College of Food, Agricultural and Natural Resource Sciences

Degree Programs and Minors ......................... 131

Agricultural Industries and Marketing B.S. .......... 131
Agricultural and Food
Business Management B.S. .......................... 132
Agronomy Minor ......................................... 134
Animal Science Minor .................................. 137
Applied Economics B.S. .............................. 138
Applied Economics Minor ............................. 140
Applied Plant Science B.S. ............................ 141
Bio-Based Products B.S. ............................... 142
Bio-Based Products Engineering Minor .............. 144
Climatology Minor ....................................... 144
Corporate Environmental Management Minor ...... 144
Designing Documents with New and Emerging
Technologies Minor ........................................ 145
Entomology Minor ......................................... 145
Environment and Natural Resources Minor ......... 145
Environmental Horticulture B.S. ...................... 146
Environmental Horticulture Minor ................... 148
Environmental Sciences, Policy
and Management B.S. .................................... 148
Fisheries and Wildlife B.S. ............................ 153
Fisheries and Wildlife Minor .......................... 155
Food Science B.S. ........................................ 155
Food Science Minor ....................................... 156
Food Systems and the Environment Minor ............ 156
Forest Resources B.S. ..................................... 157
Integrated Pest Management in Cropping Systems Minor 159
International Agriculture Minor ..................... 159
Internet, Science and Society Minor ................... 160
Land, Nature and Environmental Values Minor ....... 160
Nutrition B.S. ............................................ 161
Nutrition Minor ........................................... 162
Recreation Resource Management Minor ............. 164
Scientific and Technical Communication B.S. .......... 165
Soil Science Minor ........................................ 165
Sustainable Agriculture Minor ........................ 166
Technical Communication Minor ...................... 166
Urban and Community Forestry B.S.................... 167
Urban and Community Forestry Minor ............... 168

College of Food, Agricultural and Natural Resource Sciences

General Information .................................. 125
Admission .............................................. 125
Degrees/Majors ........................................ 126
Minors .................................................. 126
Honors .................................................. 127
Policies .................................................. 127
Graduation Requirements ............................ 127
Advising .................................................. 128
Special Learning Opportunities ....................... 128
Scholarships ............................................ 128
International Programs ............................... 128
Career Information .................................... 129
Student Organizations ................................. 129
Directory ............................................... 130
General Information

Effective July 1, 2006, the College of Agricultural, Food and Environmental Sciences, the College of Natural Resources, and the Department of Food Science and Nutrition joined to create the College of Food, Agricultural and Natural Resource Sciences (CFANS). The mission of CFANS is to integrate these units to enhance the University’s potential to become one of the premier research institutions in the world dedicated to food systems, environmental science, renewable resources, and policy, consistent with the University’s goal to become one of the top three public research universities in the world. The focus of CFANS is to enhance the University’s natural biological and social science contributions to the environment, production agriculture, human health, food systems, and natural resources. The college offers outstanding programs, provides exemplary teaching and student services, and constantly strives for continuous improvements in all aspects of the university educational experience.

The college is housed in many buildings on the St Paul Campus of the University of Minnesota’s Twin Cities campus. The Dean’s Office and Student Services Office are housed in Coffey Hall, 1420 Eckles Avenue. The Student Services Office provides admission, registration, academic advising, and other assistance to all undergraduates. Call 612-624-6768, or visit the CFANS Web site at www.cfans.umn.edu.

The college’s 16 undergraduate majors and 4 premajors will be organized within 13 academic departments.

Admission

Guidelines for admission to the College of Food, Agricultural and Natural Resource Sciences for high school graduates, transfer students, transfers within the university system, and non-degree-seeking students are explained below. For more information, call CFANS admissions, 612-625-3284 (for new freshmen) or 612-624-3220 (for transfer students).

Students seeking admission as new freshmen or as transfers from outside the University of Minnesota system apply through the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2008). For official and up-to-date information about the University’s admissions policies, procedures, and deadlines, please see the latest edition of the Undergraduate Application Booklet available from the Office of Admissions or online at http://admissions.tc.umn.edu.

Deadlines—The Office of Admissions typically accepts applications for fall semester beginning October 1 of the preceding year and admits students as long as space is available. Freshman applicants who meet the admission guidelines and apply by December 15 are guaranteed space in the following fall semester’s incoming class. Final deadlines are June 1 for fall semester and October 15 for spring semester.

High School Graduates—High school graduates need to complete the University’s high school course preparation requirements. (See Freshman Admission in the General Information section of this catalog.)

Transfer Students—Students may apply for admission to the College of Food, Agricultural and Natural Resource Sciences from other colleges or universities. Applicants may be accepted if they meet the entrance requirements of CFANS and of the major they wish to pursue. To be competitive for admission, transfer applicants who graduated from high school during 1987 or later should have completed the following:

- algebra with a grade of at least C (except for the Scientific and Technical Communications major);
- at least a C average in transfer coursework;
- a solid foundation in math and science;
- other high school preparation requirements, including foreign language. (See High School Course Preparation in the General Information section of this catalog.)

Applicants who did not complete this coursework during high school may substitute equivalent college coursework. CFANS may admit some students who have not met these guidelines. Students who are admitted but lack preparation requirements must complete all deficiencies before graduating.

After a transfer applicant is admitted, the Office of Admissions and CFANS evaluate all previous college coursework according to the standards of the University and CFANS. The student then receives a Transfer Credit Evaluation showing how previous coursework has been evaluated. Appropriate credits earned at other accredited colleges and universities or within other units of the University may be applied toward CFANS programs. Most students find they must transfer by their junior year to meet residence and upper division course requirements of CFANS.

Applicants who graduated from high school before 1987 must meet current entrance standards except for the high school preparation and second language requirements.

Transfer students must complete all specific course and area distribution requirements of CFANS regardless of the number of credits accepted for transfer. Therefore, students who begin degree work elsewhere and intend to transfer later should carefully plan pre-transfer courses to meet as many CFANS requirements as possible.

Note: A maximum of 3 internship or practical experience credits may be transferred into CFANS.

Change of College Within the University—To transfer to the College of Food, Agricultural and Natural Resource Sciences from another college within the University, students must meet CFANS entrance guidelines. Students must complete an Application for Undergraduate Change of College and apply for transfer at one of the One Stop Student Services Centers on campus. Application deadlines are consistent with posted University admission deadlines.

Non-degree-seeking—Non-degree-seeking admission is primarily for students pursuing coursework in CFANS departments but not seeking a degree, or for students preparing to apply to a graduate program offered by CFANS departments but having prerequisites to satisfy. Admission may be processed at any time before the first day of class. The non-degree-seeking category is also open to staff members in CFANS departments taking courses through the Regents Scholarship Program and CFANS graduates returning for coursework.

Students who enter CFANS as non-degree-seeking students with the intention of transferring later to the Graduate School should be aware of restrictions on the number of non-degree-seeking credits that may be transferred to a graduate program. See the Graduate School Catalog.
Degrees/Majors

The College of Food, Agricultural and Natural Resource Sciences offers 16 majors, and the major curricula all lead to the B.S. degree.

Agricultural and Food Business Management
- Business management
- Financial management
- Marketing, sales and food industry management

Agricultural Industries and Marketing
- Crops and soils industries
- Food industries

Animal Science
- Industry
- Production
- Science/Biotechnology/Pre-Veterinary Medicine

Applied Economics
- Management and finance
- Food retailing
- Marketing
- Regional and public economics
- Resources and environment
- Trade and development

Applied Plant Science
- Agroecology
- Plant Improvement
- Plant Utilization

Bio-Based Products
- Bio-based products marketing and management
- Residential building science and technology

Environmental Horticulture
- Floriculture/nursery productions and retail management
- Landscape design
- Landscape implementation and management
- Turfgrass science

Environmental Sciences, Policy and Management
- Conservation and resource management
- Corporate environmental management
- Environmental education and communication
- Environmental science
- Policy, planning, law and society

Fisheries and Wildlife
- Fisheries
- Wildlife
- Conservation biology

Food Science

Forest Resources
- Forest management and planning
- Forest conservation and ecosystem management

Nutrition
- Nutrition and Dietetics
- Nutrition Science

Recreation Resource Management
- Recreation resource management
- Resource based tourism

Scientific and Technical Communication
- Beginning fall semester 2007, the Department of Rhetoric and the scientific and technical communication major will be housed in the College of Liberal Arts.

Urban and Community Forestry
- Because the first year of coursework is somewhat similar among many of these programs, students may transfer between majors at the end of their freshman or sophomore year with little or no credit loss.
- Each CFANS major requires an orientation class for all incoming students that provides interaction with faculty and alumni in their chosen professional field, and exposure to career, learning abroad, and student life opportunities.

Pre-professional Opportunities
- Students may prepare in CFANS for the following upper division/professional programs:
  - Pre-Agricultural Education
    - Agricultural science and technology education
    - Agricultural leadership, training, and development
    - Natural and managed environmental education
  - Pre-biosystems and agricultural engineering
    - (B.S. granted by the Institute of Technology)
  - Pre-Bio-based products engineering
    - (B.S. granted by the Institute of Technology)
  - Pre-landscape architecture
    - (B.E.D. granted by the College of Design)
  - Pre-medicine and pre-dentistry
  - Pre-veterinary medicine

Minors

The College of Food, Agricultural and Natural Resource Sciences offers the following minors:

Agronomy
Animal science
Applied science
Applied economics
Bio-based products engineering
Climatology
Corporate environmental management
Designing documents with new and emerging technologies
Entomology
Environment and natural resources
Environmental horticulture
Fisheries and wildlife
Food science
Food systems and the environment
Forest resources
Integrated pest management in cropping systems
International agriculture
Internet, science, and society
Land, nature, and environmental values
Nutrition
Recreation resource management
Soil science
Sustainable agriculture
Technical communication
Urban and community forestry
Water science
CFANS students may also apply for a minor in any University department or program. Upon graduation, the minor is listed on the transcript with degree and major. For assistance in planning a minor, contact the Student Services Office. Detailed minor requirements are described in the CFANS Degree Programs and Minors section of this catalog.

Graduate Degrees—The master of science (M.S.) and the doctor of philosophy (Ph.D.) in sixteen areas of study are offered through the Graduate School in cooperation with The College of Food, Agricultural and Natural Resource Sciences. For more information, consult the Graduate School Catalog or CFANS Web site.

Honors

CFANS students may participate in honors at both the freshman/sophomore level and the junior/senior level.

At the freshman/sophomore level, students participate in specially designed honors courses and honors colloquia focusing on current issues in their chosen field. Students complete three honors courses in their first two years; one must be an honors colloquium (CFAN 100H). Completion of the freshman/sophomore honors program is recognized by a certificate and by designation on a student’s transcript.

The heart of the junior/senior level honors program is a research project supervised by a faculty mentor. Students also participate in other honors options designed to enhance their experiences. The last 60 credits of A-F registration (including transfer coursework) with the minimum GPAs specified below.

Transcripts of students graduating with honors show one of the following:

- Cum laude (minimum GPA: 3.50)
- Magna cum laude (minimum GPA: 3.66)
- Summa cum laude (minimum GPA: 3.75)

Students also receive recognition during commencement.

To achieve the honors notation on their transcripts, students must meet the GPAs stated above and complete all honors program requirements, which for most students comprises one semester of the honors colloquium, an honors option, and honors research. The honors option provides an opportunity to explore honors courses from other programs, and is very flexible and can be adapted to many situations and contexts. Registration in honors courses requires admission to the Honors Program and college office approval.

Graduation With Distinction—See the Policies section of the catalog.

Dean’s List—To be eligible for the Dean’s List, a student must be a current CFANS student and have completed 12 credits (A-F registration) with a GPA of at least 3.667. Students on the Dean’s List receive a letter from the dean and are publicly listed in the Honors and Recognition Web page of the college. There is a transcript notation for each term a student is on the Dean’s List.

Policies

Grading—All required courses in the major must be taken A-F with grades of C- or better; students who receive a grade below C- in a major course must repeat the course.

Honor System—under an honor system adopted on the St. Paul campus, students accept responsibility for the supervision of student behavior during examinations and pledge not to give or receive aid. A student or faculty member who observes an act of dishonesty must report the incident to the college Student Scholastic Standing Committee. For more information about the honor system, contact the Student Services Office.

Directed Study—With instructor approval, students may take custom-designed courses through independent study. Contact the Student Services Office for more information.

Policy Waivers—Occasionally it may be to the educational advantage of both the student and the department to consider an alternative or substitution in an academic policy or curricular requirement, provided the basic spirit of the policy or requirement is maintained. A student may petition for a departure from normal procedure. Students must receive major adviser/departmental recommendation before the petition is routed to the Student Scholastic Standing Committee.

Repeating Courses—An undergraduate student may repeat a course once. When a student repeats a course, (a) both grades for the course shall appear on the official transcript, (b) the course credits may not be counted more than once toward degree and program requirements, and (c) only the last enrollment for the course shall count in the student’s GPA. The preceding sentence of this policy shall not apply to courses using the same number but where students study different content each term of enrollment. If an undergraduate student repeats a course after his/her degree has been awarded, the original course grade will not be excluded from the degree GPA nor will the new grade be included in the degree GPA.

Special Examinations for Credit—Students who believe their knowledge of a subject is equal to that required to complete a particular course may request to take an examination for credit. If the Student Scholastic Standing Committee and the department approve, arrangements can be made with an appropriate instructor to take an examination. Usually no grade is assigned. A fee is assessed for each examination. Credit by special examination is not granted for language or mathematics courses taken in high school.

Suspension—to appeal a suspension (see Probation in the Policies section of this catalog), a student must obtain a Petition for Reinstatement from the Student Services Office. The petition must be completed and turned in to the Student Scholastic Standing Committee, along with any supporting documents. The final decision rests with the Student Scholastic Standing Committee, which informs the student of its decision in writing.

Graduation Requirements

To receive the B.S. degree, CFANS students must meet the following requirements.

- Complete the prescribed curriculum as listed in the student’s degree program.
- Achieve a cumulative GPA of at least 2.00, with grades of C- or better in each course in the major. Major course work is defined as all required courses listed in each major program including specialization courses, track courses, concentration courses, professional courses, and writing courses. The only courses not included in this policy are free electives and courses taken beyond those in the major coursework to satisfy liberal education requirements.

- Satisfy liberal education requirements.
- Satisfy residence and other general University requirements.
- Officially apply for graduation.
- Meet all financial obligations to the University.

Liberal Education—Students must meet the University’s liberal education requirements, including the diversified core and designated theme requirements. The diversified core requirements can be met by completing the core curriculum.
listed in each degree program. To satisfy the designated theme requirements, at least 3 credits are required in each of the following areas: cultural diversity; international perspectives; environment; and citizenship and public ethics. The environment theme may be satisfied by completing the required courses in each degree program. The remaining themes may be satisfied by careful selection among core professional and elective courses. See individual degree programs for specific courses.

**Field Session Requirements**—Forest resources, urban and community forestry, and fisheries and wildlife majors are required to complete a three-week summer field session at the Cloquet Forestry Center in their sophomore or junior years. To attend, students must have completed 30 semester credits and attained a cumulative GPA of at least 2.0. Students enrolling in the forest resources session must complete the following courses with a grade of at least C+: BIOL 1009 or 1001, CHEN 1011 or 1021, FR 1101, and precalculus or college algebra. Students enrolling in the fisheries and wildlife session must have completed the following courses with a grade of at least C+: one year of introductory biology and BIOL 3407. Environmental sciences, policy and management majors are required to complete either a field session or complete ESPM 4096 - Professional Experience Program: Internship (1-3 cr).

Students in the forest resources major are required to complete an advanced field session at the Cloquet Forestry Center in their senior year. To attend, students must attain a cumulative GPA of at least 2.0, complete the introductory field session, FR 3218, 3262, 3411, and 3431. This four-week session is held during the May session and the first part of the summer session.

**Advising**

Advising services for both current and prospective students are provided by professional academic advisers and by departmental faculty.

Each CFANS student, with adviser assistance, is responsible for learning curricular and graduation requirements and developing a course program and timetable to meet them. All freshmen students are assigned a professional academic adviser for their first year and then assigned a faculty adviser within their major area of study at the beginning of their sophomore year. All transfer students are assigned immediately to a faculty adviser in their major area of study.

**Special Learning Opportunities**

Many majors in CFANS offer field trips, hands-on experiential learning, and other opportunities. Please speak with your adviser or major coordinator for more information.

**Undergraduate Research Opportunities Program (UROP)**—The University of Minnesota’s UROP offers financial awards to undergraduates for research, scholarly, or creative projects undertaken in partnership with a faculty member. Applications are accepted in the fall and early spring each year.

For more information or an application packet, students should contact the CFANS Student Services Office, 190 Coffey Hall (612-624-6768).

**Internships**—CFANS juniors and seniors may participate in internships designed for students who wish to reinforce their academic experience by working in an area related to their course of study. Students work full time either fall or spring semester or during the summer. Students earn 1-3 credits for satisfactory completion of an internship. Students may enroll in two different internships, for a total of 6 credits. Salaries are paid by the cooperating businesses, industries, producers, and agencies participating in the program. For more information, students should consult their adviser or the St. Paul Campus Career Center in 198 McNeal Hall (612-624-2710).

**Scholarships**

CFANS has an extensive scholarship program for freshmen, transfer students, and continuing students. Scholarship information, applications, and deadlines are available online at www.cfans.umn.edu/scholarships.

**International Programs**

The College of Food, Agricultural and Natural Resource Sciences offers several types of study abroad that can especially enhance degree work, including field study, enrollment in international institutions, and integrated classroom study. International Programs coordinates international opportunities in CFANS (135 Skok Hall; 612-624-3221; www.cfans.umn.edu/international.html).

Some scholarships are available through CFANS to help defray costs of overseas study and travel. A written report is required. Preference is given to proposals from non-English speaking countries. Students must initiate and plan the project with the aid of a faculty adviser. For more information, contact the CFANS Student Services Office, 190 Coffey Hall (612-624-6768).

Students fluent in their host country’s language can participate in integrated classroom study programs that permit students to take regular university courses alongside students from the host country. The University’s student exchanges and consortium memberships provide access to universities in many countries. Conservation and resource management, agricultural, business and policy, plant, and animal science curricula are available throughout the world.

CFANS students need not always seek credit in their major. Study abroad is encouraged for language acquisition or cultural learning. The resulting credits can often be used as electives or to fulfill second language or liberal education requirements. The University and other institutions sponsor a broad range of intensive language and area studies programs.

**MAST Experience Abroad**—The MAST Experience Abroad program provides qualified individuals the opportunity to broaden their agricultural/horticultural skills and knowledge as well as develop or improve international language skills. Practical training programs of 3 to 12 months are available to individuals between the ages of 18 and 30. Participants gain a cross-cultural experience by living and working with a host family in Australia, Austria, Brazil, Denmark, Finland, France, Germany, Italy, the Netherlands, New Zealand, Sweden, Switzerland, or the United Kingdom. Departure dates are in January, April, June, and September. For more information, students should contact the MAST International office, 135 Skok Hall (612-624-3740).

**Student Project for Amity among Nations (SPAN)**—SPAN consists of summer overseas research on a topic of the student’s choosing, preceded by a year’s on-campus preparation and followed by project write-up in the fall. The SPAN destinations change from year to year.

More information for all of these opportunities is available from your adviser, International Programs in CFANS staff, or by going to the U of M’s Learning Abroad Center’s Web site at www.umabroad.umn.edu, 612-626-9000. If you are just beginning your exploration of international opportunities, there is an academic adviser in the Student Services Office in 190 Coffey Hall who can help identify your next steps.
Career Information

The St. Paul Campus Career Center, 198 McNeal Hall, offers assistance and advice to students seeking summer jobs and internships, as well as permanent employment after graduation. Job search assistance for all students is provided by career services staff and by department faculty. A series of workshops are provided by the center on topics such as résumé writing, interviewing, initiating internship and job searches, and summer/seasonal intern hiring updates. See www.stpaulcareers.umn.edu for more information.

Student Organizations

CFANS Student Board—The Student Board promotes student involvement in issues related to the quality and content of education both in and out of the classroom. The board creates channels of communication between the students, faculty, and administration of CFANS. Students may file for election to the board or may serve as a representative of one of the clubs or organizations affiliated with the college. More information is available in the Student Services Office in 190 Coffey Hall.

Ambassadors—The Ambassadors is a voluntary, honorary organization consisting of 30 CFANS undergraduates who assist in promoting the college to prospective students and their parents, alumni, potential donors, and the community. Ambassadors gain experience in public relations and recruitment, and develop communications skills through public speaking engagements and small group discussions with prospective students. More information is available in the Student Services Office in 190 Coffey Hall.

St. Paul Campus Board of Colleges—The St. Paul Campus Board of Colleges directs and coordinates student activities and encourages student leadership throughout the St. Paul campus. Its membership is drawn from the following colleges: Biological Sciences, The College of Food, Agricultural and Natural Resource Sciences, and Veterinary Medicine. The board cooperates with the Minnesota Student Association and the Assembly Committee on Student Affairs (ACSA). For more information, inquire at the Office for Student Affairs in 130 Coffey Hall.

The Twin Cities Student Unions Board of Governors—The Twin Cities Student Unions Board of Governors is an advisory board for the St. Paul Student Center and Coffman Memorial Union. Composed of students elected to represent various academic and student organizations on the Minneapolis and St. Paul campuses, the board formulates policies for operation of the student unions and establishes its budget. For more information, call 612-624-4738.

Student Representation on College and University Committees—All CFANS committees and most all-University committees have student representatives. For college committees, selection is made by the CFANS Student Board.

Governance—Students are encouraged to participate in governance activities at the department, college, or campus level. Within each department, several committees (including curriculum committees) have student representatives. Students serve on CFANS committees and on the Student Board, which advises the dean on student issues and concerns. Students may also participate in the St. Paul Campus Board of Colleges, which directs student activities and acts as a liaison between the student body and administration, and on the Twin Cities Unions Board of Governors, which establishes programs, operation policies, and budgets for the St. Paul Student Center and Coffman Union. Finally, CFANS student senators are elected to serve on the executive committee of the Minnesota Student Association and the University Senate.

