... 3
CPM 474 - Coatings I ................................................................. 3
CPM 475 - Coatings II ............................................................... 3
CPM 483 - Polymer Practicum....................................................... 2
CPM 484 - Coatings I Laboratory ................................................. 2
CPM 485 - Coatings II Laboratory .............................................. 2
CPM 486 - Corrosion and Materials .......................................... 3
CPM 487 - Corrosion and Materials Lab .................................... 1

*If CHEM 341/342 and 341L/342L are required for a student’s major, the credits cannot count toward a minor in coatings and polymeric materials. CHEM 353 and 354 can be substituted for CHEM 341L and 342L.

For Further Information

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This sample curriculum is not intended to serve as a curriculum guide for current students, but rather an example of course offerings for prospective students. For the curriculum requirements in effect at the time of entrance into a program, consult with an academic advisor or with the Office of Registration and Records.

This publication will be made available in alternative formats upon request. Contact the Office of Admission (701) 231-8643 or 800-488-NDSU or ND Telecommunications Relay Service 800-366-6888 (TTY) or 800-366-6889 (voice).

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