Clubs—Student clubs in The College of Food, Agricultural and Natural Resource Sciences include:
- Agricultural Education Club
- Alpha Epsilon Delta (pre-med and pre-vet)
- Alpha Tau Alpha
- Alpha Zeta Fraternity (an honor and service fraternity)
- American Association of Bovine and Swine
- American Society of Agricultural Engineers, Student Branch
- Applied Economics Student Association
- Block and Bridle
- Collegiate Agri-Women
- Cornercopia Student Organic Farm
- Fisheries, Wildlife and Conservation Biology Club (with an affiliated student chapter of The Wildlife Society)
- Frenatar: Entomology Student Association
- Food Science Club
- Forestry Club
- Forest Products Society/Student Chapter
- Gopher Crops and Soils
- Gopher Dairy Club
- Horticulture Club
- Leaders of Environmental Science Students (LOESS)
- National Agri-Marketing Association (NAMA)
- National Society for Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)
- Natural and Environmental Defense Squad
- Pre-Vet Med Club
- Recreation Resource Management Club
- Residential Building Science and Technology Club
- Rhetoric’s Association of Student Technical Communicators (R.A.S.T.E.C.)
- Sigma Pi Honor Society
- Student Chapter of the Institute of Packaging Professionals (IOPP)
- Student Chapter of the Paper Industry Management Association (PIMA)
- Student Chapter of the Society of American Foresters
- Student Chapter of the Technical Association of the Pulp and Paper Industry (TAPPI)
- Student Organization of Nutrition and Dietetics (SOND)
- Students in Honors
- The Sheep and Goat Club
- Turf Club (Golf Course Superintendent Association, U of M Student Chapter)
- Urban Forestry Club
- Water Resources Students in Action
Directory

CFANS Administration

Dean’s Office
At the time this catalog went to print, the University was conducting a national search for a new dean. See the CFANS Web site for updated information.

Associate Dean for Faculty & Academic Affairs
Ann Hill Duin
277 Coffey Hall, 612-624-4212

Associate Dean for Undergraduate Programs
Mel Baughman
190 Coffey Hall, 612-625-1288

Associate Dean for Research
F. Abel Ponce de Leon
277 Coffey Hall, 612-624-2299

Associate Dean for Extension
Michael A. Schmitt
277 Coffey Hall, 612-625-7098

Associate Dean and Coordinator, Cloquet Forestry Center
Robert A. Stine
277 Coffey Hall, 612-624-9298

International Programs
Director of International Programs
John Vreyens
612-624-1774

Student Services
Director of Student Services
Bill Ganzlin
190 Coffey Hall, 612-624-3047

Admissions/Prospective Student Services
General Information
612-624-3045

Departments
Agricultural, Food, and Environmental Education
Darrell Hartle, interim coordinator
320 Vocational and Technical Education Building
612-624-4248

Agronomy and Plant Genetics
Nancy Ehlke, interim head
411 Borlaug Hall
612-625-1791

Animal Science
James Linn, interim head
205 Haecker Hall
612-624-1205

Applied Economics
Rob King, head
231 Classroom Office Building
612-625-0231

Bioproducts and Biosystems Engineering
Shri Ramaswamy, head
207 Kaufert Lab
612-624-3797

Entomology
Mark Ascerno, head
219 Hodson Hall
612-624-1299

Fisheries, Wildlife, and Conservation Biology
Francesca Cutbert, interim head
320 Hodson Hall
612-624-1756

Food Science and Nutrition
Allen S. Levine, head
225 Food Science and Nutrition
612-624-3224

Forest Resources
Alan Ek, head
115 Green Hall
612-624-3400

Horticultural Science
Tom Michaels, head
305 Alderman Hall
612-624-7711

Plant Pathology
Carol Ishimaru, head
495 Borlaug Hall
612-625-9736

Rhetoric
Laura Gurak, head
64 Classroom Office Building
612-624-3773

Soil, Water, and Climate
Edward A. Nater, head
439 Borlaug Hall
612-625-9734

Outreach

Bell Museum of Natural History
Scott Lanyon
10 Church Street S.E.
612-624-7217

Cloquet Forestry Center
Robert A Stine
Cloquet, MN
218-726-6400

Minnesota Landscape Arboretum
Peter Olin, Director
Chanhassen, MN
952-443-1412

North Central Research and Outreach Center
Daniel L. Erkkila, interim head
Grand Rapids, MN
218-327-4361

Northwest Research and Outreach Center
Larry Smith, head
Crookston, MN
218-281-8602

Southern Research and Outreach Center
Forrest Izuno, head
Waseca, MN
507-837-5615

Southwest Research and Outreach Center
Pauline Nickel, head
Lamberton, MN
507-752-5068

UMore Park
Philip Larsen, director of operations
Rosemount, MN
651-423-2455

West Central Research and Outreach Center
Greg Cuomo, head
Morris, MN
320-589-1711
Agricultural Industries and Marketing B.S.

Requirements for this program are current for Fall 2006.
Required credits to graduate with this degree: 120.
Required credits within the major: 108.
Degree: Bachelor of Science.

This major prepares students for careers in agricultural industries. Industries related to modern agriculture include manufacturers and distributors of farm production inputs (such as equipment, structures, health products, seeds, fertilizers, and crop protection products); assemblers, processors, manufacturers, and distributors of products originating from farms (products such as meat, milk, eggs, wool, grains, fruits, vegetables, nursery crops, flowers, and turf); and finance and insurance industries providing agricultural credit. Agribusinesses such as these, as well as state, federal, and marketing agencies, need individuals who have a broad education in the scientific (and technical) aspects of agriculture, effective work and communication skills, and quantitative and qualitative skills to solve business problems.

The scientific knowledge and technical skills necessary to become an effective agribusiness professional are provided through requirements in the basic and agricultural sciences and are strengthened by selection of one of three areas of emphasis: crops and soils industries, food industries, or an individualized emphasis.

With 21 free standing elective credits, all AIM majors are encouraged to pursue a CFANS or other minor. Only 6 credits in the AIM major may also be counted towards a minor. For students interested in preparing for the Certified Crop Advisor (CCA) exam or the certified professional agronomist (CPAg) programs, a minor in agronomy is highly recommended.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements
Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements
Students must complete at least 14 credits in their sub-plan emphasis plus an internship or a student project. All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Quantitative Foundations
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
or MATH 1131 - Finite Mathematics, MATH (3.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)
AGRO 4101 - Agricultural Decision Making and Experimentation (3.0 cr)
or ANSC 2211 - Biometrics for Livestock, MATH (3.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)

Communication
RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)
RHET 3257 - Scientific and Technical Presentations (3.0 cr)
RHET 3266 - Group Process, Team Building, and Leadership, C/PE (3.0 cr)
RHET 3562W - Technical and Professional Writing, WI (4.0 cr)
RHET 4165 - Managerial and Organizational Communication, Planning, and Change (3.0 cr)
or RHET 4258 - Information-Gathering Techniques in Scientific and Technical Communication (3.0 cr)

Business Management
APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
APEC 1251 - Principles of Accounting (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
APEC 3411 - Commodity Marketing (3.0 cr)
or APEC 4451W - Food Marketing Economics, C/PE, WI (3.0 cr)
APEC 3451 - Food and Agricultural Sales (3.0 cr)
or MKTG 4030 - Selling and Sales Management (4.0 cr)
APEC 3811 - Principles of Farm Management (3.0 cr)
or APEC 3821 - Retail Center Management (3.0 cr)
or PSTL 1513 - Small Business Fundamentals With E-Business Applications (3.0 cr)
or MGMT 3001 - Fundamentals of Management (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Crops and Soils Industries
Students must complete at least 14 credits in their area of emphasis and an internship or a student project.

Required Courses

Science Foundations
CHEM 1011 - Introductory Chemistry; Lecture and Laboratory, PHYS SCI/L (4.0 cr)
SOIL 2125 - Basic Soil Science, ENV (4.0 cr)
AGRO 1101 - Biology of Plant Food Systems, BIOL SCI/L, ENV (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENV (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
BIOL 1001 - Elementary Biochemistry (3.0 cr)
or BIOL 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
College of Food, Agricultural and Natural Resource Sciences

Agriculture
- AGRO 1093 - Directed Studies (1.0-4.0 cr)
- AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
- AGRO 1660 - First-Year Colloquium/Experience in Agroecosystems Analysis (2.0 cr)
- AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
- AGRO 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
- or AIM 4011 - Student Project/Field Investigation (3.0 cr)

Crops and Soils Industries
- CFAN 3001 - Pests and Crop Protection (3.0 cr)
- SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
- AGRO 4005 - Applied Crop Physiology and Development (4.0 cr)
- or BIOL 3002 - Plant Biology: Function (2.0 cr)
- BIOL 3005W - Plant Function Laboratory, WI (2.0 cr)
- and one course from the following:
  - AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
  - or AGRO 4401 - Plant Genetics and Breeding (4.0 cr)
  - or AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
  - or AGRO 4603 - Field Crop Scouting and Problem Diagnosis (3.0 cr)
  - or AGRO 4605 - Management Strategies for Crop Production (4.0 cr)
  - or ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)

Food Industries
- Students must complete at least 14 credits in the area of emphasis and an internship or a student project.

Required Courses

Science Foundations
- CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
- CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
- or AGRO 1101 - Biology of Plant Food Systems, BIOL SCI/L, ENVT (4.0 cr)
- or BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
- or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)

Agriculture
- AGRO 1093 - Directed Studies (1.0-4.0 cr)
- AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
- AGRO 1660 - First-Year Colloquium/Experience in Agroecosystems Analysis (2.0 cr)
- AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
- AGRO 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
- or AIM 4011 - Student Project/Field Investigation (3.0 cr)

Individualized Emphasis Electives
- 14 credits from individual electives

Individualized
- At least 14 credits must be selected in consultation with an adviser and with approval of the AIM major committee. The courses comprising the individualized emphasis must have a definite theme. A collection of unrelated courses is unacceptable.

Required Courses

Science Foundations
- CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
- SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
- AGRO 1101 - Biology of Plant Food Systems, BIOL SCI/L, ENVT (4.0 cr)
- or BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
- or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
- BIOC 1001 - Elementary Biochemistry (3.0 cr)
- or BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)

Agriculture
- AGRO 1093 - Directed Studies (1.0-4.0 cr)
- AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
- AGRO 1660 - First-Year Colloquium/Experience in Agroecosystems Analysis (2.0 cr)
- AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
- AGRO 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
- or AIM 4011 - Student Project/Field Investigation (3.0 cr)

Agricultural and Food Business Management B.S.

Applied Economics
- Requirements for this program are current for Fall 2006.
- Required credits to graduate with this degree: 120.
- Required credits within the major: 64.
- Degree: Bachelor of Science.

The agricultural and food business management major is offered jointly by CFANS and the Carlson School of Management. The curriculum emphasizes concepts and methods from economics and business management and their use in identifying, analyzing, and solving management problems related to food, agriculture, natural resources, and economic development. The program provides a balance between applied economics and business management studies, with a limited amount of applied science. Students may elect a variety of courses in their junior and senior years to accommodate special interests and career goals.

Graduates of the curriculum are prepared for a wide range of employment opportunities in the food system and other agribusinesses. Examples of employment areas include finance and banking, management, input, commodity and food marketing, sales, administration, public and industrial relations, production management, economic and statistical analysis, managerial accounting, management information systems, and transportation.

Students completing the program may also pursue graduate studies in preparation for research, teaching, or continuing education positions in academic institutions, government agencies, or industry.
Admission Requirements

Students must complete 60 credits before admission to the program. A GPA above 2.00 is preferred for the following:

- 2.80 for students already admitted to the degree-granting college.
- 2.80 for students transferring from another University of Minnesota college.
- 2.80 for students transferring from outside the University.

Students are admitted to the major after satisfactory completion of a pre-agricultural and food business management program. Admission standards are developed in conjunction with the Carlson School of Management. Application deadlines are April 15 for fall semester and October 15 for spring semester.

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Required Courses for Admission

Management

Complete the following management “tool” courses on an A-F grading basis before entering the program. Students must earn a GPA of at least 2.50 in the “tool” courses.

Students contemplating graduate work in applied economics are encouraged to take both MATH 1271 and MATH 1272.

APEC 1101 and APEC 1102 are recommended courses.

ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics, IP, SSCI (4.0 cr)
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
OMS 2550 - Business Statistics: Data Sources, Presentation, and Analysis (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
MATH 1141 - Short Calculus, MATH (4.0 cr)
or MATH 1127 - Calculus I, MATH (4.0 cr)

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, and students must earn a grade of at least a C-. Students may not major in both agricultural and food business management and applied economics.

Required Courses

Communication

RHET 1152W - Writing on Issues of Science and Technology, C/PE, WI (4.0 cr)
or RHET 3502W - Technical and Professional Writing, WI (4.0 cr)
COMM 1101 - Introduction to Public Speaking (3.0 cr)
or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)
BA 3033W - Business Communication, WI (3.0 cr)
or COMM 3441 - Introduction to Organizational Communication (3.0 cr)
or RHET 3257 - Scientific and Technical Presentations (3.0 cr)

Ethics and Responsible Management

Student must take one course (3 credits) that fosters one or more of the following objectives: responsible judgment about the management of natural resources and the environment; responsible judgment regarding ethical and policy issues related to agriculture; application of global perspectives to agricultural, food, and environmental issues and decisions; application of a historical perspective to the role of science and technology.

APEC 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
or AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
or AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENV T, WI (3.0 cr)
or ANSC 1011 - Domestic Animals and Society, C/PE, ENVT (3.0 cr)
or EEB 3001 - Ecology and Society, ENVT (3.0 cr)
or ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
or ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
or ESPM 1011 - Issues in the Environment, C/PE, ENVT (3.0 cr)
or ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
or ESPM 1051 - Introduction to Environmental Science, ENVT (3.0 cr)
or GEOG 3401 - Geography of Environmental Systems and Global Change, WI (4.0 cr)
or GEOG 3401 - Geography of Environmental Systems and Global Change, WI (4.0 cr)
or HSCI 2121 - Biology and Culture in the 19th and 20th Centuries, HP (3.0 cr)
or HSCI 3331 - Technology and American Culture, HP (3.0 cr)
or HSCI 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
or HSCI 3331 - Technology and American Culture, HP (3.0 cr)
or MGT 3007 - Applied Macroeconomics: Policy, Trade, and Development, IP (3.0 cr)
or MGT 3002 - Applied Microeconomics: Managerial Economics (4.0 cr)
or MGT 3006 - Applied Macroeconomics: Government and the Economy (3.0 cr)
or MGT 3007 - Applied Macroeconomics: Policy, Trade, and Development, IP (3.0 cr)
or MKTG 3101 - Principles of Marketing (3.0 cr)
or MGT 3001 - Fundamentals of Management (3.0 cr)

Professional Courses

APEC 1001 - Orientation to Applied Economics (1.0 cr)
APEC 3001 - Applied Microeconomics: Consumers, Producers, and Markets, SSCI (4.0 cr)
APEC 3002 - Applied Microeconomics: Managerial Economics (4.0 cr)
APEC 3006 - Applied Macroeconomics: Government and the Economy (3.0 cr)
APEC 3007 - Applied Macroeconomics: Policy, Trade, and Development, IP (3.0 cr)
APEC 3501 - Agribusiness Finance (3.0 cr)
APEC 4821W - Agribusiness Management, WI (3.0 cr)
ACCT 3001 - Introduction to Management Accounting (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
OMS 3001 - Operations Management (3.0 cr)

Business Management

Students must take a minimum of two courses (6-8 credits) in APEC or ECON and a minimum of two courses (6-8 credits) from CSOM or DHA 3242 or 3245 only.

Required Courses

Business Management

Take 2 or more course(s) from the following:
APEC 3451 - Food and Agricultural Sales (3.0 cr)
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4481 - Futures and Options Markets (3.0 cr)
APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
APEC 5811 - Cooperative Organization (3.0 cr)
Take 2 or more course(s) from the following:
ACCT 3201 - Intermediate Management Accounting (2.0 cr)
ACCT 5100 - Corporate Financial Reporting (4.0 cr)
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
DHA 3245 - Multichannel Retailing (3.0 cr)
DHA 3242 - Retail Buying (3.0 cr)
FINA 4241 - Corporate Financing Decisions (4.0 cr)
FINA 4242 - Corporate Investment Decisions (4.0 cr)
HRIR 3021 - Human Resource Management and Industrial Relations (3.0 cr)
HRIR 3032 - Training and Development (2.0 cr)
HRIR 3042 - The Individual and Organizational Performance (2.0 cr)
MGMT 3010 - Introduction to Entrepreneurship (4.0 cr)
MGMT 4002 - Managerial Psychology (4.0 cr)
MGMT 4008 - Entrepreneurial Management (4.0 cr)

Financial Management

Students must take a minimum of two courses (6-8 credits) in APEC or ECON and a minimum of two courses (6-8 credits) from CSOM or DHA 3242, 3245 only.

Required Courses

Financial Management
Take 2 or more course(s) from the following:
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4481 - Futures and Options Markets (3.0 cr)
APEC 4501 - Financial Applications (3.0 cr)
APEC 5341 - Public Finance (3.0 cr)
APEC 5751 - Global Trade and Policy, IP (3.0 cr)
ECON 3701 - Money and Banking (3.0 cr)
ECON 4432W - International Finance, H (4.0 cr)
ECON 4701H - Honors Course: Money and Banking, H (4.0 cr)
ECON 4751 - Financial Economics (3.0 cr)

Take 2 or more course(s) from the following:
ACCT 3201 - Intermediate Accounting I (4.0 cr)
ACCT 3125 - Auditing Principles and Procedures (4.0 cr)
ACCT 5160 - Financial Statement Analysis (2.0 cr)
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
DHA 3242 - Retail Buying (3.0 cr)
DHA 3245 - Multichannel Retailing (3.0 cr)
FINA 4121 - Financial Markets and Interest Rates (2.0 cr)
FINA 4122 - Banking Institutions (2.0 cr)
FINA 4241 - Corporate Financing Decisions (4.0 cr)
FINA 4242 - Corporate Investment Decisions (4.0 cr)
FINA 4321 - Portfolio Management and Performance Evaluation (2.0 cr)
FINA 4322 - Security Analysis (2.0 cr)
FINA 4641 - International Finance and Risk Management (4.0 cr)
INS 4100 - Corporate Risk Management (2.0 cr)

Individualized

Students preparing for career opportunities that emphasize skills such as accounting, communications, law, or information systems may use this alternative to design an area of emphasis. A program of study under the emphasis must be approved by the adviser and the major coordinator. At least 6 of the 12 credits must be completed after receiving approval.

Required Courses

Individualized Area
Select 12 credits from individual electives.

Marketing, Sales, & Food Industry Management

Students must take a minimum of two courses (6-8 cr) in APEC or ECON and a minimum of two courses (6-8 cr) from CSOM or DHA 3242, 3245 only.

Required Courses

Marketing, Sales and Food Industry Management
Take 2 or more course(s) from the following:
APEC 3411 - Commodity Marketing (3.0 cr)
APEC 3451 - Food and Agricultural Sales (3.0 cr)
APEC 3821 - Retail Center Management (3.0 cr)
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4103 - World Food Problems, C/P/E, IP (3.0 cr)
APEC 4451W - Food Marketing Economics, C/P/E, WI (3.0 cr)
APEC 4481 - Futures and Options Markets (3.0 cr)
APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
APEC 5751 - Global Trade and Policy, IP (3.0 cr)

Take 2 or more course(s) from the following:
DHA 3242 - Retail Buying (3.0 cr)
DHA 3245 - Multichannel Retailing (3.0 cr)
MKTG 3010 - Marketing Research (4.0 cr)
MKTG 4020 - Advanced Logistics and Supply Chain Management (2.0 cr)
MKTG 4030 - Selling and Sales Management (4.0 cr)
MKTG 4040 - Buyer Behavior (4.0 cr)
MKTG 4050 - Integrated Marketing Communications (4.0 cr)
MKTG 4060 - Marketing and Distribution Channels (4.0 cr)
MKTG 4070 - International Marketing (2.0 cr)
MKTG 4080 - Marketing Strategy (4.0 cr)
OMS 3056 - Operations Planning and Control (4.0 cr)

Agronomy Minor

Agronomy and Plant Genetics

Requirements for this program are current for Fall 2006. Required credits in this minor: 17.

This minor provides strong science-based courses emphasizing crop management in the context of sustainable ecosystems. It is well suited for students majoring in agriculture, food and environmental education; animal science; business and economics; environmental science, or for students seeking knowledge and principles of crop production. The minor allows students to complete coursework providing the minimal background needed to prepare for the Certified Crop Advisor (CCA) exams. Students must complete a minimum of 17 credits.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses

Minor Courses
CFAN 3001 - Pests and Crop Protection (3.0 cr)
AGRO 4005 - Applied Crop Physiology and Development (4.0 cr)
AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)

Electives
Take 5 or more credit(s) from the following:
AGRO 2104 - Grain and Seed Technology (2.0 cr)
AGRO 2501 - Plant Identification for Urban and Rural Landscapes (2.0 cr)
AGRO 4093 - Directed Studies for Advanced Students (1.0-4.0 cr)
AGRO 4401 - Plant Genetics and Breeding (4.0 cr)
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
AGRO 4603 - Field Crop Scouting and Problem Diagnosis (3.0 cr)
AGRO 4605 - Management Strategies for Crop Production (4.0 cr)
Animal Science B.S.

Animal Science

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 93 to 103.

This program requires summer terms.

Degree: Bachelor of Science.

The animal science major prepares students for veterinary school, work as managers and technical advisers for animal production systems, various careers in animal industries or biotechnology, or graduate study in animal related specializations. Areas of emphasis include industry, production, or science/pre-vet. In addition, depending on the area of emphasis, students may select from the following areas of study: biotechnology, dairy, beef, sheep, swine, equine, companion animal, or poultry.

Animal Science/Doctor of Veterinary Medicine Joint Degree:
The animal science/doctor of veterinary medicine joint degree is a cooperative program between CFANS and the College of Veterinary Medicine (CVM). Students who are accepted into CVM and successfully complete one year (two semesters) of the veterinary medicine curriculum can earn the B.S. degree from CFANS. This program is available to students who satisfy the CFANS residency requirements and complete the CFANS portion in three academic years.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tcnj.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Foundation Courses

One semester of calculus is required for Biotechnology Option in the Science/Pre-Veterinary sub-plan.

APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
BIOL 1009 - General Biology, BIOL SC/L (4.0 cr)
RHET 1223 - Oral Presentations in Professional Settings, WI (4.0 cr)
MATH 1051 - College Algebra and Probability, MATH (3.0 cr)
MATH 1142 - Short Calculus, MATH (4.0 cr)
MATH 1271 - Calculus I, MATH (4.0 cr)
MATH 1281 - Calculus with Biological Emphasis I, MATH (4.0 cr)

Professional Courses

ANSC 1001 - Orientation to Animal Science (1.0 cr)
ANSC 1101 - Introductory Animal Science (4.0 cr)
ANSC 2211 - Biometrics for Livestock, MATH (3.0 cr)
ANSC 2401 - Animal Nutrition (3.0 cr)
ANSC 3221 - Animal Breeding (4.0 cr)
ANSC 3301 - Systemic Physiology (4.0 cr)

Take 6 or more credit(s) from the following:

CFAN 4009W - Undergraduate Senior Thesis: Science in Agriculture, WI (1.0-6.0 cr)

Take 3 or more credit(s) from the following:

ANSC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Animal Industry

Required Courses

Animal Industry Courses

APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
APEC 1251 - Principles of Accounting (3.0 cr)
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
CHEM 1011 - General Chemistry: Lecture and Laboratory, PHYS SC/L (4.0 cr)
RHET 3266 - Group Process, Team Building, and Leadership, C/PE (3.0 cr)
RHET 1152W - Writing on Issues of Science and Technology, C/PE, WI (4.0 cr)
or
RHET 3257 - Scientific and Technical Presentations (3.0 cr)

Take 3 or more course(s) from the following:

APEC 3001 - Applied Microeconomics: Consumers, Producers, and Markets, SSCI (4.0 cr)
APEC 3002 - Applied Microeconomics: Managerial Economics (4.0 cr)
APEC 3411 - Commodity Marketing (3.0 cr)
APEC 3811 - Principles of Farm Management (3.0 cr)
APEC 3821 - Retail Center Management (3.0 cr)
APEC 4451W - Food Marketing Economics, C/PE, WI (3.0 cr)
APEC 4821W - Agribusiness Management, WI (5.0 cr)

Take one course from the following:

APEC 3451 - Food and Agricultural Sales (3.0 cr)
APEC 3501 - Agribusiness Finance (3.0 cr)
BIE 3061 - Professional Sales Management (3.0 cr)
JOUR 3201 - Principles of Strategic Communication: Advertising (3.0 cr)

Animal Science Electives

Courses in this list cannot be used to fulfill requirements in other areas.

Take 12 or more credit(s) from the following:

CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
ANSC 1007 - Horse in Your Backyard (2.0 cr)
ANSC 1011 - Domestic Animals and Society, C/PE, ENVT (3.0 cr)
ANSC 1021 - Avian Sampler (1.0 cr)
ANSC 1403 - Companion Animal Nutrition and Care (3.0 cr)
ANSC 1511 - Food Animal Products for Consumers (3.0 cr)
ANSC 1202 - Livestock and Carcass Evaluation (3.0 cr)
ANSC 1303 - Beginning Livestock Judging (2.0 cr)
ANSC 3007 - Equine Nutrition (3.0 cr)
ANSC 3052 - Equine Anatomy and Exercise Physiology (4.0 cr)
ANSC 3142 - Advanced Livestock Judging (2.0 cr)
ANSC 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
ANSC 3305 - Reproductive Biology in Health and Disease (4.0 cr)
ANSC 3501 - Farm Animal Environment (3.0 cr)
ANSC 3509 - Animal Biotechnology (3.0 cr)
ANSC 3511 - Animal Growth and Development (3.0 cr)
ANSC 3609 - Animal Production Systems (2.0 cr)
ANSC 4011 - Dairy Cattle Breeding (3.0 cr)
ANSC 4401 - Swine Nutrition (3.0 cr)
ANSC 4403 - Ruminant Nutrition (3.0 cr)
ANSC 4404 - Applied Dairy Nutrition (2.0 cr)
ANSC 4611 - Advanced Pork Production Systems Management (2.0 cr)
ANSC 4613 - Advanced Beef Production Systems Management (2.0 cr)
ANSC 4614 - Advanced Dairy Production Systems Management (2.0 cr)
ENT 4281 - Veterinary Entomology (3.0 cr)
FSCN 1102 - Food: Safety, Risks, and Technology, C/PE (3.0 cr)
SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
VCS 4600 - Small Animal and Equine Behavior (3.0 cr)
Animal Management

Take one course from the following:
- ANSC 4102 - Equine Management (3.0 cr)
- ANSC 4601 - Pork Production Systems Management (4.0 cr)
- ANSC 4602 - Sheep Production Systems Management (4.0 cr)
- ANSC 4603 - Beef Production Systems Management (4.0 cr)
- ANSC 4604 - Dairy Production Systems Management (4.0 cr)
- ANSC 4605 - Poultry Production Systems Management (4.0 cr)
- ANSC 4606 - Small Animal Management (3.0 cr)

Animal Production

Students take courses in their selected emphasis area: industry, production, or science/pre-veterinary medicine. In addition, students may select from the following areas of study: dairy, beef, sheep, swine, equine, companion animal, or poultry.

Required Courses

Production
- ANSC 1511 - Food Animal Products for Consumers (3.0 cr)
- ANSC 4609 - Animal Production Systems (2.0 cr)
- BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
- CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
- ENVT 1007 - Horse in Your Backyard (2.0 cr)
- ANSC 1011 - Domestic Animals and Society, C/PE, ENVT (3.0 cr)
- ANSC 1403 - Companion Animal Nutrition and Care (3.0 cr)
- ANSC 1511 - Food Animal Products for Consumers (3.0 cr)
- ANSC 2012 - Livestock and Carcass Evaluation (3.0 cr)
- ANSC 2013 - Beginning Livestock Judging (2.0 cr)
- APEC 2451 - Principles of Accounting (3.0 cr)
- SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
- VCS 2032 - General Microbiology With Laboratory (4.0 cr)
- ANSC 3007 - Equine Nutrition (3.0 cr)
- ANSC 3052 - Equine Anatomy and Exercise Physiology (4.0 cr)
- ANSC 3142 - Advanced Livestock Judging (2.0 cr)
- ANSC 3203 - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
- ANSC 3303 - Reproductive Biology in Health and Disease (4.0 cr)
- ANSC 3501 - Animal Environment (3.0 cr)
- ANSC 3509 - Animal Biotechnology (3.0 cr)
- ANSC 3511 - Animal Growth and Development (3.0 cr)
- ANSC 3609 - Animal Production Systems (2.0 cr)
- ANSC 4011 - Dairy Cattle Breeding (3.0 cr)
- ANSC 4102 - Equine Management (3.0 cr)
- ANSC 4401 - Swine Nutrition (3.0 cr)
- ANSC 4403 - Ruminant Nutrition (3.0 cr)
- ANSC 4404 - Applied Dairy Nutrition (2.0 cr)
- ANSC 4601 - Pork Production Systems Management (4.0 cr)
- ANSC 4602 - Sheep Production Systems Management (4.0 cr)
- ANSC 4603 - Beef Production Systems Management (4.0 cr)
- ANSC 4604 - Dairy Production Systems Management (4.0 cr)
- ANSC 4605 - Poultry Production Systems Management (4.0 cr)
- ANSC 4606 - Small Animal Management (3.0 cr)
- ANSC 4609 - Animal Production Systems (2.0 cr)
- ANSC 4611 - Advanced Pork Production Systems Management (2.0 cr)
- ANSC 4613 - Advanced Beef Production Systems Management (2.0 cr)
- ANSC 4614 - Advanced Dairy Production Systems Management (2.0 cr)
- APEC 3411 - Commodity Marketing (3.0 cr)
- APEC 3451 - Food and Agricultural Sales (3.0 cr)
- APEC 3811 - Principles of Farm Management (3.0 cr)
- ENT 4281 - Veterinary Entomology (3.0 cr)
- VCS 4600 - Small Animal and Equine Behavior (3.0 cr)
- VCS 4606 - Small Animal Management (3.0 cr)
- ANSC 3502 - Animal Health & Disease (3.0 cr)
- ANSC 3700 - Equine Reproduction and Breeding Management (2.0 cr)
- ANSC 4615 - Equine Reproduction and Breeding Management (2.0 cr)

Animal Production Focus

Students are required to complete one of the following course groups.

Dairy
- ANSC 4011 - Dairy Cattle Breeding (3.0 cr)
- ANSC 4403 - Ruminant Nutrition (3.0 cr)
- ANSC 4604 - Dairy Production Systems Management (4.0 cr)
- ANSC 4614 - Advanced Dairy Production Systems Management (2.0 cr)
- OR-

Beef
- ANSC 4012 - Beef Cattle Production (3.0 cr)
- ANSC 4403 - Ruminant Nutrition (3.0 cr)
- ANSC 4603 - Beef Production Systems Management (4.0 cr)
- ANSC 4613 - Advanced Beef Production Systems Management (2.0 cr)
- OR-

Swine
- ANSC 4012 - Pig Production (3.0 cr)
- ANSC 4403 - Ruminant Nutrition (3.0 cr)
- ANSC 4603 - Beef Production Systems Management (4.0 cr)
- ANSC 4613 - Advanced Beef Production Systems Management (2.0 cr)

Equine

Take 11 or more credits from the following:
- ANSC 2015 - Horse Health Management (2.0 cr)
- APEC 3811 - Principles of Farm Management (3.0 cr)
- APEC 3411 - Commodity Marketing (3.0 cr)
- APEC 3451 - Food and Agricultural Sales (3.0 cr)
- APEC 3811 - Principles of Farm Management (3.0 cr)
- ENT 4281 - Veterinary Entomology (3.0 cr)
- VCS 4600 - Small Animal and Equine Behavior (3.0 cr)
- VCS 4606 - Small Animal Management (3.0 cr)
- ANSC 3502 - Animal Health & Disease (3.0 cr)
- ANSC 3700 - Equine Reproduction and Breeding Management (2.0 cr)
- OR-

Companion Animal
- ANSC 1403 - Companion Animal Nutrition and Care (3.0 cr)
- VCS 4600 - Small Animal and Equine Behavior (3.0 cr)
- VCS 4606 - Small Animal Management (3.0 cr)
- 3 credits to be determined in consultation with an adviser

Poultry

The three poultry courses must be taken from the Midwest Poultry Consortium (MPC) Summer Program at Madison, Wisconsin. Courses cannot count for requirements in this section and professional courses.
ANSC 4605 - Poultry Production Systems Management (4.0 cr)
Three MPC summer courses

-OR-

Individualized Option
Students select 12 credits in consultation with an adviser and with the approval of the Animal Production Systems Committee.

Science/Pre-Vet
Students in the Science/Pre-Veterinary emphasis must select either the Basic Science or Biotechnology Option.

Required Courses
Core Courses
BIOL 4003 is required for the Biotechnology Option.
BIOC 3021 - Biochemistry (3.0 cr)
CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
CHEM 2301 - Organic Chemistry I (3.0 cr)
CHEM 2311 - Organic Lab (4.0 cr)
VBS 2032 - General Microbiology With Laboratory (4.0 cr)
BIOL 4003 - Genetics (3.0 cr)
or GCD 3022 - Genetics (3.0 cr)

Take one of the follow pairs of courses:
PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)
PHYS 1102W - Introductory College Physics II, PHYS SCI/L, WI (4.0 cr)
or
PHYS 1201W - Introductory Physics for Biology and Pre-medicine I, PHYS SCI/L, WI (5.0 cr)
PHYS 1202W - Introductory Physics for Biology and Pre-medicine II, PHYS SCI/L, WI (5.0 cr)

Science/Pre-Veterinary Options
Students are required to complete one of the following course groups.

Basic Science Option
Any animal science course not used to fulfill another requirement may also be used as a basic science elective.

Take 12 or more credit(s) from the following:
CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
ANSC 1011 - Domestic Animals and Society, C/PE, ENVT (3.0 cr)
ANSC 1403 - Companion Animal Nutrition and Care (3.0 cr)
ANSC 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
ANSC 3305 - Reproductive Biology in Health and Disease (4.0 cr)
ANSC 3509 - Animal Biotechnology (3.0 cr)
ANSC 4011 - Dairy Cattle Breeding (3.0 cr)
ANSC 4401 - Swine Nutrition (3.0 cr)
ANSC 4403 - Ruminant Nutrition (3.0 cr)
ENT 4281 - Veterinary Entomology (3.0 cr)
VPM 3502 - Animal Health & Disease (3.0 cr)

Take one course from the following:
ANSC 4102 - Equine Management (3.0 cr)
ANSC 4601 - Pork Production Systems Management (4.0 cr)
ANSC 4602 - Sheep Production Systems Management (4.0 cr)
ANSC 4603 - Beef Production Systems Management (4.0 cr)
ANSC 4604 - Dairy Production Systems Management (4.0 cr)
ANSC 4605 - Poultry Production Systems Management (4.0 cr)
VCS 4606 - Small Animal Management (3.0 cr)

Biotechnology Option
CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
ANSC 3509 - Animal Biotechnology (3.0 cr)
BIOL 4003 - Genetics (3.0 cr)

Select at least 2 credits of a laboratory,
Take 11 or more credit(s) from the following:
ANSC 3511 - Animal Growth and Development (3.0 cr)
ANSC 3305 - Reproductive Biology in Health and Disease (4.0 cr)
BIOL 4025 - Laboratory in Biochemistry (2.0 cr)
BIOL 4125 - Laboratory in Molecular Biology and Biotechnology (3.0 cr)
BIOC 5001 - Biochemistry, Molecular and Cellular Biology (5.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
GCD 4015 - Genetics Laboratory (2.0 cr)
GCD 4025 - Cell Biology Laboratory (2.0 cr)
GCD 4034 - Molecular Genetics (3.0 cr)
GCD 4143 - Human Genetics (3.0 cr)
GCD 4151 - Molecular Biology of Cancer (3.0 cr)
GCD 4161 - Developmental Biology (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
MICB 3301 - Biology of Microorganisms (5.0 cr)
MICB 4131 - Immunology (3.0 cr)
MICB 4141W - Biology, Genetics, and Pathogenesis of Viruses: Writing Intensive, WI (4.0 cr)
MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
MICB 4235 - Advanced Laboratory: Virology, Immunology, and Microbial Genetics (3.0 cr)

Animal Science Minor

Animal Science
Requirements for this program are current for Fall 2006.
Required credits in this minor: 20.
The minor is for students who want to include animal science coursework to enhance or supplement their major program.
Students have flexibility in choosing courses to meet the requirements. To complete the minor, students must complete at least 20 credits with an ANSC designator.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements
To complete the minor, students must complete at least 20 credits with an ANSC designator.

Required Courses
Minor Courses
At least 10 credits must be 3xxx or higher.

Take no more than 10 credit(s) from the following:
ANSC 1xxx
ANSC 2xxx

Take 10 or more credit(s) from the following:
ANSC 3xxx
ANSC 4xxx
ANSC 5xxx

-OR-
Applied Economics B.S.

Applied Economics

Requirements for this program are current for Fall 2006.
Required credits to graduate with this degree: 120.
Required credits within the major: 52.
Degree: Bachelor of Science.

The applied economics major prepares students for careers in private industry, government agencies, agribusiness, or graduate work. Students may choose one of six professional application clusters: management and finance; marketing; food retailing; trade and development; resources and environment; or regional and public economics. Students may also, in consultation with their adviser, develop an individualized application cluster.

The curriculum emphasizes fundamental written and oral communication skills and a strong foundation in mathematics, economic principles and their applications. Areas of employment for graduates include management, finance, marketing and international trade, domestic and international development, environmental impact assessment, resource management and use, and government-related work in planning, taxation, and development. Entry-level jobs are often in merchandising and sales, credit analysis, management, and other customer contact areas.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements
Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements
Every student’s program is capped off with 12 credits of advanced-level coursework, called a professional application cluster. All required courses must be taken A-F, and students must earn a grade of at least a C-. Students may not major in both applied economics and agricultural and food business management.

Required Courses
Foundation Courses
Students considering graduate study in applied economics are encouraged to take MATH 1271 and MATH 1272
MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)

Writing Performance
RHET 3562W - Technical and Professional Writing, WI (4.0 cr)
COMM 1313W - Analysis of Argument, WI (3.0 cr)
or ENPSTL 1021W - Intermediate Expository Writing, WI (4.0 cr)
or RHET 1152W - Writing on Issues of Science and Technology, C/PE, WI (4.0 cr)
or RHET 3221W - Theories of Human Communication, C/PE, SSCI, WI (4.0 cr)

Speech Performance
COMM 1101 - Introduction to Public Speaking (3.0 cr)
or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)
COMM 3441 - Introduction to Organizational Communication (3.0 cr)
or RHET 3257 - Scientific and Technical Presentations (3.0 cr)
COMM 3411 - Introduction to Small Group Communication (3.0 cr)
or RHET 3266 - Group Process, Team Building, and Leadership, C/PE (3.0 cr)

Additional Social Science
Students majoring in applied economics must complete 3 credits in social sciences beyond the 6 credits required for liberal education. The 3 credits may not be in courses with the APEC or ECON designator.

Professional Courses
APEC 1001 - Orientation to Applied Economics (1.0 cr)
APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
APEC 3001 - Applied Microeconomics: Consumers, Producers, and Markets, SSCI (4.0 cr)
APEC 1102 - Principles of Macroeconomics: Managerial Economics (4.0 cr)
APEC 3006 - Applied Macroeconomics: Government and the Economy (3.0 cr)
APEC 3007 - Applied Macroeconomics: Policy, Trade, and Development, IP (3.0 cr)
ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
or APEC 1251 - Principles of Accounting (3.0 cr)
OMS 2550 - Business Statistics: Data Sources, Presentation, and Analysis (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)

Ethics and Responsible Management
Student must take one course (3 credits) from the list below that fosters one or more of the following objectives: responsible judgment about the management of natural resources and the environment; responsible judgment regarding ethical and policy issues related to agriculture; application of global perspectives to agricultural, food, and environmental issues and decisions; application of a historical perspective to the role of science and technology.

Take 1 or more course(s) from the following:
CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
AGRO 1103 - Crops, Environment, and Society, ENV (4.0 cr)
AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENV, WI (3.0 cr)
ANSC 1011 - Domestic Animals and Society, C/PE, ENV (3.0 cr)
BAE 3212 - Safety and Environmental Health Issues in Plant and Animal Production and Processing, C/PE, ENV, H (3.0 cr)
Biol 4501 - Social Uses of Biology, C/PE (3.0 cr)
EE 1701W - Energy, Environment, and Society, C/PE, ENV, WI (3.0 cr)
EEB 3001 - Ecology and Society, ENV (3.0 cr)
ESPM 1011 - Issues in the Environment, C/PE, ENV (3.0 cr)
ESPM 1051 - Introduction to Environmental Science, ENV (3.0 cr)
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENV, WI (3.0 cr)
ESPM 4061W - Water Quality and Natural Resources, ENV (3.0 cr)
FSCN 1102 - Food: Safety, Risks, and Technology, C/PE (3.0 cr)
GEO 3005 - Earth Resources, C/PE, IP (3.0 cr)
GEOG 3401 - Geography of Environmental Systems and Global Change, WI (4.0 cr)
HSCI 3211 - Biology and Culture in the 19th and 20th Centuries, HP (3.0 cr)
HSCI 3331 - Technology and American Culture, HP (3.0 cr)
PBIO 1212 - Plants and Society, ENV (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.
Food Retailing

Students take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991), plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of 12 credits minimum. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Required Courses

Food Retailing Core Courses

Take 12 or more credit(s) from the following:

- Take 2 or more course(s) from the following:
  - APEC 3451 - Food and Agricultural Sales (3.0 cr)
  - APEC 3821 - Retail Center Management (3.0 cr)
- APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
- APEC 4451W - Food Marketing Economics, C/PE, WI (3.0 cr)
- APEC 4481 - Futures and Options Markets (3.0 cr)

Take 2 or more course(s) from the following:

- AIM 4011 - Student Project/Field Investigation (3.0 cr)
- DHA 3242 - Retail Buying (3.0 cr)
- DHA 3245 - Multichannel Retailing (3.0 cr)
- HRIR 3032 - Training and Development (2.0 cr)
- HRIR 3042 - The Individual and Organizational Performance (2.0 cr)
- MKTG 4020 - Advanced Logistics and Supply Chain Management (2.0 cr)
- MKTG 4060 - Marketing and Distribution Channels (4.0 cr)
- MKTG 4080 - Marketing Strategy (4.0 cr)
- OMS 3001 - Introduction to Operations Management (3.0 cr)
- OMS 3056 - Operations Planning and Control (4.0 cr)

Individualized Professional

Students develop a program in consultation with an adviser. Students must take at least 12 credits.

Required Courses

Individualized Professional Application Courses

Courses listed here are suggestions. All courses must be chosen in consultation with an adviser.

Take 12 or more credit(s) from the following:

- APEC 1xxx
- APEC 2xxx
- APEC 3xxx
- APEC 4xxx
- HRIR 1xxx
- HRIR 2xxx
- HRIR 3xxx
- HRIR 4xxx
- MGMT 1xxx
- MGMT 2xxx
- MGMT 3xxx
- MGMT 4xxx
- MKTG 1xxx
- MKTG 2xxx
- MKTG 3xxx
- MKTG 4xxx

Management and Finance

Students must take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991) plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of at least 12 credits. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Required Courses

Management and Finance Core Courses

Take 12 or more credit(s) from the following:

- Take 2 or more course(s) from the following:
  - APEC 3501 - Agribusiness Finance (3.0 cr)
  - APEC 3811 - Principles of Farm Management (3.0 cr)
  - APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
  - APEC 4481 - Futures and Options Markets (3.0 cr)
  - APEC 4501 - Financial Applications (3.0 cr)
  - APEC 4821W - Agribusiness Management, WI (3.0 cr)
  - APEC 5811 - Cooperative Organization (3.0 cr)
- Take 2 or more course(s) from the following:
  - ACCT 3001 - Introduction to Management Accounting (3.0 cr)
  - ACCT 5100 - Corporate Financial Reporting (4.0 cr)
  - ACCT 5160 - Financial Statement Analysis (2.0 cr)
  - ECON 3701 - Money and Banking (3.0 cr)
  - ECON 4721 - Money and Banking (3.0 cr)
  - ECON 4751 - Financial Economics (3.0 cr)
  - FINA 4241 - Corporate Financing Decisions (4.0 cr)
  - FINA 4242 - Corporate Investment Decisions (4.0 cr)
  - HRIR 3021 - Human Resource Management and Industrial Relations (3.0 cr)
  - MGMT 3001 - Fundamentals of Management (3.0 cr)

Marketing

Students must take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991) plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of at least 12 credits. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Required Courses

Marketing Core Courses

Take 12 or more credit(s) from the following:

- Take 2 or more course(s) from the following:
  - APEC 3411 - Commodity Marketing (3.0 cr)
  - APEC 3451 - Food and Agricultural Sales (3.0 cr)
  - APEC 3821 - Retail Center Management (3.0 cr)
  - APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
  - APEC 4481 - Futures and Options Markets (3.0 cr)
  - AIM 4011 - Student Project/Field Investigation (3.0 cr)
  - DHA 3245 - Multichannel Retailing (3.0 cr)
  - HRIR 3032 - Training and Development (2.0 cr)
  - MKTG 4060 - Marketing and Distribution Channels (4.0 cr)
  - MKTG 4080 - Marketing Strategy (4.0 cr)
- Take 2 or more course(s) from the following:
  - AIM 4011 - Student Project/Field Investigation (3.0 cr)
  - DHA 3245 - Multichannel Retailing (3.0 cr)
  - HRIR 3032 - Training and Development (2.0 cr)
  - MKTG 3001 - Principles of Marketing (3.0 cr)
  - MKTG 3010 - Marketing Research (4.0 cr)
  - MKTG 4030 - Selling and Sales Management (4.0 cr)
  - MKTG 4040 - Buyer Behavior (4.0 cr)
  - MKTG 4050 - Integrated Marketing Communications (4.0 cr)
  - MKTG 4060 - Marketing and Distribution Channels (4.0 cr)
  - MKTG 4080 - Marketing Strategy (4.0 cr)

Regional and Public Economics

Students must take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991) plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of at least 12 credits. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.
Required Courses

Regional and Public Economics Electives
Take 12 or more credit(s).

Take 2 or more course(s) from the following:
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4311 - Tourism Development: Principles, Processes, Policies (3.0 cr)
APEC 5321 - Regional Economic Analysis (3.0 cr)
APEC 5341 - Public Finance (3.0 cr)

Take 2 or more course(s) from the following:
ECON 3041 - Prospective World Economy (3.0 cr)
ECON 3601 - Industrial Organization and Antitrust Policy (3.0 cr)
ECON 3801 - Elements of Public Economics (3.0 cr)
ECON 4307 - Comparative Economic Systems, IP (3.0 cr)
ECON 4337 - Comparative Economic Systems, IP (3.0 cr)
ECON 4531 - Labor Economics (3.0 cr)
ECON 4623 - Housing Markets and Public Policy (3.0 cr)
ECON 4631 - Industrial Organization and Antitrust Policy (3.0 cr)
ECON 4831 - Cost-Benefit Analysis, WI (3.0 cr)
URBS 1001W - Introduction to Urban Studies: The Complexity of Metropolitan Life, C/PE, WI (3.0 cr)

Resources and the Environment
Students must take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991) plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of at least 12 credits. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Required Courses

Resources and Environment Electives
Take 12 or more credit(s).

Take 2 or more course(s) from the following:
APEC 3611 - Environmental and Natural Resource Economics, ENVT (3.0 cr)
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 5651 - Economics of Natural Resource and Environmental Policy, ENVT (3.0 cr)
APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
APEC 5751 - Global Trade and Policy, IP (3.0 cr)

Take 2 or more course(s) from the following:
ECON 4301 - Economic Development, WI (3.0 cr)
ECON 4307 - Comparative Economic Systems, IP (3.0 cr)
ECON 4311 - Economy of Latin America (3.0 cr)
ECON 4313 - The Russian Economy (3.0 cr)
ECON 4315 - The Japanese Economy (3.0 cr)
ECON 4331W - Economic Development, WI (3.0 cr)
ECON 4337 - Comparative Economic Systems, IP (3.0 cr)
ECON 4421W - Economic Integration of the Americas, IP, WI (3.0 cr)
ECON 4432W - International Finance, IP, WI (3.0 cr)

Trade and Development
Students must take at least two upper division APEC courses (excluding 3991, 4096, 5891, 5991) plus two additional courses from APEC, ECON, Carlson School of Management, or other courses listed below, for a total of at least 12 credits. While students are encouraged to complete credits in one of the following areas, students may select courses across the categories in consultation with their adviser.

Required Courses

Trade and Development Electives
Take 12 or more credit(s) from the following:

Take 2 or more course(s) from the following:
APEC 3041W - Economic Development of U.S. Agriculture, HP, WI (3.0 cr)
APEC 3071 - Agriculture and Economic Growth in Developing Countries (3.0 cr)
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4103 - World Food Problems, C/PE, IP (3.0 cr)
APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
APEC 5751 - Global Trade and Policy, IP (3.0 cr)

Take 2 or more course(s) from the following:
ECON 4041 - The Prospective World Economy (3.0 cr)
ECON 4301 - Economic Development, WI (3.0 cr)
ECON 4307 - Comparative Economic Systems, IP (3.0 cr)
ECON 4311 - Economy of Latin America (3.0 cr)
ECON 4313 - The Russian Economy (3.0 cr)
ECON 4315 - The Japanese Economy (3.0 cr)
ECON 4331W - Economic Development, WI (3.0 cr)
ECON 4337 - Comparative Economic Systems, IP (3.0 cr)
ECON 4421W - Economic Integration of the Americas, IP, WI (3.0 cr)
ECON 4432W - International Finance, IP, WI (3.0 cr)

Applied Economics Minor

Applied Economics
Requirements for this program are current for Fall 2006.
Required credits in this minor: 16.

This minor is for students who want to include a basic core of applied economics coursework to enhance or supplement their major program. Students have flexibility in choosing courses to meet the minor requirements. Students who wish to minor in applied economics should consult with the major coordinator for applied economics to obtain approval before completion of 9 credits in the minor. No more than 6 credits may be counted for both the major and the applied economics minor. Students must complete at least 16 credits for the minor.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses

Minor Courses
APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics, IP, SSCI (4.0 cr)
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
Take 8 - 10 credit(s) from the following:
APEC 3xxx
APEC 4xxx
APEC 5xxx
Applied Plant Science B.S.

Agronomy and Plant Genetics

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 73 to 82.

This program requires summer terms.

Degree: Bachelor of Science.

The applied plant science major provides options for a broad course of study in plant sciences, as well as options to concentrate more specifically within an area of individual interest, such as genetics, biotechnology, sustainable agriculture, renewable energy, or healthy foods. It provides a solid science background and integrates knowledge of science, environment, production and industry in preparation for continuing study in graduate school or careers in improvement of the quality and benefits of plants and plant products; industry, government, and universities as research scientists; agencies and organizations concerned with natural resource management; advisory, inspection and certification services; bio-safety and food security; related fields of biology and agricultural education.

Students choose from three areas of emphasis: agroecology, plant improvement, and plant utilization.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Students develop a plan of study that fulfills the required science core (43-49 credits) and area electives (12-17 credits). Students enroll in a set of three common courses in their freshman year and a series of three integrative courses in each of the following three years. The last course in the series is the senior capstone course. After fulfilling CLE and major requirements, students should have between 15 and 22 credits available for electives.

Required Courses

Science Foundation Courses

BIOL 1009 is recommended.

BIOL 2022 - General Botany (3.0 cr)
CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)

or BIOL 1009 - General Botany, BIOL SCI/L (4.0 cr)
AGRO 4005 - Applied Crop Physiology and Development (4.0 cr)

or

BIOL 3002 - Plant Biology: Function (2.0 cr)
BIOL 3005W - Plant Function Laboratory, WI (2.0 cr)

or HORT 3005 - Environmental Effects on Horticultural Crops (2.0 cr)

Major Courses

AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
AGRO 1660 - First-Year Colloquium/Experience in Agroecosystems Analysis (2.0 cr)
AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
AGRO 4093 - Directed Studies for Advanced Students (1.0-4.0 cr)
or AGRO 4096 - Professional Experience Program: Internship (1.0-3.0 cr)

Take 2 or more course(s) from the following:
CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
CFAN 3001 - Pests and Crop Protection (3.0 cr)
AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
AGRO 4103 - World Food Problems, C/PE, IP (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Agroecology

Required Courses

Agroecology

SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
or BIOC 3021 - Biochemistry (3.0 cr)
BIOL 3407 - Ecology, ENVT (3.0 cr)
or ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
BIOL 4003 - Genetics (3.0 cr)
or GCD 3022 - Genetics (3.0 cr)
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)

Electives

Take 17 or more credit(s) including 4 or more sub-requirement(s) from the following:

Take 1 or more course(s) from the following:
AGRO 2501 - Plant Identification for Urban and Rural Landscapes (2.0 cr)
ENT 5021 - Insect Taxonomy and Phylogeny (4.0 cr)
ENT 5371 - Principles of Systematics (3.0 cr)
PBIO 4321 - Taxonomy of Minnesota Flora (3.0 cr)

Take 1 or more course(s) from the following:
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
EEB 5122W - Plant Interactions with Animals and Microbes, WI (3.0 cr)
ENT 3005 - Insect Biology (3.0 cr)
ENT 5211 - Insect Pest Management (3.0 cr)
ENT 5341 - Biological Control of Insects and Weeds (3.0-4.0 cr)
PLPA 5201 - Biology of Plant Diseases (4.0 cr)
PLPA 5204 - Plant Disease Management (3.0 cr)

Take 1 or more course(s) from the following:
AGRO 4605 - Management Strategies for Crop Production (4.0 cr)
ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
HORT 4072 - Growing Plants Organically: What It Means To Be Green (3.0 cr)
HORT 5052 - Specialty Greenhouse Crop Production (3.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)

Take 1 or more course(s) from the following:
AGRO 5321 - Ecology of Agricultural Systems, ENVT (3.0 cr)

Degree Programs
Bio-Based Products B.S.

Bio-Based Products

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120 to 128.

Required credits within the major: 120 to 128.

Degree: Bachelor of Science.

Bio-based products are materials, chemicals, and energy derived from renewable, bio-resources including forestry, agriculture and other biomass. Many of the commercial products and forms of energy that we use today and come from depleting fossil fuels can be derived from renewable, bio-resources. The molecular building blocks and components of biomass can be harnessed to heat our homes, run our cars, light our buildings, and provide industrial and consumer products. These products include fibers and fiber-based products, paper, board, engineered wood, structural panels, wood-based composites, renewable plastics, and bio-derived chemicals and fuels.

This major provides students with a strong foundation in the sustainable use of bio-resources while protecting the environment. The interdisciplinary bio-based products major combines coursework in science, engineering, technology, and business—all related to the manufacturing and end-use applications of materials, products, and energy from renewable resources.

Students choose one of the following three areas of specialization: pre-bio-based products engineering (joint program with the Institute of Technology; see major requirements listed in the Institute of Technology section of this catalog); bio-based products marketing and management; or residential building science and technology. In addition, the department also offers a minor in bio-based products engineering that enables students in any of the basic sciences and engineering majors to gain a better understanding of and appreciation for sustainable use of the renewable resources.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Communication Skills
COMM 1101 - Introduction to Public Speaking (3.0 cr) or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

Physical and Biological Sciences
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOC 3021 - General Biology (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
FINA 3001 - Finance Fundamentals (3.0 cr)
ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
Bio-Based Marketing and Management
BP 4413 - Systems Approach to Residential Construction (3.0 cr)
BP 1003 - Wood and Fiber Science Lab (1.0 cr)
Bio-Based Products
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
APEC 1102 - Principles of Macroeconomics, SSCI (3.0 cr)
Macroeconomics
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
Bio-Based Products Marketing and Management
The bio-based products marketing and management specialization combines coursework in liberal arts, basic sciences, communications, and business. Students learn about the physical and social aspects of renewable bio-based products and resources, and the combination of marketing and sales courses with technical bio-based products engineering coursework, which prepares them for the growing bio-based products industries.
Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.
Bio-Based Products Marketing and Management
The bio-based products marketing and management specialization combines coursework in liberal arts, basic sciences, communications, and business. Students learn about the physical and social aspects of renewable bio-based products and resources, and the combination of marketing and sales courses with technical bio-based products engineering coursework, which prepares them for the growing bio-based products industries.
Required Courses
Mathematical Thinking
MATH 1142 - Short Calculus, MATH (4.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
Physical and Biological Sciences
Take one of the following pairs of courses.
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or
CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
Macroeconomics
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
Bio-Based Products
BP 1003 - Wood and Fiber Science Lab (1.0 cr)
BP 4413 - Systems Approach to Residential Construction (3.0 cr)
Bio-Based Marketing and Management
ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP (3.0 cr)
FINA 3001 - Finance Fundamentals (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
Marketing and Management Focus
Students are required to complete one of the following course groups.
Marketing and Sales
Take 9 or more credit(s) from the following:
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
JOUR 4261 - Advertising: Media Strategy (3.0 cr)
JOUR 4272 - Interactive Advertising (3.0 cr)
MKTG 3010 - Marketing Research (4.0 cr)
MKTG 4030 - Selling and Sales Management (4.0 cr)
Management
Take 9 or more credit(s) from the following:
ACCT 3001 - Introduction to Management Accounting (3.0 cr)
HRIR 3021 - Human Resource Management and Industrial Relations (3.0 cr)
IDSC 3001 - Information Systems for Business Processes and Management (3.0 cr)
IE 4521 - Statistics, Quality, and Reliability (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
OMS 3001 - Introduction to Operations Management (3.0 cr)
OMS 3056 - Operations Planning and Control (4.0 cr)
Residential Building Science and Technology
The residential building science and technology program is designed to investigate the important relationships between people, their homes, and the environment. From a solid scientific and engineering base, this interdisciplinary program builds critical thinking skills and helps students explore the opportunities that can enhance the performance of houses. The curriculum draws upon a wide range of resources across the University and includes physical science, social science, management, marketing, communications, material sciences, and engineering coursework.
The environment and international perspectives themes are satisfied automatically by completing required courses in the residential building science and technology specialization.
Required Courses
Mathematical Thinking
MATH 1171 - Calculus I, MATH (4.0 cr)
MATH 1272 - Calculus II (4.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
or
STAT 3021 - Introduction to Probability and Statistics (3.0 cr)
Chemistry and Physics
CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)
or
PHYS 1302W - Introductory Physics for Science and Engineering II, PHYS SCI/L (4.0 cr)
Residential Building Science and Technology
BP 4413 - Systems Approach to Residential Construction (3.0 cr)
BP 4414 - Advanced Residential Building Science, WI (3.0 cr)
BP 4415 - Advanced Residential Building Science Lab (1.0 cr)
BP 4416 - Building Testing and Diagnostics (2.0 cr)
CE 3402 - Construction Materials (3.0 cr)
CE 4101W - Project Management, WI (3.0 cr)
DHA 2463 - Housing and Community Development, C/PE (3.0 cr)
ESPM 1102W - Introductory College Physics II, PHYS SCI/L, WI (4.0 cr)
or
PHYS 1302W - Introductory Physics for Science and Engineering II, PHYS SCI/L (4.0 cr)
Notes: The honors sub-plan does not meet this requirement.
Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.
Bio-Based Products Marketing and Management
The bio-based products marketing and management specialization combines coursework in liberal arts, basic sciences, communications, and business. Students learn about the physical and social aspects of renewable bio-based products and resources, and the combination of marketing and sales courses with technical bio-based products engineering coursework, which prepares them for the growing bio-based products industries.
Required Courses
Mathematical Thinking
MATH 1142 - Short Calculus, MATH (4.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
Physical and Biological Sciences
Take one of the following pairs of courses.
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or
CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
Macroeconomics
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
Bio-Based Products
BP 1003 - Wood and Fiber Science Lab (1.0 cr)
BP 4413 - Systems Approach to Residential Construction (3.0 cr)
Bio-Based Marketing and Management
ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP (3.0 cr)
FINA 3001 - Finance Fundamentals (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)
or DHA 1101W - Introduction to Design Thinking, OH, WI (4.0 cr)
or LA 1101W - Introduction to Design Thinking, OH, WI (4.0 cr)

Electives
Course selections must be approved by RBST faculty adviser.

Take 12 or more credit(s) from the following:
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
CMGT 4011 - Construction Documents and Contracts (3.0 cr)
CMGT 4021 - Construction Planning and Scheduling (3.0 cr)
CMGT 4022 - Construction Estimating (3.0 cr)
CMGT 4031 - Construction Safety and Loss Control (3.0 cr)
DHA 2402 - Residential Technology (3.0 cr)
IE 5531 - Engineering Optimization I, H (4.0 cr)
OMS 3059 - Quality Management and Six Sigma (4.0 cr)
APEC 1102 - Principles of Macroeconomics, IP, SSCI (3.0 cr)
or ECON 1102 - Principles of Macroeconomics, IP, SSCI (4.0 cr)
ARCH 5351 - AutoCAD I (3.0 cr)

Bio-Based Products Engineering Minor
Bio-Based Products
Requirements for this program are current for Fall 2006.
Required credits in this minor: 14.
This program provides students with a strong background in the basic sciences and engineering and their application to manufacturing and end-use applications of materials, chemicals, and energy from renewable resources.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements
Required Courses
Minor Courses
Take 14 or more credit(s) from the following:
BP 4001 - Chemistry of Plant Materials (4.0 cr)
BP 4301 - Surface and Colloid Science in Bio-based Products Manufacturing (3.0 cr)
BP 4302 - Organisms Impacting Bio-based Products (3.0 cr)
BP 4303 - Bio-Based Materials Science (3.0 cr)
BP 4305 - Pulp and Paper Technology (3.0 cr)
BP 4401 - Bio-Based Products Engineering (4.0 cr)
BP 4404 - Bio-based Composites Engineering (3.0 cr)
BP 4501 - Process and Product Design I (2.0 cr)
BP 4502W - Process and Product Design II, WI (3.0 cr)

Climatology Minor
Agronomy and Plant Genetics
Requirements for this program are current for Fall 2006.
Required credits in this minor: 20.
The minor lets students broaden their expertise in weather and climate studies. Students who will be working for any industry or agency that depends on understanding weather and climate change will find the minor useful. Students take courses in meteorology, atmosphere, and biometeorology. Electives are in climate models, climate variations, climate change, and atmospheric boundary layer.
To complete the minor, students must complete at least 20 credits.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements
Required Courses for the Program
Minor Courses
ESPM 1425 - The Atmosphere, ENVT, PHYS SCI/L (4.0 cr)
ESPM 5211 - Environmental Biophysics and Ecology (3.0 cr)

Electives
Take 13 or more credit(s) from the following:
EEB 5008 - Forest Response to Quaternary Climate Change (2.0 cr)
EEB 5009 - Quaternary Vegetation History and Climate (3.0 cr)
GEOG 3401 - Geography of Environmental Systems and Global Change, WI (4.0 cr)
GEOG 5423 - Climate Models and Modeling (3.0 cr)
GEOG 5426 - Climatic Variations (3.0 cr)

Corporate Environmental Management Minor
Bio-Based Products
Requirements for this program are current for Fall 2006.
Required credits in this minor: 18.
The corporate environmental management (CEM) minor is designed to provide students with an excellent opportunity to gain a broad exposure to the strategic, analytical, and managerial processes associated with the environmental impact of companies’ and other organizations’ products and processes. Completion of the CEM minor enhances students’ preparation for graduate school and for entering a career in the growing corporate functions of environmental management and regulatory compliance.
The CEM minor is available to students in good standing in all majors at the University of Minnesota, Twin Cities.

Admission Requirements
Students must complete 4 courses before admission to the program.
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Required Courses for Admission
Preparatory Courses
APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics, IP, SSCI (4.0 cr)
or ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
Designing Documents with New and Emerging Technologies Minor

**Rhetoric**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 16.

The minor focuses on designing effective communication products using both traditional and emerging technologies. Students learn to design written messages using computer technologies; visual messages using photography, digital imaging, and video; and online and Web messages using multimedia. World Wide Web technologies, and streaming audio and video. Message design components include audience analysis and rigorous evaluation of document usability. This minor differs from the technical communication minor by its focus on emerging technologies.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**Program Requirements**

**Required Courses**

<table>
<thead>
<tr>
<th>Minor Courses</th>
<th>Credit(s)</th>
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<tbody>
<tr>
<td>RHET 3671 - Visual Rhetoric</td>
<td>3.0</td>
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<tr>
<td>RHET 3672 - Project Design and Development</td>
<td>3.0</td>
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<tr>
<td>RHET 4501 - Usability and Human Factors in Technical Communication</td>
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<tr>
<td>RHET 4662W - Emerging Technologies in Scientific and Technical Communication</td>
<td>4.0</td>
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<tr>
<td>RHET 3101 - Functional Photography</td>
<td>3.0</td>
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<tr>
<td>or RHET 3257 - Scientific and Technical Presentations</td>
<td>3.0</td>
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<tr>
<th>Take 6 or more credit(s) from the following:</th>
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<tbody>
<tr>
<td>ENT 5910 - Special Problems in Entomology</td>
<td>1.0-6.0</td>
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<tr>
<td>ENT 5920 - Special Lectures in Entomology</td>
<td>1.0-3.0</td>
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<tr>
<td>Take 3 or more credit(s) from the following:</td>
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<tr>
<td>ENT 3xx</td>
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<td>ENT 4xx</td>
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<td>ENT 5xx</td>
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**Environment and Natural Resources Minor**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 16.

The environment and natural resources minor provides students in programs such as biology, education, journalism, political science, and others with the basic understanding to recognize, evaluate, and develop solutions to a range of environmental problems. Students interested in the minor should contact CFANS Student Services Office at 612-624-6768.
Environmental Horticulture B.S.

Horticultural Science

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 49.

Degree: Bachelor of Science.

The environmental horticulture major educates and prepares students in all phases of horticulture: crop and plant production; education (botanic gardens and arboreta); service oriented activities (landscaping and landscape maintenance); plant use and function (design, reclamation, and restoration); and recreation (golf courses and parks). Students gain experience in the use of plants to alter environments, restore damaged landscapes, improve the health and well-being of individuals, educate people about science and agriculture, improve community environments, and provide recreational and practical benefits to the public.

Students choose either a business or science option. Landscape design, a joint offering with the College of Design, combines architecture and landscape architecture courses available in College of Design with the plant-based design courses available in CFANS.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

Applied courses in horticultural science, soil science, entomology, plant pathology, and applied economics vary depending on program. All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Foundation Courses

APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)
CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or CHEM 1021 - Chemical Principles I, ENV'T, PHYS SCI/L (4.0 cr)
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)

Professional Courses

BIOL 3002 - Plant Biology: Function (2.0 cr)
HORT 1001 - Plant Propagation, BIOL SCI/L (4.0 cr)
HORT 1015 - Woody and Herbaceous Plants (4.0 cr)
HORT 3002W - Greenhouse Management, WI (3.0 cr)
HORT 3005 - Environmental Effects on Horticultural Crops (2.0 cr)
HORT 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
PLPA 2001 - Introductory Plant Pathology (3.0 cr)
SOIL 2125 - Basic Soil Science, ENV'T (4.0 cr)
ENT 3005 - Insect Biology (3.0 cr)
or ENT 4015 - Ornamentals and Turf Entomology (3.0 cr)
or ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)

Focus for ENR Minor

Students are required to complete one of the following course groups.

Environmental Management and Policy

Take 10 or more credit(s) from the following:
ESPM 3002 - Colloquium: Exotic Plants and Animals (1.0 cr)
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENV'T, WI (3.0 cr)
ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENV'T (3.0 cr)
ESPM 3101 - Conservation of Plant Biodiversity, ENV'T (3.0 cr)
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
ESPM 3245 - Sustainable Land Use Planning and Policy, ENV'T (3.0 cr)
ESPM 3261W - Economics and Natural Resources Management, ENV'T, SSCI, WI (4.0 cr)
ESPM 3601 - Our Home, Our Environment (3.0 cr)
ESPM 4061W - Water Quality and Natural Resources, ENV'T, WI (3.0 cr)
ESPM 4195W - Problem Solving and Planning in Natural Resources, WI (4.0 cr)
ESPM 4295W - GIS in Environmental Science and Management, WI (4.0 cr)
ESPM 4811 - Environmental Interpretation (3.0 cr)
ESPM 5601 - Principles of Waste Management (3.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)

Environmental Science

Take 10 or more credit(s) from the following:
ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
ESPM 3612W - Soil and Environmental Biology, C/PE, SSCI, WI (3.0 cr)
ESPM 4216 - Contaminant Hydrology (2.0 cr)
ESPM 4601 - Contaminant Hydrology (2.0 cr)
ESPM 5555 - Wetland Hydrology (3.0 cr)
EEB 4611 - Biogeochemical Processes (3.0 cr)
ENT 3925 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
ENT 5241 - Ecological Risk Assessment (3.0 cr)
FR 3114 - Hydrology and Watershed Management (3.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
PLPA 3002 - Air Pollution, People, and Plants: The Science and the Ethics, C/PE, ENV'T (3.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
Environmental Horticulture Options

Students are required to complete one of the following course groups.

Business Option

Take 2 or more course(s) from the following:
- ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
- APEC 1251 - Principles of Accounting (3.0 cr)
- PSTD 1513 - Small Business Fundamentals With E-Business Applications (3.0 cr)
- OMS 2550 - Business Statistics: Data Sources, Presentation, and Analysis (4.0 cr)

-OR-

Science Option

- BIOC 3021 - Biochemistry (3.0 cr)
- CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
- CHEM 2301 - Organic Chemistry I (3.0 cr)
- PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)
  or PHYS 1111 - Basic Physics I (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Floriculture/Nursery Production and Retail Management

22 credits are required.

Required Courses

- APEC 3821 - Retail Center Management (3.0 cr)
- HORT 4015 - Advanced Woody and Herbaceous Plant Topic (1.0 cr)
- HORT 5041W - Nursery Management, WI (4.0 cr)
- HORT 5051 - Floriculture Crop Production (4.0 cr)
- PLPA 4000 - Plant Pathology Practicum (1.0 cr)
- HORT 4401 - Plant Genetics and Breeding (4.0 cr)
  or HORT 4071W - Applications of Biotechnology to Plant Improvement, C/PE, WI (4.0 cr)

Take 6 or more credit(s) from the following:

- HORT 1xxx
- HORT 2xxx
- HORT 3xxx
- HORT 4xxx

Individualized

Students must submit a course of study to the Department of Horticultural Science Undergraduate Studies Committee at least three semesters before graduation.

Students choose two required courses plus 16 additional credits in consultation with an adviser to total at least 21 credits.

Required Courses

- HORT 4401 - Plant Genetics and Breeding (4.0 cr)
  or HORT 4071W - Applications of Plant Biotechnology to Plant Improvement (4.0 cr)
- PLPA 4000 - Plant Pathology Practicum (1.0 cr)

Landscape Design

21 credits are required.

Required Courses

Landscape Design

Take 21 or more credit(s) from the following:

- ARCH 3301 - Drawing for Design in Architecture, OH (3.0 cr)
- ARCH 3711 - Environmental Design and the Sociocultural Context, C/PE, WI (3.0 cr)
- HORT 4021 - Landscape Design and Implementation I (4.0 cr)
- HORT 4022 - Applications in Computer-Aided Design for Landscapes (3.0 cr)
- HORT 4061W - Turfgrass Management, WI (3.0 cr)
- HORT 5018 - Landscape Operations and Management (3.0 cr)
- HORT 5021 - Landscape Design and Implementation II (4.0 cr)
- LA 1301 - Introduction to Drawing in Architecture and Landscape Architecture, OH (3.0 cr)
- LA 3001 - Understanding and Creating Landscape Space (3.0 cr)
- LA 3204 - Landscape Ecology (3.0 cr)
- LA 3413 - Introduction to Landscape Architectural History, IP (3.0 cr)
- LA 3501 - Environmental Design and Its Biological and Physical Context, ENVT (3.0 cr)
- LA 3571 - Landscape Construction: Site Systems and Engineering (3.0 cr)
- ARCH 3411 - Architectural History to 1750, HP, IP (3.0 cr)
  or ARCH 3412 - Architectural History since 1750, HP, IP (3.0 cr)

Landscape Implementation and Management

21 credits are required.

Required Courses

Landscape Implementation and Management

- HORT 4021 - Landscape Design and Implementation I (4.0 cr)
- HORT 4061W - Turfgrass Management, WI (3.0 cr)
- HORT 5009 - Pesticides in Horticulture: Their Use and Abuse (3.0 cr)
- HORT 5018 - Landscape Operations and Management (3.0 cr)
- PLPA 4000 - Plant Pathology Practicum (1.0 cr)
- HORT 4401 - Plant Genetics and Breeding (4.0 cr)
  or HORT 4071W - Applications of Biotechnology to Plant Improvement, C/PE, WI (4.0 cr)
- FR 3501 - Arboriculture: Selection and Maintenance of Trees (3.0 cr)
  or HORT 1xxx
  or HORT 2xxx
  or HORT 3xxx
  or HORT 4xxx

Turfgrass Science

21 credits are required.

Required Courses

Turfgrass Science

- HORT 4021 - Landscape Design and Implementation I (4.0 cr)
- HORT 4061W - Turfgrass Management, WI (3.0 cr)
- HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
- HORT 5061 - Turfgrass Science (3.0 cr)
- PLPA 4000 - Plant Pathology Practicum (1.0 cr)
- SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
- HORT 4401 - Plant Genetics and Breeding (4.0 cr)
  or HORT 4071W - Applications of Biotechnology to Plant Improvement, C/PE, WI (4.0 cr)

Take 3 or more credit(s) from the following:

- HORT 1xxx
- HORT 2xxx
- HORT 3xxx
- HORT 4xxx
Environmental Horticulture Minor

**Horticultural Science**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 18.

Plants provide many practical and recreational benefits to society--whether it is the food we eat, the parks we play in, or the gardens we enjoy admiring. The horticulture science minor is geared toward students who want to learn more about plants and their many, diverse uses in the landscape. Coursework is flexible and can easily be tailored to specific horticultural interests, including floriculture and nursery production, turfgrass science, landscape design and maintenance, fruit and vegetable production, sustainable and organic production practices, therapeutic horticulture, plant physiology, and genetics. Students wishing to complete a minor in horticultural science should contact the Department of Horticultural Science, 305 Alderman Hall for assistance.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**Program Requirements**

**Required Courses**

**Minor Courses**

- **HORT 1001 - Plant Propagation**, BIOL SCI/L (4.0 cr)

**Electives**

At least 14 credits from courses with a HORT designator, of which one horticulture related course (SOILS, ENT, PLPA, or BIOL 3002) may be substituted. At least two HORT courses must be at 4xxx or 5xxx. A maximum of 3 credits of HORT 5090 - Directed Studies may be applied.

**Environmental Sciences, Policy and Management B.S.**

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 46.

This program requires summer terms.

Degree: Bachelor of Science

The environmental sciences, policy and management (ESPM) major is designed to address the needs posed by the complexity of environmental and renewable resource issues that are faced on a state, national and global level. This interdisciplinary, environmental major prepares graduates to solve environmental problems from an integrated knowledge base.

The mission of the ESPM major is to:

- improve the basis for environmental decision-making by integrating physical, biological, and social sciences with policy analysis and management;

- educate the next generation of environmental professionals and leaders;

- foster innovative approaches for the education of environmental professionals;

- facilitate science/social science/policy linkages within and beyond the University.

Students complete a set of common “integrated core” courses that focus on integrated problem solving using environmental sciences, policy, ethics, management models, and communication theory. Students also incorporate classroom and fieldwork.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site.

**General Requirements**

All students are required to complete general University and college requirements including writing and liberal education courses. For more information about University-wide requirements, see the liberal education requirements.

Recommended freshman writing course(s) for this program: RHET 1101

**Program Requirements**

All students complete Required Courses below and choose one of the following ESPM tracks: conservation and resource management (CRM); corporate environmental management (CEM); environmental education and communication (EEC); policy, planning, law and society (PPLS); and environmental science (ES).

Students are strongly encouraged to have an international experience before graduation. Courses completed during an international experience (study, work, volunteer, research) can meet program requirements, liberal education requirements, and/or electives. Discussion with an adviser prior to commencing an international experience is required to plan how courses meet requirements in the ESPM major.

All required courses must be taken A-F, and students must earn a grade of at least a C-.

**Required Courses**

**Communication Skills**

RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

or COMM 1101 - Introduction to Public Speaking (3.0 cr)

**Mathematical Thinking**

Students in policy, planning, law and society track or environmental education and communication track may select SOC 3811. Students in conservation and resource management track must take ESPM 3012.

STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)

or SOC 3811 - Basic Social Statistics, MATH (4.0 cr)

**Physical and Biological Sciences**

CHEM 1021 is required for the environmental science track.

CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)

or CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)

BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, PHYS SCI/L, ENVT (4.0 cr)

or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)

**Integrated ESPM Core**

ESPM 1001 - Orientation to Environmental Sciences, Policy, and Management (1.0 cr)

ESPM 1011 - Issues in the Environment, C/PE, ENVT (3.0 cr)

ESPM 2021 - Environmental Sciences: Integrated Problem Solving (3.0 cr)

ESPM 3000 - Seminar on Current Issues for ESPM (1.0 cr)

ESPM 4041 - Problem Solving for Environmental Change (4.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Conservation and Resource Management
Students in the CRM track are involved in what Thoreau suggested was “environmental wisdom” or the ability to make effective decisions about the environment by synthesizing natural and human created facts and information. Students integrate this understanding with diverse economic and social insight to make effective decisions for the environment and society.

This track prepares students for technical support, operational, and managerial positions in diverse aspects of resource conservation and management with local, state, and federal agencies and the private sector. This track also prepares students for graduate study in a wide range of areas. Students solve problems in field settings and communicate their understanding, synthesis, and decision-making to diverse audiences. They gain experience in the actual implementation of decisions. Students may also develop special skills through electives (e.g., geographic information systems, geospatial analysis).

Required Courses

Social Sciences
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
or APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics (4.0 cr)

ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
or ESPM 3271 - Human Environmental Behavior and Policy (3.0 cr)

CRM Core Courses
ESPM 1145 - Quantitative Methods for Environmental Scientists and Managers (4.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)

ESPM 3012 - Quantitative Methods for Environmental Scientists II (4.0 cr)

BIOL 2012 - General Zoology (4.0 cr)
or BIOL 2022 - General Botany (3.0 cr)
or ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
or ESPM 3101 - Conservation of Plant Biodiversity, ENVT (3.0 cr)
or ESPM 3108 - Ecology of Managed Systems (4.0 cr)
or ESPM 3612W - Soil and Environmental Biology, WI (3.0 cr)

CRM Contract Courses
Take 36 or more credit(s) including 4 or more sub-requirement(s) from the following:

Courses taken to meet other requirements cannot be double counted here, nor can courses count for multiple groups. Course selections from contract area must be made through a faculty adviser. A contract is required.

Take 10 or more credit(s) from the following:

EEB 4601 - Limnology (3.0 cr)
ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
ESPM 3101 - Conservation of Plant Biodiversity, ENVT (3.0 cr)
ESPM 3575 - Wetlands Conservation (3.0 cr)
ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
ENT 3925 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
ESPM 3108 - Ecology of Managed Systems (4.0 cr)
ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
ESPM 3612W - Soil and Environmental Biology, WI (3.0 cr)
ESPM 4216 - Contaminant Hydrology (2.0 cr)
ESPM 4601 - Soils and Pollution (3.0 cr)
FR 3104 - Forest Ecology (4.0 cr)
FR 3114 - Hydrology and Watershed Management (3.0 cr)
FR 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FR 5153 - Forest and Wetland Hydrology (3.0 cr)
FW 4102 - Principles of Conservation Biology (3.0 cr)
FW 4103 - Principles of Wildlife Management (3.0 cr)
FW 5411 - Aquatic Toxicology, ENVT (3.0 cr)
FW 5604W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)
HORT 5071 - Restoration and Reclamation Ecology, ENVT (3.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
SOIL 5555 - Wetland Soils (3.0 cr)
SOIL 5711 - Forest Soils (2.0 cr)

Take 7 or more credit(s) from the following:

ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
ESPM 4021W - Environmental Impact Statements, WI (3.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FR 3218 - Measuring & Modeling Forests (3.0 cr)
FR 3262 - Remote Sensing of Natural Resources and Environment (4.0 cr)
FR 5412 - Digital Remote Sensing (3.0 cr)
FW 5051 - Analysis of Populations (3.0 cr)
GEOG 3561 - Principles of Geographic Information Science (4.0 cr)
GIS 5571 - Introduction to Arc/Info (3.0 cr)

Take 1 or more course(s) totaling 2 - 3 credit(s) from the following:

ESPM 3031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
ESPM 3111 - Hydrology and Water Quality Field Methods (3.0 cr)
PBIO 4321 - Minnesota Flora (3.0 cr)
SOIL 4093 - Directed Study (1.0-7.0 cr)
SOIL 4511 - Field Study of Soils (2.0 cr)
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

Take 3 or more credit(s) from the following:

ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
ESPM 3271 - Human Environmental Behavior and Policy (3.0 cr)
ESPM 3602 - Regulatory and Ethical Frameworks for CEM (3.0 cr)
ESPM 3604 - Environmental Management Systems and Strategy (3.0 cr)
ESPM 4021W - Environmental Impact Statements, WI (3.0 cr)
ESPM 4242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)

Corporate Environmental Management

The CEM track provides graduates with the fundamental skills to systematically determine the environmental burdens associated with a firm’s products or manufacturing processes and to identify opportunities that generate value from environmental risk reduction, regulatory compliance programs, and other alternatives for improving environmental performance. The CEM track prepares students for positions in growing environmental,
College of Food, Agricultural and Natural Resource Sciences

health, and safety organizations housed within private enterprises, consultancies, and governmental institutions, as well as for graduate study in business, public policy, environmental sciences, and industrial ecology.

Student experiences within this track focus on analytical tools; the business, legal, regulatory, and ethical framework in which industrial firms operate; physical, chemical, and biological mechanisms associated with industrial emissions; techniques used to reduce the environmental impacts of industrial activity; and effective communication.

Required Courses
Social Sciences
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
or APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics (4.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
or ESPM 3271 - Human Environmental Behavior and Policy (3.0 cr)

Prerequisite CEM Courses
ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
MATH 1271 - Calculus I, MATH (4.0 cr)
MATH 1272 - Calculus II (4.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I, PHYS SCI/L, WI (4.0 cr)
PHYS 1302W - Introductory Physics for Science and Engineering II, PHYS SCI/L, WI (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (3.0 cr)
or BIO 3111 - Biotechnology (3.0 cr)

CEM Track Required Courses
CE 3501 - Environmental Engineering, C/PE, ENVT (3.0 cr)
ESPM 3602 - Regulatory and Ethical Frameworks for CEM (3.0 cr)
ESPM 3603 - Environmental Life Cycle Analysis (3.0 cr)
ESPM 3604 - Environmental Management Systems and Strategy (3.0 cr)
ESPM 3606 - Minimizing Industrial Emissions (3.0 cr)
ESPM 5019 - Business, Natural Environment, and Global Economy (2.0 cr)
ESPM 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
or ESPM 3111 - Hydrology and Water Quality Field Methods (3.0 cr)
or appropriate study abroad
or FR 2101 - Identifying Forest Plants (1.0 cr)
and FR 2102 - Northern Forests: Field Ecology (2.0 cr)
and FR 2104 - Measuring Forest Resources (1.0 cr)

Track Contract Courses
Take 13 or more credit(s) from the following:
ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP (3.0 cr)
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
ESPM 3605 - Recycling: Extending Raw Materials (3.0 cr)
ESPM 4607 - Industrial Biotechnology and the Environment (2.0 cr)
ESPM 4608 - Bioremediation (2.0 cr)
ESPM 4216 - Contaminant Hydrology (2.0 cr)

Environmental Education and Communication
Students in the EEC track gain a solid base of knowledge in the environmental sciences, environmental ethics, and the social context of environmental issues, and they develop a practical set of skills for teaching effectively in informal settings and for communicating clearly in written, oral, and electronic forms. This track prepares students to work at government agencies, nature centers, parks, non-governmental organizations, and similar institutions, and is appropriate for students who wish to gain a broad understanding of environmental issues and the choices humans can make to mitigate unwanted impacts of human behavior on the environment.

Students may specialize in a content area through a minor, study abroad experience in ESPM topics, and/or a student designed content area. Students are encouraged to make choices that strengthen their expertise in an area and/or provide comparative understanding from another culture or discipline.

Courses listed in the track but not taken are good possibilities for use in a content area, as are courses listed below. ESPM students should see their adviser for a list of minors.

Required Courses
Social Sciences
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
or APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics (4.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
or ESPM 3271 - Human Environmental Behavior and Policy (3.0 cr)

Education and Communication
ESPM 2401 - Environmental Education/Naturalist (3.0 cr)
RHET 3404 - Environmental Communication (3.0 cr)
CI 5534 - Studies in Science Education (3.0 cr)
or CI 5537 - Principles of Environmental Education (3.0 cr)
or CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)
or EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
or REC 5301 - Wilderness and Adventure Education (4.0 cr)
or REC 5311 - Programming Outdoor and Environmental Education (3.0 cr)
or RRM 5259 - Visitor Behavior Analysis (3.0 cr)
COMM 3441 - Introduction to Organizational Communication (3.0 cr)
or COMM 3451W - Intercultural Communication: Theory and Practice, IP, WI (3.0 cr)
or ESPM 4811 - Environmental Interpretation (3.0 cr)
or RHET 1152W - Writing on Issues of Science and Technology, C/PE, WI (4.0 cr)
or RHET 3221W - Theories of Human Communication, C/PE, SSCI, WI (4.0 cr)
or RHET 3401 - Internet Communication: Tools and Issues (3.0 cr)
or RHET 5664 - Science Writing for Popular Audiences (3.0 cr)

Human Dimensions
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
or PHIL 3301 - Environmental Ethics, C/PE, ENVT (4.0 cr)
or RHET 3362 - Applied Environmental Ethics (3.0 cr)

Take 2 or more course(s) from the following:
CSCL 3366W - Landscape, Nature, Society, ENVT, WI (3.0 cr)
ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP (3.0 cr)
ESPM 3001 - Treaty Rights and Natural Resources, CD, HP (3.0 cr)
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
GEOG 3376 - Political Ecology of North America, C/PE, ENVT (3.0 cr)
HIST 3452 - African Conservation Histories, HP, ENVT (3.0 cr)
HSCI 3244 - History of Ecology and Environmentalism (3.0 cr)
POL 4210 - Topics in Political Theory (3.0 cr)
RHET 1135 - The Land in American Experience, CD, OH (3.0 cr)
RHET 3302 - Science, Religion, and the Search for Human Nature, OH (3.0 cr)
RHET 3383 - In Search of Nature, ENVT, OH (3.0 cr)
CSCL 3361 - Visions of Nature: The Natural World and Political Thought, C/PE, ENVT (4.0 cr)
or EEB 3361 - Visions of Nature: The Natural World and Political Thought, C/PE, ENVT (4.0 cr)
Natural Sciences
BIOL 3407 - Ecology, ENVT (3.0 cr)
or EEB 3001 - Ecology and Society, ENVT (3.0 cr)
or FR 3104 - Forest Ecology (4.0 cr)
EEB 4601 - Limnology (3.0 cr)
or ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
or FR 3114 - Hydrology and Watershed Management (3.0 cr)
or GEO 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
or PHYS 1001W - Energy and the Environment, ENVT, PHYS SCI/L, WI (4.0 cr)
or PLPA 3002 - Air Pollution, People, and Plants: The Science and the Ethics, C/PE, ENVT (3.0 cr)
or SOIL 1125 - The Soil Resource, ENVT, PHYS SCI/L (4.0 cr)

Take 3 or more course(s) including 2 or more sub-requirement(s) from the following:

Take 1 or more course(s) from the following:
BIOL 2022 - General Botany (3.0 cr)
FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
PBIO 4321 - Minnesota Flora (3.0 cr)
PBIO 4511 - Flowering Plant Diversity (3.0 cr)

Take 1 or more course(s) from the following:
BIOL 2022 - General Botany (3.0 cr)
EEB 4134 - Introduction to Ornithology (4.0 cr)
EEB 4129 - Mammalogy (4.0 cr)
ENT 3005 - Insect Biology, BIOL SCI/L (3.0 cr)
FW 3136 - Biology of Fishes (4.0 cr)

Complex Human and Natural Systems
ESPM 3108 - Ecology of Managed Systems (4.0 cr)
or EEB 5146 - Science and Policy of Global Environmental Change (3.0 cr)
or FR 5146 - Science and Policy of Global Environmental Change, ENVT (3.0 cr)
or FW 4102 - Principles of Conservation Biology (3.0 cr)
or HORT 5071 - Restoration and Reclamation Ecology, ENVT (3.0 cr)

Field Experience
ESPM 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
or FR 2101 - Identifying Forest Plants (1.0 cr)
and FR 2102 - Northern Forests: Field Ecology (2.0 cr)
and FR 2104 - Measuring Forest Resources (1.0 cr)

Environmental Science
The ES track focuses on the application and integration of basic and applied sciences to solve complex environmental problems. Students can earn professional licenses and certification in several areas and will be qualified to work as soil scientists, hydrologists, water quality and wetland ecology scientists, environmental remediation scientists, climatologists, and atmospheric scientist. Graduates find jobs with environmental regulatory agencies, private consulting firms, and nonprofit organizations. This track provides a diverse basic and applied science background that also prepares students for scientific research through advanced graduate studies.

Students in this track use an understanding of biology, chemistry, physics, and mathematics to develop a broad knowledge base in soil, hydrologic, atmospheric, and biological sciences. Students study the interaction between science and the functioning of urban, forested, and agricultural lands as well as hydrologic, atmospheric, soil, and wetland resources.

Required Courses
Social Sciences
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
or APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)
or ECON 1101 - Principles of Microeconomics (4.0 cr)

ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
or ESPM 3271 - Human Environmental Behavior and Policy (3.0 cr)

Additional Basic Science and Math Courses
ESPM 3131 - Environmental Physics (3.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)
MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)
or MATH 1281 - Calculus with Biological Emphasis I, MATH (4.0 cr)
BIOL 2111 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
or BIOL 2112 - General Zoology (4.0 cr)
or BIOL 2122 - General Botany (3.0 cr)
or BIOL 2132 - General Microbiology with Laboratory (4.0 cr)

Applied Sciences and Technology Courses
ESPM 1425 - The Atmosphere, ENVT, PHYS SCI/L (4.0 cr)
ESPM 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
FR 3114 - Hydrology and Watershed Management (3.0 cr)
or GEO 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
or GEOG 3561 - Principles of Geographic Information Science (4.0 cr)
BIOL 3407 - Ecology, ENVT (3.0 cr)
or ESPM 3108 - Ecology of Managed Systems (4.0 cr)
or FR 3104 - Forest Ecology (4.0 cr)

Take 2 or more credit(s) from the following:
ESPM 3031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
ESPM 3111 - Hydrology and Water Quality Field Methods (3.0 cr)
PBIO 4321 - Minnesota Flora (3.0 cr)
SOIL 3521 - Soil Judging (1.0 cr)
SOIL 4093 - Directed Study (1.0-7.0 cr)
SOIL 4511 - Field Study of Soils (2.0 cr)
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

ES Contract Courses
Take 15 - 21 credit(s) from the following:
Students must develop a contract with their faculty adviser to develop an area of specialization. All track electives must be upper division. Depending on the selected group of courses, students have the opportunity to become certified or licensed as a professional soil scientist, hydrologist, wetland delineator, erosion control specialist, or site evaluator for individual sewage treatment system.

Take 0 - 21 credit(s) from the following:
ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
GEO 4703 - Glacial Geology (4.0 cr)
GEO 5108 - Principles of Environmental Geology (3.0 cr)
GEOG 3441 - Quaternary Landscape Evolution (3.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
SOIL 3521 - Soil Judging (1.0 cr)
SOIL 4511 - Field Study of Soils (2.0 cr)
SOIL 5515 - Soil Genesis and Landscape Relations (3.0 cr)
SOIL 5555 - Wetland Soils (3.0 cr)
SOIL 5711 - Forest Soils (2.0 cr)

Take 0 - 21 credit(s) from the following:
EEB 4601 - Limnology (3.0 cr)
EEB 4605 - Limnology Laboratory (1.0 cr)
ESPM 4216 - Contaminant Hydrology (2.0 cr)
FR 5153 - Forest and Wetland Hydrology (3.0 cr)
FW 5049W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)
GEO 5701 - General Hydrogeology (3.0 cr)
WRS 5101 - Water Resources: Individuals and Institutions (3.0 cr)
College of Food, Agricultural and Natural Resource Sciences

Students study concepts, issues, and problem solving approaches that address the policy, legal, economic, political, planning and sociological aspects of environment and natural resource management. This study includes ethics and conflict management. The track further emphasizes an interdisciplinary approach for examining problems such as sustainable land use planning, resource conservation and management, law, and environmental protection at a range of political levels and spatial scales and developing effective and innovative solutions. Students develop skill in integrating knowledge from the physical, biological, and social sciences to develop policy and planning alternatives and appropriate strategies to provide real solutions to complex problems.

Required Courses

PPLS Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit(s)</th>
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<tbody>
<tr>
<td>ESPM 3241W</td>
<td>Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)</td>
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<tr>
<td>ESPM 3261W</td>
<td>Economics and Natural Resources Management, ENV, C/PE, WI (3.0 cr)</td>
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<tr>
<td>ESPM 3271</td>
<td>Human Environmental Behavior and Policy (3.0 cr)</td>
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<tr>
<td>ESPM 3202W</td>
<td>Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)</td>
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<tr>
<td>ESPM 3245</td>
<td>Sustainable Land Use Planning and Policy, ENV (3.0 cr)</td>
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<tr>
<td>ESPM 3251</td>
<td>Natural Resources in Sustainable International Development, ENV, IP (3.0 cr)</td>
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<tr>
<td>ESPM 4242</td>
<td>Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)</td>
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<tr>
<td>ESPM 4256</td>
<td>Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)</td>
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<tr>
<td>ESPM 4096</td>
<td>Professional Experience Program: Internship (1.0-3.0 cr)</td>
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<tr>
<td>or FR 2101</td>
<td>Identifying Forest Plants (1.0 cr)</td>
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<tr>
<td>and FR 2102</td>
<td>Northern Forests: Field Ecology (2.0 cr)</td>
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<td>and FR 2104</td>
<td>Measuring Forest Resources (1.0 cr)</td>
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<tr>
<td>or ESPM 3108</td>
<td>Ecology of Managed Systems (4.0 cr)</td>
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<tr>
<td>ESPM 3211</td>
<td>Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)</td>
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<tr>
<td>FR 3131</td>
<td>Geographical Information Systems (GIS) for Natural Resources (4.0 cr)</td>
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<tr>
<td>RRMM 4232W</td>
<td>Managing Recreational Lands, ENV, WI (4.0 cr)</td>
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<tr>
<td>ESPM 3021</td>
<td>Ecological Vegetation Management: a Consulting Approach, ENV (3.0 cr)</td>
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<td>or ESPM 3604</td>
<td>Environmental Management Systems and Strategy (3.0 cr)</td>
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<td>or ESPM 4021W</td>
<td>Environmental Impact Statements, WI (3.0 cr)</td>
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<td>or ESPM 4061W</td>
<td>Water Quality and Natural Resources, ENV, WI (3.0 cr)</td>
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<td>or FR 3104</td>
<td>Forest Ecology (3.0 cr)</td>
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<td>or FR 3114</td>
<td>Hydrology and Watershed Management (3.0 cr)</td>
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<td>Managing Forest Ecosystems: Silviculture (3.0 cr)</td>
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<td>or FR 5146</td>
<td>Science and Policy of Global Environmental Change, ENV (3.0 cr)</td>
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<td>or FR 3411</td>
<td>Managing Forest Ecosystems: Silviculture (3.0 cr)</td>
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<tr>
<td>or ESPM 4021W</td>
<td>Environmental Impact Statements, C/PE, SSCI, WI (3.0 cr)</td>
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<tr>
<td>or ESPM 3021</td>
<td>Ecological Vegetation Management: a Consulting Approach, C/PE, SSCI, WI (3.0 cr)</td>
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<tr>
<td>or ESPM 3245</td>
<td>Sustainable Land Use Planning and Policy, ENV, C/PE, WI (3.0 cr)</td>
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<tr>
<td>or ESPM 3261W</td>
<td>Economics and Natural Resources Management, ENV, C/PE, WI (3.0 cr)</td>
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<td>or ESPM 3271</td>
<td>Human Environmental Behavior and Policy (3.0 cr)</td>
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<td>or ESPM 3202W</td>
<td>Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)</td>
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<td>or ESPM 3245</td>
<td>Sustainable Land Use Planning and Policy, ENV (3.0 cr)</td>
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<td>or ESPM 3251</td>
<td>Natural Resources in Sustainable International Development, ENV, IP (3.0 cr)</td>
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<tr>
<td>or ESPM 4242</td>
<td>Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)</td>
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<td>or ESPM 4256</td>
<td>Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)</td>
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<tr>
<td>or ESPM 4096</td>
<td>Professional Experience Program: Internship (1.0-3.0 cr)</td>
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<tr>
<td>or FR 2101</td>
<td>Identifying Forest Plants (1.0 cr)</td>
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<td>and FR 2102</td>
<td>Northern Forests: Field Ecology (2.0 cr)</td>
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<td>and FR 2104</td>
<td>Measuring Forest Resources (1.0 cr)</td>
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<td>or ESPM 3108</td>
<td>Ecology of Managed Systems (4.0 cr)</td>
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<td>ESPM 3211</td>
<td>Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)</td>
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<tr>
<td>FR 3131</td>
<td>Geographical Information Systems (GIS) for Natural Resources (4.0 cr)</td>
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<td>RRMM 4232W</td>
<td>Managing Recreational Lands, ENV, WI (4.0 cr)</td>
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<td>ESPM 3021</td>
<td>Ecological Vegetation Management: a Consulting Approach, ENV (3.0 cr)</td>
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</tbody>
</table>

PPLS Contract Courses

Take 12 or more credit(s) from the following:

Students may specialize in a content area through a minor, study abroad experience in ESPM topics, and/or a student designed content area. Students are encouraged to make choices that strengthen their expertise in an area and/or provide comparative understanding from another culture or discipline.

Courses listed in the track but not taken are good possibilities for use in a content area, as are courses listed below. PPLS students should see their adviser for a list of minors.

APEC 3xxx
BP 3xxx
COMM 3xxx
ECON 3xxx
FW 3xxx
FR 3xxx
GLOS 3xxx
GEOG 3xxx
Fisheries and Wildlife B.S.

Fisheries, Wildlife, and Conservation Biology

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 85 to 92.

This program requires one summer term.

Degree: Bachelor of Science.

The fisheries and wildlife curriculum gives students a broad science background emphasizing biological and environmental sciences and other coursework needed for careers in fisheries, wildlife, conservation biology, and other natural resource and environmental fields. Graduates are prepared to research, plan, and implement the management, protection, and enhancement of fisheries and aquatic resources, wildlife resources, and biological diversity. Graduates find employment as fisheries and wildlife scientists and managers, naturalists, zoo biologists, environmental biologists, environmental educators, and other natural resource professionals. The program also provides students with the fundamental science background needed to enter a wide variety of graduate programs in biological and natural resource sciences as well as professional programs in veterinary medicine, environmental law, and environmental education.

Students select an area of specialization, usually by the end of the sophomore year. Areas of specialization include conservation biology, fisheries, and wildlife. Although no computer course is required, students are expected to be computer literate and competent using word processing, spreadsheet, and e-mail software.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

After completing a core curriculum that includes liberal education, communications, basic science, mathematics, and an orientation to the fields of fisheries, wildlife, and conservation biology, students complete additional credits in one of three areas of specialization: fisheries, wildlife, or conservation biology. Some of the core curriculum courses also fulfill diversified core and designated theme requirements. Electives to complete the required 120 credits are chosen in consultation with a program adviser.

Students may also fulfill the minimum requirements for admission to the University’s College of Veterinary Medicine and other colleges of veterinary medicine by completing a bachelor’s degree in fisheries and wildlife within any of the three areas of specialization.

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Communication Skills

COMM 1101 - Introduction to Public Speaking (3.0 cr)

or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

Mathematical Thinking

FW 4001 - Biometry, WI (4.0 cr)

MATH 1142 - Short Calculus, MATH (4.0 cr)

or MATH 1271 - Calculus I, MATH (4.0 cr)

or MATH 1281 - Calculus with Biological Emphasis I, MATH (4.0 cr)

Physical, Chemical, and Biological Sciences

BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)

BIOL 2012 - General Zoology (4.0 cr)

BIOL 3407 - Ecology, ENV (3.0 cr)

CHEM 1021 - Chemical Principles I, ENV, PHYS SCI/L, (4.0 cr)

GCD 3022 - Genetics (3.0 cr)

FR 3114 - Hydrology and Watershed Management (3.0 cr)

or GEO 1001 - Earth and Its Environments, ENV, PHYS SCI/L (4.0 cr)

or SOIL 2125 - Basic Soil Science, ENV (4.0 cr)

or PHYS 1102W - Introductory College Physics II, PHYS SCI/L, WI (4.0 cr)

or PHYS 1202W - Introductory Physics for Biology and Pre-medicine II, PHYS SCI/L, WI (5.0 cr)

PHYS 1001W - Energy and the Environment, ENV, PHYS SCI/L, WI (4.0 cr)

or PHYS 1101W - Introductory College Physics I, PHYS SCI/L, WI (4.0 cr)

or PHYS 1201W - Introductory Physics for Biology and Pre-medicine I, PHYS SCI/L, WI (5.0 cr)

Major Courses

FW 1001 - Orientation in Fisheries, Wildlife, and Conservation Biology (1.0 cr)

Problem Solving

FW 4701 - Fisheries and Wildlife Problem Solving (2.0 cr)

or CFAN 3100H - Honors Experience (2.0 - 3.0 cr)

and CFAN 3101H - Honors Seminar (1.0 - 3.0 cr)

or another approved honors course at 3xxx or 4xxx

Field Experience

Complete one of the following approved field experiences.

Cloquet Program

Take all of the following in the same summer term:

FW 4106 - Important Plants in Fisheries and Wildlife Habitats (1.0 cr)

FW 4108 - Field Methods in Research and Conservation of Vertebrate Populations (3.0 cr)

or

Alternative Field Course

Students not taking FW 4106/4108 in Cloquet must receive advance approval before enrolling in an alternate field course.

Economics

APEC 1101 - Principles of Microeconomics, SSCI (3.0 cr)

or APEC 1102 - Principles of Microeconomics, IP, SSCI (3.0 cr)

or ECON 1101 - Principles of Microeconomics, IP, SSCI (4.0 cr)

or ECON 1102 - Principles of Microeconomics, IP, SSCI (4.0 cr)

or ECON 3261W - Economics and Natural Resources Management, ENV, SSCI, WI (4.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.
Conservation Biology

The conservation biology specialization is for students interested in careers dealing with a broad range of conservation issues in aquatic or terrestrial habitats. Positions typically focus on protection of endangered species and management for biodiversity. Careers as environmental educators or naturalists are also options.

All required courses in the specialization must be taken A-F and completed with a grade of at least C-.

Required Courses

Human Dimensions

Take 2 or more course(s) from the following:

- ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
- ESPM 3020W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
- ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
- ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENVT (3.0 cr)

Animals and Plants

- BIOL 2022 - General Botany (3.0 cr)

Take 1 or more course(s) from the following:

- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- ENT 5021 - Insect Taxonomy and Phylogeny (4.0 cr)
- ENT 5361 - Aquatic Insects (4.0 cr)
- FW 3136 - Biology of Fishes (4.0 cr)

Take 1 or more course(s) from the following:

- BIOL 3007W - Plant Biology: Diversity and Adaptation, WI (4.0 cr)
- FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
- PBIO 4321 - Minnesota Flora (3.0 cr)
- PBIO 4511 - Flowering Plant Diversity (3.0 cr)

Community and Ecosystem Ecology

- FR 3204 - Landscape Ecology and Management (3.0 cr)

Take 1 or more course(s) from the following:

- EEB 4014 - Ecology of Vegetation (3.0 cr)
- EEB 4016W - Ecological Biogeography, WI (3.0 cr)
- EEB 4601 - Limnology (3.0 cr)
- EEB 4609W - Ecosystem Ecology, WI (3.0 cr)
- ESPM 3575 - Wetlands Conservation (3.0 cr)
- FR 3104 - Forest Ecology (4.0 cr)

Conservation Biology

- FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FW 4102 - Principles of Conservation Biology (3.0 cr)
- FW 4103 - Principles of Wildlife Management (3.0 cr)
- or FW 5051 - Analysis of Populations (3.0 cr)
- or FW 5601 - Fisheries Population Analysis (3.0 cr)
- or FW 5603W - Habitats and Regulation of Wildlife, ENVT, WI (3.0 cr)
- or FW 5604W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)

Fisheries

The fisheries area of specialization is for students who wish to pursue careers in fisheries and aquatic resource science, management, and administration; fish hatchery management; and aquaculture, aquatic education, and aquatic environmental assessment. The curriculum meets the education criteria for the Certified Fisheries Professional designation established by the American Fisheries Society, the major professional organization for fisheries scientists and managers in North America.

Required Courses

Human Dimensions

Take 2 or more course(s) from the following:

- ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
- ESPM 3020W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
- ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
- ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENVT (3.0 cr)

Animals and Plants

- FW 3136 - Biology of Fishes (4.0 cr)
- FW 4401 - Fish Physiology and Behavior (2.0 cr)

Take 1 or more course(s) from the following:

- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- ENT 5021 - Insect Taxonomy and Phylogeny (4.0 cr)
- ENT 5361 - Aquatic Insects (4.0 cr)
- PBIO 4321 - Minnesota Flora (3.0 cr)
- PBIO 4511 - Flowering Plant Diversity (3.0 cr)

Community and Ecosystem Ecology

- EEB 4601 - Limnology (3.0 cr)

Take 1 or more course(s) from the following:

- EEB 4609W - Ecosystem Ecology, WI (3.0 cr)
- ESPM 3575 - Wetlands Conservation (3.0 cr)
- ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
- FR 3204 - Landscape Ecology and Management (3.0 cr)

Fisheries

- CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
- FW 5601 - Fisheries Population Analysis (3.0 cr)
- FW 5604W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)

Take one of the following course pairs:

- BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
- CHEM 2301 - Organic Chemistry I (3.0 cr)
- or CHEM 2101 - Introductory Analytical Chemistry Lecture (3.0 cr)
- CHEM 2111 - Introductory Analytical Chemistry Lab (2.0 cr)
- or CHEM 2301 - Organic Chemistry I (3.0 cr)
- CHEM 2302 - Organic Chemistry II (3.0 cr)

Wildlife

The wildlife specialization is for students who wish to pursue careers in wildlife science, management, and administration; zoology; terrestrial ecology; environmental assessment; and education. With proper selection of electives, students can meet the education criteria for the Certified Wildlife Biologist designation established by the Wildlife Society, the major professional organization for wildlife scientists and managers in North America.

Required Courses

Human Dimensions

Take 2 or more course(s) from the following:

- ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
- ESPM 3020W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
- ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
- ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENVT (3.0 cr)
Food Science B.S.

Food Science and Nutrition

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Degree: Bachelor of Science.

Food science applies chemistry, microbiology, and engineering to the science and technology of making foods. Chemistry — because foods undergo chemical reactions when they are heated, frozen, mixed with each other, and stored. Microbiology — because many foods are made by microorganisms (e.g., bread, cheese, yogurt, sauerkraut, tempeh) and because microorganisms cause extensive, rapid, and often dangerous spoilage. Physics and engineering — because foods must be constructed, moved through the factory, made safe, and distributed intact to the consumer.

Food science involves creating new food products and making current products more stable, nutritious, convenient, reliable, and safe.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Calculus

Take one of the following course pairs:

MATH 1271 - Calculus I, MATH (4.0 cr)
MATH 1272 - Calculus II (4.0 cr)
or
MATH 1571H - Honors Calculus I, MATH, H (4.0 cr)
MATH 1572H - Honors Calculus II, H (4.0 cr)

Biology and Chemistry

CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)
CHEM 2301 - Organic Chemistry I (3.0 cr)
CHEM 2302 - Organic Chemistry II (3.0 cr)
MICB 3301 - Biology of Microorganisms (5.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
or PSTL 1131 - Principles of Biological Science, BIOL SCI/L (4.0 cr)
BIOC 4025 - Laboratory in Biochemistry (2.0 cr)
or
CHEM 2111 - Introductory Analytical Chemistry (2.0 cr)
or
CHEM 2311 - Organic Lab (4.0 cr)
or
FSCN 4613 - Experimental Nutrition (2.0 cr)
BIOC 3021 - Biochemistry (3.0 cr)
or take the following course pair:
BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
Food Science Minor

**Food Science and Nutrition**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 20.

See major description for more information.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

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**Program Requirements**

**Required Courses**

**Minor Courses**

Note: Many of the courses listed in the minor have prerequisites that do not count toward the 20 credits

**Take 20 or more credit(s) from the following:**

- BAE 4744 - Engineering Principles for Biological Scientists (4.0 cr)
- FSCN 1102 - Food: Safety, Risks, and Technology, C/PE (3.0 cr)
- FSCN 3102 - Introduction to Food Science (3.0 cr)
- FSCN 4121 - Food Microbiology and Fermentations (3.0 cr)
- FSCN 4111 - Food Chemistry (3.0 cr)
- FSCN 4122 - Laboratory Methods in Food Microbiology and Fermentations (2.0 cr)
- FSCN 4131 - Food Quality (3.0 cr)
- FSCN 4312W - Food Analysis, WI (4.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)

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**Food Systems and the Environment Minor**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 15.

This interdisciplinary minor, based in CFANS, serves students from other colleges who have an interest in and a desire to acquire some breadth about food systems and the environment. Students completing this minor will be better prepared to understand the complexity of modern global food systems; understand the interdependence of rural and urban societies; understand the environmental impact of consumer driven food systems choices; manage natural resources used for food and fiber for the benefit of society; make more responsible personal and public decisions impacting food systems and the environment.

**Admission Requirements**

This minor is limited to non-CFANS majors. Interested students should contact the minor adviser at 612-625-7254 or the CFANS Student Services Office at 612-625-7254.

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**Program Requirements**

**Required Courses**

**Minor Courses**

Students may only choose one course from each designator, in consultation with the minor adviser.

**Take 15 or more credit(s) from the following:**

- CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
- CFAN 3001 - Pests and Crop Protection (3.0 cr)
- CFAN 3500 - International Field Studies Seminar (3.0 cr)
- AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
- ANSC 1011 - Domestic Animals and Society, C/PE, ENVT (3.0 cr)
- ANSC 1101 - Introductory Animal Science (4.0 cr)
- APEC 3611 - Environmental and Natural Resource Economics, ENVT (3.0 cr)
- BAE 5203 - Environmental Impacts of Food Production (3.0 cr)
- ENT 4015 - Ornamentals and Turf Entomology (3.0 cr)
- ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
- FSCN 1102 - Food: Safety, Risks, and Technology, C/PE (3.0 cr)
Forest Resources B.S.

**Forest Resources**

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 120.

This program requires summer terms.

Degree: Bachelor of Science.

The forest resources curriculum prepares students to plan, implement, and research the management, protection, and sustainable use of forest and related resources, including timber, water, wildlife, recreation, and aesthetic resources. Students select between two tracks: forest management and planning and forest conservation and ecosystem management. Students taking the forest management and planning track receive training in principles and techniques of resource management. Students taking the forest conservation and ecosystem management track focus on conservation issues and strategies and on a broader understanding of ecosystem structure and function. Students should choose one of these tracks as early as possible in their college careers. A minor is also available.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**General Requirements**

Recommended freshman writing course(s) for this program: RHET 1101

**Program Requirements**

All required courses must be taken A-F, and students must earn a grade of at least a C-.

**Required Courses**

**Communication Skills**

COMM 1101 - Introduction to Public Speaking (3.0 cr)
or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

**Mathematical Thinking**

ESPM 3012 - Quantitative Methods for Environmental Scientists and Managers I (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)
or ESPM 1145 - Quantitative Methods for Environmental Scientists and Managers I (4.0 cr)

**Physical and Biological Sciences**

BIOL 2022 - General Botany (3.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SC/L, ENVT (4.0 cr)
or BIOL 1009 - General Biology, BIOL SC/L (4.0 cr)
PHYS 1001W - Energy and the Environment, ENVT, PHYS SC/L, WI (4.0 cr)
or “B” or better in high school physics
SOIL 1125 - The Soil Resource, ENVT, PHYS SC/L (4.0 cr)
or SOIL 1125 - Basic Soil Science, ENVT (4.0 cr)

**Social Sciences**

ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)

**Professional Courses**

FW 2001 is recommended for sophomores and FW 5603W is recommended for juniors or seniors. Field training in assessment and biology of forests courses are taught at the Cloquet Forestry Center during the summer.

FR 1001 - Orientation and Information Systems (1.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FR 3218 - Measuring & Modeling Forests (3.0 cr)
FR 3262 - Remote Sensing of Natural Resources and Environment (4.0 cr)
FR 3471 - Forest Planning and Management (3.0 cr)
RM 4232W - Managing Recreational Lands, ENVT, WI (4.0 cr)
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
FR 3104 - Forest Ecology (4.0 cr)
FR 3114 - Hydrology and Watershed Management (3.0 cr)
FR 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
FR 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
FW 2001 - Introduction to Fisheries, Wildlife, and Conservation Biology, ENVT (3.0 cr)
or FW 5603W - Habits and Regulation of Wildlife, ENVT, WI (3.0 cr)
ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)

**Cloquet Program**

*Take all of the following in the same summer term:*

FW 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

**Forest Conservation/Ecosystem Management**

This track is for students who wish to learn the fundamentals of forest resources management while gaining knowledge of conservation issues and strategies and in the structure and function of ecosystems. Graduates might pursue careers as forest managers and conservationists or seek careers in research, teaching, and technical support for forest and related resource management and conservation.

All required courses in this track must be taken A-F and completed with a grade of at least C-.

**Required Courses**

**Physical and Biological Sciences**

CHEM 1021 - Chemical Principles I, ENVT, PHYS SC/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENVT, PHYS SC/L (4.0 cr)
Forest Conservation and Management

Students select, with faculty adviser approval, a minimum of 12 additional credits in professional courses chosen from the list below. Courses used to satisfy other requirements may not be used to fill this 12-credit requirement.

Take 12 or more credit(s) from the following:
- ESPM 2041 - Natural Resources Consumption and Sustainability, ENVT, IP (3.0 cr)
- ESPM 3002 - Colloquium: Exotic Plants and Animals (1.0 cr)
- ESPM 3101 - Conservation of Plant Biodiversity, ENVT (3.0 cr)
- ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
- ESPM 3031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
- ESPM 3251 - Natural Resources in Sustainable International Development, ENVT, IP (3.0 cr)
- ESPM 3703 - Agroforestry in Watershed Management (3.0 cr)
- ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
- ENT 5241 - Ecological Risk Assessment (3.0 cr)
- ESPM 5555 - Wetland Soils (3.0 cr)
- FR 3203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FR 3204 - Landscape Ecology and Management (3.0 cr)
- FR 3431 - Timber Harvesting and Road Planning (2.0 cr)
- FR 3612 - Silviculture and Timber Harvesting Practices in Minnesota (1.0 cr)
- FR 4118 - Trees: Structure and Function (3.0 cr)
- FR 5142 - Tropical Forest Ecology, ENVT (3.0 cr)
- FR 5153 - Forest and Wetland Hydrology (3.0 cr)
- FR 5228 - Advanced Assessment and Modeling (3.0 cr)
- FR 5264 - Advanced Forest Management Planning (3.0 cr)
- FR 5611 - Field Silviculture (2.0 cr)
- FR 5615 - Field Remote Sensing and Resource Survey (2.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENVT (3.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife, ENVT, WI (3.0 cr)
- FW 5604W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)
- GEO 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
- HORT 5071 - Restoration and Reclamation Ecology, ENVT (3.0 cr)
- LA 3501 - Environmental Design and Its Biological and Physical Context, ENVT (3.0 cr)
- SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
- BIOL 3407 - Ecology, ENVT (3.0 cr)
or EEB 4014 - Ecology of Vegetation (3.0 cr)
or EEB 4609W - Ecosystem Ecology, WI (3.0 cr)
- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)
- ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
or ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)

Electives
Choose electives from courses listed above, or consult with your adviser about other options to reach the required 120 credits.

Forest Management and Planning

This track is for students who wish to become directly involved in forest land management or find positions in specialized areas such as resource analysis and planning, timber harvesting, forest protection, or policy development. Graduates may also pursue graduate study to become researchers and teachers or seek advanced positions in administering and managing forest and related natural resources.

All required courses in this track must be taken A-F and completed with a grade of at least C-.

Required Courses

Physical and Biological Sciences

Take one of the following pairs of courses:
- BIOL 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
- CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or
- CHEM 1021 - Chemical Principles I, ENVT, PHYS SCI/L (4.0 cr)
- CHEM 1022 - Chemical Principles II, ENVT, PHYS SCI/L (4.0 cr)

Preparatory Courses

- BP 1002 - Wood and Fiber Science (3.0 cr)
- FR 3431 - Timber Harvesting and Road Planning (2.0 cr)
- FR 3612 - Silviculture and Timber Harvesting Practices in Minnesota (1.0 cr)

Advanced Training in Assessment and Management of Forests

These courses are taught at the Cloquet Forestry Center during May session.
- FR 5611 - Field Silviculture (2.0 cr)
- FR 5615 - Field Remote Sensing and Resource Survey (2.0 cr)
- FR 5621 - Field Timber Harvesting and Road Planning (2.0 cr)

Additional Professional Courses

With faculty adviser approval, students select additional professional courses from the list below. Courses used to satisfy other requirements may not be used to fill the 6-credit professional requirement.

Take 6 or more credit(s) from the following:
- ESPM 3031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
- ESPM 3251 - Natural Resources in Sustainable International Development, ENVT, IP (3.0 cr)
- ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (3.0 cr)
- FR 3203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FR 3204 - Landscape Ecology and Management (3.0 cr)
- FR 5611 - Field Silviculture (2.0 cr)
- FR 5615 - Field Remote Sensing and Resource Survey (2.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENVT (3.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife, ENVT, WI (3.0 cr)
- FW 5604W - Fisheries Ecology and Management, ENVT, WI (3.0 cr)
- GEO 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
- HORT 5071 - Restoration and Reclamation Ecology, ENVT (3.0 cr)
- LA 3501 - Environmental Design and Its Biological and Physical Context, ENVT (3.0 cr)
- SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
- BIOL 3407 - Ecology, ENVT (3.0 cr)
or EEB 4014 - Ecology of Vegetation (3.0 cr)
or EEB 4609W - Ecosystem Ecology, WI (3.0 cr)
- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)
- ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
or ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)

Forest Resources Minor

Forest Resources

Requirements for this program are current for Fall 2006.

Required credits in this minor: 18.

The forest resources minor helps students in natural resources and other areas gain deeper understanding of the scientific foundations of forestry, the management of forest resources, and the importance of forest resources to society. Students select from an array of courses in forest assessment, forest biology and management, and forest economics and policy.
may include a three-week hands-on field session at the Cloquet Forestry Center as part of their minor. Students interested in the minor should contact the CFANS Student Services Office.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements
The sequence of courses in the Cloquet Forestry Center may be used to either meet the minor courses requirement or as an elective, but they cannot be used to satisfy both requirements.

Required Courses
Minor Courses
FR 3104 - Forest Ecology (4.0 cr)
FR 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
Take one of the following field experiences:
FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
or
Cloquet Program
Take all of the following in the same term:
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

Electives
Take 7 or more credit(s) from the following:
Forest Policy, Management, and Planning
Take 3 or more credit(s) from the following:
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
FR 3471 - Forest Planning and Management (3.0 cr)
FR 4501 - Urban Forest Management: Managing Greenspaces for People, C/PE (3.0 cr)
RRM 4232W - Managing Recreational Lands, ENVT, WI (4.0 cr)

Resource Assessment
Take 0 or more credit(s) from the following:
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FR 3218 - Measuring & Modeling Forests (3.0 cr)
FR 3262 - Remote Sensing of Natural Resources and Environment (4.0 cr)

Management of Vegetation, Wildlife, Water and Soil Resources
Take 0 or more credit(s) from the following:
ESPM 3703 - Agroforestry in Watershed Management (3.0 cr)
ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
FR 3501 - Arboriculture: Selection and Maintenance of Trees (3.0 cr)
FR 3431 - Timber Harvesting and Road Planning (2.0 cr)
FR 5142 - Tropical Forest Ecology, ENVT (3.0 cr)
FR 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)

Cloquet Program
Take all of the following in the same term:
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

Integrated Pest Management in Cropping Systems Minor
Agronomy and Plant Genetics
Requirements for this program are current for Fall 2006.
Required credits in this minor: 20.
Students selecting this interdisciplinary minor learn how the environment and cropping systems interact with the biology of the major agronomic or horticultural crop pests. Students also learn to select and apply efficient, environmentally sound pest management procedures. Courses come from agronomy and plant genetics; entomology; horticultural science; plant pathology; and soil, water, and climate.
The minor provides sufficient knowledge and skills for employment in agricultural crop protection, product development and sales, crop management consultation, pest regulation, research, or application of agricultural crop protection materials. To complete the minor, students must complete at least 20 credits.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements
Required Courses
Minor Courses
AGRO 2501 - Plant Identification for Urban and Rural Landscapes (2.0 cr)
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
ENT 3005 - Insect Biology (3.0 cr)
PLPA 3002 - Air Pollution, People, and Plants: The Science and the Ethics, C/PE, ENVT (3.0 cr)
AGRO 4005 - Applied Crop Physiology and Development (4.0 cr)
or BIOL 3002 - Plant Biology: Function (2.0 cr)
and HORT 3005 - Environmental Effects on Horticultural Crops (2.0 cr)

Management
AGRO 4605 - Management Strategies for Crop Production (4.0 cr)
or ENT 5211 - Insect Pest Management (3.0 cr)
or HORT 4061W - Turfgrass Management, WI (3.0 cr)
or HORT 5032 - Sustainable Commercial Vegetable Production Systems (3.0 cr)
or HORT 5041W - Nursery Management, WI (4.0 cr)
or PLPA 5204 - Plant Disease Management (3.0 cr)

Applied Courses
AGRO 4603 - Field Crop Scouting and Problem Diagnosis (3.0 cr)
or AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
or ES 3612W - Soil and Environmental Biology, WI (3.0 cr)
or PLPA 5202 - Field Plant Pathology (2.0 cr)

International Agriculture Minor
Requirements for this program are current for Fall 2006.
Required credits in this minor: 18.
Due to the international nature of food and agricultural systems, and the interdependence of environmental systems, CFANS students are strongly encouraged to incorporate an international experience during their academic degree program. Students with a particular interest in international agriculture can minor in international agriculture and choose between a self-contained block of courses or a series of courses integrated into the
degree program. The minor is structured to include a general overview of international agriculture, followed by area, culture, or language studies; expanded coursework in agriculture; and an international experience. Students are required to travel outside the United States for a minimum two-week academic experience.

The program for a minor in international agriculture must be developed in coordination with International Programs in the college. Students must complete 18 credits with a minimum GPA of 2.00.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**Program Requirements**

**International Opportunities**

The University of Minnesota is partnering with universities in Austria, Germany, and Italy to provide semester study abroad opportunities comparing U.S. and the European Union’s biotechnology, food safety, and regulatory policies. The US-EU FIPSE Program offers courses taught in English, as well as the chosen country’s language. Courses include agricultural economics, tropical agriculture, organic food chain management, and environmental and agricultural food production. German or Italian language studies are required for participants. Admitted students will receive financial support for language classes and a semester of study at one of the EU partner universities.

The Minnesota Studies in International Development program to Ecuador, Ghana, India, Kenya or Senegal offers courses in language training, grassroots development, area studies, and an internship.

Additional international practical or internship experiences may qualify for the minor. Arrangements can be made through MAST International or the CFANS Career Services office.

Travel grants for overseas experience are available through the Academic Enrichment Program. Students are also eligible for scholarships through the Learning Abroad Center.

**Required Courses for the Program**

**Minor Courses**

- CFA3 5000 - International Field Studies Seminar (3.0 cr)
- Take 6 credits 3xxx or 4xxx area culture or language studies
- Take 2 - 4 credit(s) from the following:
  - CFA3 3000 - Directed Studies in International Agriculture (2.0-4.0 cr)
- Take 7 or more credit(s) from the following:
  - ATEE 5331 - History, Philosophy, and Systems of Extension (3.0 cr)
  - ATEE 5361 - World Development Problems (3.0 cr)
  - AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
  - APEC 3007 - Applied Macroeconomics: Policy, Trade, and Development, IP (3.0 cr)
  - APEC 3071 - Agriculture and Economic Growth in Developing Countries (3.0 cr)
  - APEC 5751 - Global Trade and Policy, IP (3.0 cr)
  - FSCN 3615 - Sociocultural Aspects of Food, Nutrition, and Health, CD, SSCI (3.0 cr)
  - PLPA 3001 - Plant Disease Biology and Management (1.0 cr)
  - PLPA 3002 - Air Pollution, People, and Plants: The Science and the Ethics, C/PE, ENVT (3.0 cr)
  - RHET 3384 - From Soil to Civilization: Agriculture and the Emergence of the Modern World, IP, SSCI (3.0 cr)
  - RHET 3376W - Terrorism, C/PE, IP, WI (3.0 cr)
  - AGRO 4103 - World Food Problems, C/PE, IP (3.0 cr)
  - RHET 4196 - Internship in Scientific and Technical Communication (3.0-6.0 cr)
- Outside Electives
  - Take 6 credits of approved coursework outside the Department of Rhetoric, which complement the minor.

**Internet, Science and Society Minor**

**Rhetoric**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 18.

This minor introduces students to the field of Internet studies and allows them to select from elective courses that focus on an area of interest. Areas of study might include legal or social issues, such as intellectual property on the Internet or ways in which gender stereotypes are both reinforced and modified online; how scientific and technical information is conveyed on the Internet and how the Internet is playing an important role in our ability to share cutting-edge information; or how controversies, such as current debates over genetically modified foods, are played out in cyberspace.

Several courses in the minor include guest speakers from the affiliated faculty of the Internet Studies Center. Students have the opportunity to publish their work on the Internet Studies Center Web site and to attend guest lectures by internationally known Internet studies scholars.

Students should work with the minor adviser in Rhetoric. Students must complete at least 18 credits for the minor.

**Admission Requirements**

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

**Program Requirements**

**Required Courses**

**Minor Courses**

- RHET 3371 - Technology, Self, and Society, C/PE, HP (3.0 cr)
- RHET 3401 - Internet Communication: Tools and Issues (3.0 cr)
- RHET 3577W - Rhetoric, Technology, and the Internet, C/PE, WI (3.0 cr)

**Electives**

- Take 3 or more credit(s) from the following:
  - RHET 3108 - Gender and Ethnicity and the Rhetoric of Science and Technology, CD (3.0 cr)
  - RHET 3291 - Independent Study (1.0-3.0 cr)
  - RHET 4105W - Corporate Video for Technical Communicators, WI (4.0 cr)
  - RHET 4196 - Internship in Scientific and Technical Communication (3.0-6.0 cr)

**Outside Electives**

- Take 6 credits of approved coursework outside the Department of Rhetoric, which complement the minor.

**Land, Nature and Environmental Values Minor**

**Rhetoric**

Requirements for this program are current for Fall 2006.

Required credits in this minor: 18.

This multidisciplinary minor based in the humanities complements professional and scientific degree programs in CFANS and serves students from other colleges who have an interest in cultural issues relating to the environment. Students are introduced to the historical development, philosophical assumptions, and imaginative expression of the human
relationship to nature and are asked to consider implications of issues involving our use of nature. Students write a senior integrative paper relating some aspect of their major field to social, cultural, or historical trends in the larger society.

For assistance in planning a minor in land, nature, and environmental values, see the humanities course coordinator in the Department of Rhetoric. Students must complete at least 18 credits to complete the minor.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu/. American Dietetic Association requirements.

Students who plan to become registered dietitians must meet the following:

- High school work and leadership skills. Graduates take positions in various food-related fields, including nutrition, industry, and community programs. Graduates with a cumulative GPA of 3.00, strong work experience in nutrition, demonstrated leadership skills, and are highly recommended, may apply for a postbaccalaureate dietetic internship.

Nutrition and Dietetics
The nutrition and dietetics option (the Didactic Program in Dietetics) offers preparation in the basic sciences and liberal education, food science, and a focus on human needs related to nutrition. Students identify several areas of interest and develop a varied portfolio of competence. Work experience in nutrition, electives, and extracurricular activities develop communication and leadership skills. Graduates take positions in various food-related fields, including nutrition, industry, and community programs. Graduates with a cumulative GPA of 3.00, strong work experience in nutrition, demonstrated leadership skills, and are highly recommended, may apply for a postbaccalaureate dietetic internship.

Students who plan to become registered dietitians must meet the American Dietetic Association requirements.

Nutrition B.S.

Food Science and Nutrition
Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.
Required credits within the major: 89 to 111.
Degree: Bachelor of Science.

The nutrition major explores how nutrients and the foods from which they are derived aid the body in health, growth, and development. With major national and international concern for how food and nutrition affect health and disease, registered dietitians and nutritionists have many career opportunities. Students choose one of two options: nutrition and dietetics or nutrition science.

Students expecting to apply for an internship or graduate school should maintain a GPA of at least 2.80. A cumulative GPA of at least 3.00 is highly recommended, and is required for admission in the case of some graduate schools.

The Didactic Program in Dietetics (nutrition and dietetics option) is currently granted initial accreditation and the Coordinated Program in Dietetics is currently granted accreditation status by the Commission on Accreditation for Dietetics Education of the American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995 (312-899-5400).

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements
Recommended freshman writing course(s) for this program:
RHET 1101

Program Requirements
All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Foundation Courses

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<td>CHEM 1021</td>
<td>Chemical Principles I</td>
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<td>CHEM 1022</td>
<td>Chemical Principles II</td>
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<td>CHEM 2301</td>
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<td>COMM 1101</td>
<td>Introduction to Public Speaking</td>
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<td>FSCN 1102</td>
<td>Food: Safety, Risks, and Technology</td>
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<td>FSCN 1112</td>
<td>Principles of Nutrition</td>
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<td>Introduction to Food Science</td>
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<td>Principles of Biological Science</td>
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Major Courses

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<td>CHEM 1021</td>
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<td>CHEM 2401</td>
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<tr>
<td>BIOL 3201W</td>
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</table>

Program Sub-plans

Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Nutrition and Dietetics

The nutrition and dietetics option (the Didactic Program in Dietetics) offers preparation in the basic sciences and liberal education, food science, and a focus on human needs related to nutrition. Students identify several areas of interest and develop a varied portfolio of competence. Work experience in nutrition, electives, and extracurricular activities develop communication and leadership skills. Graduates take positions in various food-related fields, including nutrition, industry, and community programs. Graduates with a cumulative GPA of 3.00, strong work experience in nutrition, demonstrated leadership skills, and are highly recommended, may apply for a postbaccalaureate dietetic internship.

Students who plan to become registered dietitians must meet the American Dietetic Association requirements.
Required Courses
Nutrition Courses
FSCN 3614 - Nutrition Education and Counseling (3.0 cr)
FSCN 3615 - Sociocultural Aspects of Food, Nutrition, and Health, CD, SSCI (3.0 cr)
FSCN 3731 - Food Service Operations Management Laboratory (2.0 cr)
FSCN 3732 - Food Service Operations Management (3.0 cr)
FSCN 4614 - Community Nutrition, CD (3.0 cr)
FSCN 4665 - Medical Nutrition Therapy I (3.0 cr)
FSCN 4666 - Medical Nutrition Therapy II (3.0 cr)
FSCN 4732 - Food and Nutrition Management, C/PE (3.0 cr)
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)

Electives
Select one course from the following:
FSCN 4111 - Food Chemistry (3.0 cr)
or
FSCN 4121 - Food Microbiology and Fermentations (3.0 cr)

Nutrition Science
The nutrition science option is for students planning to do graduate work in nutrition, related sciences, or professional programs such as medicine or dentistry.

Required Courses
Nutrition Science Courses
CHEM 2302 - Organic Chemistry II (3.0 cr)
CHEM 2311 - Organic Lab (4.0 cr)
NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
NUTR 5623W - Regulation of Energy Balance, WI (2.0 cr)
PHYS 1201W - Introductory Physics for Biology and Pre-medicine I, PHYS SCI/L, WI (5.0 cr)
PHYS 1202W - Introductory Physics for Biology and Pre-medicine II, PHYS SCI/L, WI (5.0 cr)
PHYS 1202W - Introductory Physics for Biology and Pre-medicine II, PHYS SCI/L, WI (5.0 cr)
PHYS 1202W - Introductory Physics for Biology and Pre-medicine II, PHYS SCI/L, WI (5.0 cr)
FSCN 4111 - Food Chemistry (3.0 cr)
or
an advanced chemistry course may be approved to fulfill this requirement
BIOL 4003 - Genetics (3.0 cr)
or
CHEM 3022 - Genetics (3.0 cr)
MATH 1142 - Short Calculus, MATH (4.0 cr)
or
MATH 1271 - Calculus I, MATH (4.0 cr)
ant
MATH 1272 - Calculus II (4.0 cr)
STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
or
STAT 3021 - Introduction to Probability and Statistics (3.0 cr)
or
STAT 5021 - Statistical Analysis (4.0 cr)

Nutrition Minor

Food Science and Nutrition
Requirements for this program are current for Fall 2006.
Required credits in this minor: 14 to 16.
See major description for more information.

Admission Requirements
Students must complete 4 courses before admission to the program.
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Recreation Resource Management B.S.
Forest Resources
Requirements for this program are current for Fall 2006.
Required credits to graduate with this degree: 120.
Required credits within the major: 120.
This program requires summer terms.
Degree: Bachelor of Science.
The recreation resource management curriculum prepares students to plan and manage natural and non-urban recreational land and water, as well as manage the people and organizations that depend on these important resources. The curriculum emphasizes natural and managed non-urban areas; natural resources-oriented recreation programs in public and private sectors; social science aspects of natural resources use; and skills in communication, planning, and management. Students select between two tracks: recreation resource management and resource based tourism. Students taking the recreation resource management track receive training in principles and techniques of resource management; students taking the resource based tourism track receive training in organizational and visitor management, policy, and administration.
Graduates may become directly involved in recreation resource management and play specialized supporting roles in areas such as planning and public relations. Some find employment in fields such as environmental education and interpretation. Students pursuing graduate study may develop careers in teaching or research or seek advanced positions in recreation resource management and administration.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements
Recommended freshman writing course(s) for this program:
RHET 1101
Program Requirements
All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Communication Skills
COMM 1101 - Introduction to Public Speaking (3.0 cr)
or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

Mathematical Thinking
MATH 1031 - College Algebra and Probability, MATH (3.0 cr)
or MATH 1051 - Precalculus I (3.0 cr)
or ESPM 1145 - Quantitative Methods for Environmental Scientists and Managers I (4.0 cr)
SOC 3811 - Basic Social Statistics, MATH (4.0 cr)
or STAT 3011 - Introduction to Statistical Analysis, MATH (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or ESPM 3012 - Quantitative Methods for Environmental Scientists and Managers II (4.0 cr)

Social Sciences
ESPM 3261W - Economics and Natural Resources Management, ENVT, SSCI, WI (4.0 cr)
PSY 1001 - Introduction to Psychology, SSCI (4.0 cr)
or SOC 1001 - Introduction to Sociology, CD, SSCI (4.0 cr)
PSY 3201 - Introduction to Social Psychology (4.0 cr)
or SOC 3411W - Organizations and Society, WI (3.0 cr)
or SOC 3711 - Principles of Social Organization (3.0 cr)
or SOC 3721 - Principles of Social Psychology (3.0 cr)

Professional Orientation
RRM 1001 - Orientation and Information Systems (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. (Note: The honors sub-plan does not meet this requirement.) Honors students are required to complete one sub-plan plus the honors sub-plan.

Recreation Resource Management
This track is for students who wish to develop careers in planning or managing the use of recreational land and water, and for students who plan to pursue graduate study. Graduates may become directly involved in recreation resource management and play specialized supporting roles in areas such as planning and public relations. Graduates may also pursue graduate study to facilitate career advancement or develop a foundation for research and teaching in this area.

Required Courses

Physical and Biological Sciences
BIOL 2022 - General Botany (3.0 cr)
GEO 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
or CHEM 1101 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
SOIL 1125 - The Soil Resource, ENVT, PHYS SCI/L (4.0 cr)
or SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)

Professional Courses
ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
FR 3131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
or FR 3411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
BIOL 3407 - Ecology, ENVT (3.0 cr)
or EEB 3001 - Ecology and Society, ENVT (3.0 cr)
or FR 3104 - Forest Ecology (4.0 cr)
ESPM 4061W - Water Quality and Natural Resources, ENVT, WI (4.0 cr)
or FR 3114 - Hydrology and Watershed Management (3.0 cr)
ESPM 3101 - Conservation of Plant Biodiversity, ENVT (3.0 cr)
or FW 2001 - Introduction to Fisheries, Wildlife, and Conservation Biology, ENVT (3.0 cr)
ESPM 3245 - Sustainable Land Use Planning and Policy, ENVT (3.0 cr)
ESPM 4195W - Problem Solving and Planning in Natural Resources, WI (4.0 cr)
RRM 4232W - Managing Recreational Lands, ENVT, WI (4.0 cr)
RRM 5259 - Visitor Behavior Analysis (3.0 cr)
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENVT, WI (3.0 cr)
or ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
or APEC 4311 - Tourism Development: Principles, Processes, Policies (3.0 cr)
or RRM 3201 - Introduction to Travel and Tourism (3.0 cr)

Additional Professional Courses
Take 9-10 credits, choosing one course from each of the three groups. RRM 3201 may be used only if it was not used to fulfill another requirement.

Social and Managerial Sciences
ANTH 3041 - Ecological Anthropology, C/PE, ENVT (3.0 cr)
or APEC 5321 - Regional Economic Analysis (3.0 cr)
or ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
or GEOG 3361W - Land Use, Landscapes, and the Law, C/PE, ENVT, WI (3.0 cr)

Recreation Programming and Management Services
ESPM 4811 - Environmental Interpretation (3.0 cr)
or REC 3551 - Administration and Finance of Leisure Services (4.0 cr)
or REC 5191 - Commercial Recreation and Tourism (3.0 cr)
or REC 5501 - Wilderness and Adventure Education (4.0 cr)
or REC 5311 - Programming Outdoor and Environmental Education (3.0 cr)
or REC 5801 - Legal Aspects of Sport and Recreation (4.0 cr)
or RRM 3201 - Introduction to Travel and Tourism (3.0 cr)

Management of Vegetation, Soil, and Water Resources
FR 3204 - Landscape Ecology and Management (3.0 cr)
or FR 3262 - Remote Sensing of Natural Resources and Environment (4.0 cr)
or GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
or HORT 5071 - Restoration and Reclamation Ecology, ENVT (3.0 cr)
or LA 3204 - Landscape Ecology and Management of Vegetation, Soil, and Water Resources (4.0 cr)
or LA 3501 - Environmental Design and Its Biological and Physical Context, ENVT (3.0 cr)
or

Cloquet Program
Take all of the following in the same term:
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)
Resource Based Tourism
This track is for students who wish to understand the fundamentals of resource management, but focus on managing the businesses and visitors who depend on these resources for recreation and revenue. Graduates are likely to pursue opportunities developing and managing resource based tourism operations, programs, and visitors in both domestic and international locations. Graduates may also pursue graduate study to facilitate career advancement or develop a foundation for research and teaching in this area.

Required Courses

Physical and Biological Sciences
Biol 2022 - General Botany (3.0 cr)
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
or CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
Biol 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
Geo 1001 - Earth and Its Environments, ENVT, PHYS SCI/L (4.0 cr)
or SOIL 1125 - The Soil Resource, ENV, PHYS SCI/L (4.0 cr)
or SOIL 2125 - Basic Soil Science, ENV (4.0 cr)

Professional Courses
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, C/PE, WI (3.0 cr)
ESPM 3245 - Sustainable Land Use Planning and Policy, ENV (3.0 cr)
REC 5191 - Commercial Recreation and Tourism (3.0 cr)
RRM 3101 - Nature and Heritage Based Tourism (3.0 cr)
RRM 3201 - Introduction to Travel and Tourism (3.0 cr)
RRM 4232W - Managing Recreational Lands, ENV, WI (4.0 cr)
BLAW 3058 - The Law of Contracts and Agency (4.0 cr)
or REC 5801 - Legal Aspects of Sport and Recreation (4.0 cr)
ESPM 4811 - Environmental Interpretation (3.0 cr)
or REC 5311 - Programming Outdoor and Environmental Education (3.0 cr)
MKTG 3010 - Marketing Research (4.0 cr)
or RRM 5259 - Visitor Behavior Analysis (3.0 cr)
ESPM 3251 - Natural Resources in Sustainable International Development, ENV, IP (3.0 cr)
Biol 3407 - Ecology, ENV (3.0 cr)
or EEB 3001 - Ecology and Society, ENV (3.0 cr)
or FR 3104 - Forest Ecology (4.0 cr)
MGMT 3001 - Fundamentals of Management (3.0 cr)
MKTG 3001 - Principles of Marketing (3.0 cr)

Additional Professional Courses
Area of Concentration Contract required. Course selections must be made in consultation with a faculty adviser and have faculty adviser signature.

Take 15 or more credit(s) from the following:
COMM 5451W - Intercultural Communication Processes, IP, WI (3.0 cr)
ESPM 3011W - Ethics and Leadership in Resource Management, C/PE, ENV, WI (3.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
FINA 3001 - Finance Fundamentals (3.0 cr)
FR 3204 - Forest Ecology (4.0 cr)
FW 2001 - Introduction to Fisheries, Wildlife, and Conservation Biology, ENV (3.0 cr)
FW 4104 - Hunting and Fishing Traditions: Field Sports Reflected in Arts, Literature, and Practice (3.0 cr)
FW 5003 - Human Dimensions of Biological Conservation, C/PE, ENV (3.0 cr)
GEOG 3379 - Environment and Development in the Third World, ENV, IP (3.0 cr)
GEOG 3361W - Land Use, Landscapes, and the Law, C/PE, ENV, WI (3.0 cr)
JOUR 3201 - Principles of Strategic Communication: Advertising (3.0 cr)
LA 3501 - Environmental Design and Its Biological and Physical Context, ENV (3.0 cr)
MGMT 4008 - Entrepreneurial Management (4.0 cr)
MKTG 4030 - Selling and Sales Management (4.0 cr)
MKTG 4040 - Buyer Behavior (4.0 cr)
MKTG 4050 - Integrated Marketing Communications (4.0 cr)
MKTG 4060 - Marketing and Distribution Channels (4.0 cr)
MKTG 4070 - International Marketing (2.0 cr)
MST 5011 - Museum History and Philosophy (3.0 cr)
MST 5012 - Museum Practices (3.0 cr)
PA 5531 - Strategies for Sustainable Development: Theory and Practice (2.0 cr)
REC 5301 - Wilderness and Adventure Education (4.0 cr)
SOCI 4305 - Society and the Environment: A Growing Conflict, C/PE, ENV (3.0 cr)

Recreation Resource Management Minor

Forest Resources

Requirements for this program are current for Fall 2006.
Required credits in this minor: 19 to 20.
Students may pursue a recreation resource management (RRM) minor in either one of two tracks: the resource based tourism (RBT) track or the standard RRM track. Students must complete the minor core courses and then choose either the RBT track or the RRM track.

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.umn.edu.

Program Requirements

Required Courses

Minor Courses
ESPM 3245 - Sustainable Land Use Planning and Policy, ENV (3.0 cr)
RRM 4232W - Managing Recreational Lands, ENV, WI (4.0 cr)
RRM 5259 - Visitor Behavior Analysis (3.0 cr)

Recreation Resource Management Options
Students are required to complete one of the following course groups.

Recreation Resource Management
Take 3 or more course(s) from the following:
ESPM 3202W - Environmental Conflict Management, Leadership, and Planning, ENVT (3.0 cr)
ESPM 3245 - Sustainable Land Use Planning and Policy, ENV (3.0 cr)
ESPM 3241W - Natural Resource and Environmental Policy: History, Creation, and Implementation, C/PE, SSCI, WI (3.0 cr)
FR 3104 - Forest Ecology (4.0 cr)
ESPM 4811 - Environmental Interpretation (3.0 cr)
or REC 5311 - Programming Outdoor and Environmental Education (3.0 cr)

Resource Based Tourism

RE 5191 - Commercial Recreation and Tourism (3.0 cr)
RRM 3101 - Nature and Heritage Based Tourism (3.0 cr)
APEC 4311 - Tourism Development: Principles, Processes, Policies (3.0 cr)
or RRM 3201 - Introduction to Travel and Tourism (3.0 cr)
Scientific and Technical Communication B.S.

Rhetoric

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 46.

Degree: Bachelor of Science.

Scientific and technical communicators apply modern techniques and technologies to the distribution of knowledge in industry, business, education, and government. They write and design information for audiences ranging from scientists to management to consumers of technical products and services. To accomplish their objectives, scientific and technical communicators apply principles of audience analysis, writing and editing, oral communication, usability and testing, visual communication, communication technology, and communication and research theory with an emphasis on science and technology. The program offers an interdisciplinary curriculum that combines theory and practice in a program flexible enough to allow students to plan a course of study appropriate to their career goals.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

All required courses must be taken A-F, (except for the internship, which is taken S-N) and students must earn a grade of at least a C-.

Equivalent transfer courses are accepted in all areas (except for required rhetoric courses). Students are strongly encouraged to pursue a minor in a technical or scientific field.

Required Courses

Foundation Courses

The grammar exemption test and RHET 3441 are waived for 2006-07.

RHET 1001 - Introduction to Scientific and Technical Communication (2.0 cr)
Pass grammar exemption test
or RHET 3441 - Essentials of Grammar, Punctuation, and Style (2.0 cr)

Written, Oral, and Visual Communication

RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)
RHET 3257 - Scientific and Technical Presentations (3.0 cr)
RHET 3266 - Group Process, Team Building, and Leadership, C/PE (3.0 cr)
RHET 3562W - Technical and Professional Writing, WI (4.0 cr)
RHET 3671 - Visual Rhetoric (3.0 cr)
RHET 3672 - Project Design and Development (3.0 cr)
RHET 4561 - Editing and Style for Technical Communicators (3.0 cr)

Theory and Research

RHET 3221W - Theories of Human Communication, C/PE, SSCL, WI (4.0 cr)
RHET 3701W - Rhetorical Theory and Scientific and Technical Communication, WI (4.0 cr)
RHET 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
or RHET 4258 - Information-Gathering Techniques in Scientific and Technical Communication (3.0 cr)

Science, Technology, and Society

Take 2 or more course(s) from the following:

RHET 3108 - Gender and Ethnicity and the Rhetoric of Science and Technology, CD (3.0 cr)
RHET 3302 - Science, Religion, and the Search for Human Nature, OH (3.0 cr)
RHET 3371 - Technology, Self, and Society, C/PE, HP (3.0 cr)
RHET 3383 - In Search of Nature, ENVT, OH (3.0 cr)

Internship

RHET 4196 - Internship in Scientific and Technical Communication (3.0 cr)

Electives

In addition to the courses listed below, students may also include courses they did not use to meet the Theory and Research and Science, Technology, and Society requirements.

Take 5 or more credit(s) from the following:

RHET 3270 - Special Topics (1.0-3.0 cr)
RHET 3291 - Independent Study (1.0-3.0 cr)
RHET 3361 - Literature of Social Movements in the United States: 1950 to 2000, C/PE, LIT (3.0 cr)
RHET 3376W - Terrorism, C/PE, IP, WI (3.0 cr)
RHET 3382W - War, C/PE, OH, WI (3.0 cr)
RHET 3401 - Internet Communication: Tools and Issues (3.0 cr)
RHET 3470 - Special Topics in Communication Skills (2.0 cr)
RHET 3577W - Rhetoric, Technology, and the Internet, C/PE, WI (3.0 cr)
RHET 4105W - Corporate Video for Technical Communicators, WI (4.0 cr)
RHET 4165 - Managerial and Organizational Communication, Planning, and Change (3.0 cr)
RHET 4562 - Theory and Practice in International Business Communication, IP (3.0 cr)
RHET 4573W - Writing Proposals and Grant Management (3.0 cr)
RHET 4662W - Emerging Technologies in Scientific and Technical Communication, WI (4.0 cr)

Soil Science Minor

Soil, Water, and Climate

Requirements for this program are current for Fall 2006.

Required credits in this minor: 20.

The minor provides a strong background in basic soil sciences, covering such topics as soil biology, conservation, contaminants, water movement, and land use. Students completing the minor meet the minimum requirements for employment with the Natural Resources Conservation Service as a soil conservationist. They are also prepared to take the Professional Soil Science Examination for geoscientists. Students must complete 20 credits for the minor.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses

Minor Courses

ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
ESPM 3612W - Soil and Environmental Biology, WI (3.0 cr)
ESPM 4601 - Soils and Pollution (3.0 cr)
SOIL 3416 - Plant Nutrients in the Environment (3.0 cr)
SOIL 4511 - Field Study of Soils (2.0 cr)
SOIL 1125 - The Soil Resource, ENVT, PHYS SCI/L (4.0 cr)
or SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)
Sustainable Agriculture Minor

Requirements for this program are current for Fall 2006.

Required credits in this minor: 17.

This minor allows students to study the sustainability of agricultural food systems from an integrated perspective, including coursework, practical experience, and community reflection. Required courses and courses from the foundational clusters—land and public policy; agriculture, environment, and natural resources; and citizens, science, and society—define the students’ minor curriculum. In addition, each student works with a minor adviser to design an individualized practical experience in some aspect of sustainable agriculture (i.e., an internship, experiential learning opportunity, etc.). Through the student-led seminar series, What’s Up in Sustainable Agriculture (WUSA), and the senior capstone, students synthesize their learning about sustainability for local, national and global agricultural food systems. For this minor, students must complete 8-10 credits of required courses and a minimum of 9 credits of foundational coursework, for a total of at least 17 credits.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses

Minor Courses
AGRO 4660 should be taken concurrently with or after completion of the internship.
AGRO 4660 - Senior Capstone: Leadership, Decision Making, and Problem Solving (2.0 cr)
AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
AGRO 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, WI (3.0 cr)
or ANSC 3203W - Environment, Global Food Production, and the Citizen, C/PE, ENVT, W (3.0 cr)

Take 1 - 3 credit(s) from the following:
AEE 3096 - Experiential Learning: Production and Business (1.0-8.0 cr)
AGRO 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
ANSC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
APEC 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
ESPM 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
HORT 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
FSCN 4096 - Professional Experience Program: Internship (1.0-3.0 cr)
PLPA 4096 - Professional Experience Program: Internship (1.0-3.0 cr)

Foundation Course Clusters
Select one course from each of the following clusters. Other courses may be substituted with approval of the minor adviser and coordinator.

Take 9 or more credit(s) including 3 or more sub-requirement(s) from the following:

Electives
ESPM 4021W - Environmental Impact Statements, WI (3.0 cr)
or ESPM 4216 - Contaminant Hydrology (2.0 cr)
or ESPM 5555 - Wetland Soils (3.0 cr)
or SOIL 5515 - Soil Genesis and Landscape Relations (3.0 cr)

Land and Public Policy
APEC 3041W - Economic Development of U.S. Agriculture, HP, WI (3.0 cr)
or GEOG 3361W - Land Use, Landscapes, and the Law, C/PE, ENVT, WI (3.0 cr)
or PA 5002 - Introduction to Policy Analysis (1.5 cr)
or RHET 1315 - The Land in American Experience, CD, OH (3.0 cr)
or AGRO 4103 - World Food Problems, C/PE, IP (3.0 cr)
or APEC 4103 - World Food Problems, C/PE, IP (3.0 cr)
or FSCN 4103 - World Food Problems, C/PE, IP (3.0 cr)

Agriculture/Environment and Natural Resources
CFAN 3001 - Pests and Crop Protection (3.0 cr)
or AGRO 1103 - Crops, Environment, and Society, ENVT (4.0 cr)
or AGRO 5999 - Special Topics: Workshop in Agronomy (1.0-6.0 cr)
or ANSC 1101 - Introductory Animal Science (4.0 cr)
or ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENVT (3.0 cr)
or ESPM 3221 - Soil Conservation and Land-Use Management (3.0 cr)
or GEOG 3355 - Environmental Quality, C/PE, ENVT (3.0 cr)
or HORT 4072 - Growing Plants Organically: What It Means To Be Green (3.0 cr)
or SOIL 1125 - The Soil Resource, ENVT, PHYS SCI/L (4.0 cr)
or SOIL 2125 - Basic Soil Science, ENVT (4.0 cr)

Citizens/Science and Society
CFAN 1501 - Biotechnology, People, and the Environment, ENVT (3.0 cr)
or BAE 5212 - Safety and Environmental Health Issues in Plant and Animal Production and Processing, C/PE, ENVT, H (3.0 cr)
or GEOG 3371W - Cities, Citizens, and Communities, CD, SSCI, WI (4.0 cr)
or RHET 3371 - Technology, Self, and Society, C/PE, HP (3.0 cr)
or SOC 3451W - Cities and Social Change, SSCI, WI (3.0 cr)

Technical Communication Minor

Rhetoric

Requirements for this program are current for Fall 2006.

Required credits in this minor: 16.

The minor provides theoretical and practical information about how to communicate complex technical information to various audiences. Students take required courses in oral and written communication and in communication technologies. Additional courses (e.g., visual communication, project management, international communication) are selected to complement students’ career plans. For help in planning the minor, contact the major coordinator of the Scientific and Technical Communication Program in the Department of Rhetoric.

Students must complete at least 16 credits for the minor.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses for the Program

Minor Courses
Independent study and internship courses cannot be used to satisfy the RHET 3xxx-5xxx requirement.
RHET 3257 - Scientific and Technical Presentations (3.0 cr)
RHET 3562W - Technical and Professional Writing, WI (4.0 cr)
RHET 4561 - Editing and Style for Technical Communicators (3.0 cr)
Urban and Community Forestry B.S.

Forest Resources

Requirements for this program are current for Fall 2006.

Required credits to graduate with this degree: 120.

Required credits within the major: 120.

This program requires summer terms.

Degree: Bachelor of Science.

The urban and community forestry curriculum prepares students for careers in planning and managing vegetation and natural resources in or near urban communities, and for direct involvement in resource management or for specialized supporting roles in areas such as urban planning and environmental education.

Urban forests include areas along streets and in parks, private lands, greenbelts, and open spaces. Urban foresters help communities plan, design, or protect urban and peri-urban forests; supervise tree selection and planting; and design insect control/disease protection and plant health care programs.

Principle employers for graduates in urban and community forestry include city governments, private tree care and arboricultural consulting companies, state and federal forestry agencies, nurseries, and utility companies. Graduates may also be qualified for traditional forestry positions, including those in the federal government.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

General Requirements

Recommended freshman writing course(s) for this program: RHET 1101

Program Requirements

Students going into consulting or private business should choose courses in the forest health and cultural practices of urban forestry. Students interested in managing the urban landscape should concentrate on courses in the management and administration areas.

All required courses must be taken A-F, and students must earn a grade of at least a C-.

Required Courses

Communication Skills
COMM 1101 - Introduction to Public Speaking (3.0 cr)
or RHET 1223 - Oral Presentations in Professional Settings (3.0 cr)

Mathematical Thinking
ESPM 1145 - Quantitation Methods for Environmental Scientists and Managers I (4.0 cr)
or MATH 1142 - Short Calculus, MATH (4.0 cr)
or MATH 1271 - Calculus I, MATH (4.0 cr)

Take 2 or more course(s) from the following:
RHET 3xx
RHET 4xx
RHET 5xx

Take one of the following pairs of courses.
RHET 1101 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or CHEM 1011 - Introductory Chemistry, PHYS SCI/L (4.0 cr)

Physical and Biological Sciences

BIOL 2022 - General Botany (3.0 cr)
BIOL 1001 - Introductory Biology I: Evolutionary and Ecological Perspectives, BIOL SCI/L, ENVT (4.0 cr)
or BIOL 1009 - General Biology, BIOL SCI/L (4.0 cr)
SOIL 1125 - The Soil Resource, ENV, PHYS SCI/L (4.0 cr)
or SOIL 2125 - Basic Soil Science, ENV (4.0 cr)

Take one of the following pairs of courses.
BIOC 2011 - Biochemistry for the Agricultural and Health Sciences (3.0 cr)
CHEM 1011 - Introductory Chemistry: Lecture and Laboratory, PHYS SCI/L (4.0 cr)
or CHEM 1021 - Chemical Principles I, ENV, PHYS SCI/L (4.0 cr)
CHEM 1022 - Chemical Principles II, ENV, PHYS SCI/L (4.0 cr)

Professional Courses

ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
FR 1101 - Dendrology: Identifying Forest Trees and Shrubs (3.0 cr)
FR 3104 - Forest Ecology (4.0 cr)
FR 4501 - Urban Forest Management: Managing Greenspaces for People, C/PE (3.0 cr)
HORT 1015 - Woody and Herbaceous Plants (4.0 cr)
HORT 5041W - Nursery Management, WI (4.0 cr)

Take all of the following in the same summer term:
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

Cloquet Program

Take all of the following in the same summer term:
FR 2101 - Identifying Forest Plants (1.0 cr)
FR 2102 - Northern Forests: Field Ecology (2.0 cr)
FR 2104 - Measuring Forest Resources (1.0 cr)

Additional Professional Courses

Select courses from the list below in consultation with a faculty adviser.

Take 6 or more credit(s) from the following:
ANTH 3041 - Ecological Anthropology, C/PE, ENVT (3.0 cr)
BP 1002 - Wood and Fiber Science (3.0 cr)
ESPM 3021 - Ecological Vegetation Management: a Consulting Approach, ENV (3.0 cr)
ESPM 3031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
Urban and Community Forestry Minor

Forest Resources

Requirements for this program are current for Fall 2006.

Required credits in this minor: 16.

The urban and community forestry minor (16 credits) enables students in programs such as education, landscape architecture, horticultural sciences, natural resources, and related areas to understand the science and practice underlying the management of urban and community forests. The minor incorporates fundamental science, arboriculture, forest health, and resource management coursework. Students interested in the minor should contact the CFANS Student Services Office.

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions Web site at http://admissions.tc.umn.edu.

Program Requirements

Required Courses

Minor Courses

- ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
- or PLPA 3003 - Diseases of Forest and Shade Trees (3.0 cr)
- FR 3501 - Arboriculture: Selection and Maintenance of Trees (3.0 cr)
- or FR 4501 - Urban Forest Management: Managing Greenspaces for People, C/PE (3.0 cr)

Electives

Take 10 or more credit(s) from the following:

- ESPM 3211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- FR 3104 - Forest Ecology (4.0 cr)
- FR 3218 - Measuring & Modeling Forests (3.0 cr)
- FR 4118 - Trees: Structure and Function (3.0 cr)
- HORT 1015 - Woody and Herbaceous Plants (4.0 cr)
- RRM 4232W - Managing Recreational Lands, ENVT, WI (4.0 cr)