This track centers on 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. The track is rooted in understanding how earth systems work and how they can be manipulated to positive ends through management. Students learn how to integrate this understanding with diverse economic and social insight to make effective decisions for the environment and society.

Since earth systems are inherently complex and our understanding is often imperfect, conserving and restoring them requires broad knowledge and experience while using the most current analytical, policy, and managerial tools. Thus, students study the structure and function of forests, farms, cities, and wetlands. Through their coursework they investigate the causes, consequences, and solutions to environmental problems created by human action. Students solve problems in field settings and learn to communicate their understanding, synthesis, and decision-making to diverse audiences. Finally, they gain experience in the implementation of decisions. Students may also develop special skills through electives, such as geographic information systems and geospatial analysis.

With this track students are well prepared for technical support, operational, and managerial positions in diverse aspects of resource conservation and management with local, state, and federal agencies as well as the private sector. Examples are positions with the state land and water management agencies, pollution control authorities, in land use planning, environmental review, and with conservation organizations. This track also prepares students for graduate study in a wide range of areas.

Note: One course cannot satisfy multiple requirements in the major; however a course can satisfy a major requirement and a liberal education and/or CFANS minor requirement.

A. Integrated ESPM Core (12 credits)

___ ESPM 1001 Orientation to ESPM: Freshmen Students (1 cr, F)
___ ESPM 1002 Orientation to ESPM: Transfer Students (1 cr, F)
___ ESPM 1011 Issues in the Environment (3 cr, F/S)
___ ESPM 2021 Environmental Sciences – Integrated Problem Solving (3 cr, S)
___ ESPM 3000 Seminar on Current Issues in ESPM (1 cr, F/S)
___ ESPM 401W Problem Solving for Environmental Change (4 cr, F)
___ ESPM 4021W Problem Solving: Env Review (4 cr, S)

B. Communications (7 credits)

___ Writ 1301 University Writing (4 cr, F/S)
___ Writ 1401 Writing and Academic Inquiry (4 cr, F/S)
___ Comm 1101 Introduction to Public Speaking (3 cr, F/S)
___ AFEE 2421 Communication for Ag, Food & Env. (3 cr, F/S)

C. Mathematical Thinking (8 credits)

___ ESPM 3012 Statistical Methods for Env. Scientists & Mgrs. (4 cr, F/S)
___ Stat 3011 Introduction to Statistical Analysis (4 cr, F/S)
___ Math 1142 Short Calculus (4 cr, F/S)
___ Math 1271 Calculus 1 (4 cr, F/S)

D. Physical, Biological & Technical Sciences (22-24 credits)

___ Biol 1009 General Biology (4 cr, F/S)
___ Biol 2022 General Botany (3 cr, F/S)
___ Biol 2012 General Zoology (4 cr, F/S)
___ ESPM 3108 Ecology of Managed Systems (3 cr, F)
___ ESPM 3101 Conservation of Plant Biodiversity (3 cr, F)
___ ESPM 3612W Soil and Environmental Biology (3 cr, F)
___ FNRM 1101 Dendrology (3 cr, F)
___ FNRM 3104 Forest Ecology (4 cr, F)
___ Soil 2125 Basic Soil Science (4 cr, F/S)
___ FNRM 3131 GIS for Natural Resources (4 cr, F/S)
___ Chem 1015 Introductory Chemistry: Lecture (3 cr, F/S)
___ Chem 1017 Introductory Chemistry: Laboratory (1 cr, F/S)
___ BioC 2011 Biochemistry for Ag. & Health Sciences (3 cr, F/S)

E. Social Sciences (7 credits)

___ ESPM 3261 Economics & Natural Resources Mgmt (4 cr, F/S)
___ ApEc 1101 Principles of Microeconomics (4 cr, F/S)
___ Econ 1101 Principles of Microeconomics (4 cr, F/S)
___ ESPM 3271 Env. Policy, Law & Human Behavior (3 cr, F)
___ ESPM 3241W Natural Resource & Environmental Policy (3 cr, S)

F. Internship (1 credit)

___ ESPM 4096 Professional Experience Internship (1 cr, F/S)

*Requires approval and supervision of faculty advisor in the track.
G. CRM Track: Contract Courses (32 credits)

A course cannot be on your contract if it is already satisfying an ESPM requirement from the first page, nor can courses count for multiple groups. You are required to complete a contract with your faculty adviser for 32 credits. The contract must include classes from the lists below reflecting the shown minimum credits per area, plus additional classes from any of the shown areas to reach 32 credits. You must choose enough contract courses approved as WI, Diversified Core and Designated Themes to satisfy your University Liberal Education and Writing Intensive requirements. At least 15 credits for your contract must be taken on the UMTC campus.

**CONSERVATION AND MANAGEMENT (MINIMUM 10 CREDITS)**

- BBE 4504W Bio-based Products Dev/jnt & Mgmt (3 cr, S) WI
- BBE 4535 Assessment & Diagnosis of Impaired Waters (3 cr, F)
- BBE 4608 Environmental & Industrial Microbiology (3 cr, F)
- EEB 3603: Science, Protection & Mgmt. of Aquatic Envs. (3 cr, F)
- Ent 3925 Insects, Aquatic Habitats & Pollution (3 cr, F)
- Ent 4251 Forest & Shade Tree Entomology (3 cr, F)
- ESPM 401W Water Quality & Natural Resources (3 cr, F) WI
- *ESPM 3101 Conservation and Plant Biodiversity (3 cr, F)
- ESPM 3575 Wetlands (3 cr, S)
- *ESPM 3108 Ecology of Managed Systems (3 cr, F) E
- ESPM 4216 Contaminant Hydrology (3 cr, F)
- ESPM 3221 Soil Conservation and Land-Use Mgmt. (3 cr, S)
- ESPM 3602 Regulations & Corp Environ. Mgmt (3 cr, S)
- ESPM 3603 Environmental Life Cycle Analysis (3 cr, F)
- ESPM 3607 Natural Res. Consumption and Sustainability (3 cr, S)
- ESPM 3656 Composting & Organics Utilization (3 cr, S)
- *ESPM 3612W Soil and Environmental Biology (3 cr, F) WI
- ESPM 4601 Soil Pollution (3 cr, F)
- ESPM 4609 Air Pollution Impacts, Mgmt & Ethical Challenges (3 cr, S)
- ENGL3501 Public Discourse: Coming to Terms with the Environment (3 cr, S) WI
- ESPM 5071 Ecological Restoration (4 cr, F)
- FNRM 3114 Hydrology and Watershed Management (3 cr, F)
- *FNRM 3104 Forest Ecology (4 cr, F)
- FNRM 3411 Managing Forest Ecosystems: Silviculture (3 cr, F)
- FNRM 5153 Forest and Wetland Hydrology (3 cr, S)
- FW 4102 Principles of Conservation Biology (3cr, S)
- FW 4103 Principles of Wildlife Management (3cr, S)
- FW 5604W Fisheries Ecology and management (3 cr, S) WI
- Writ 3315 Writing on Issues of Land & the Environment (3 cr, S) AH, DSJ
- HSCI 3244 History of Ecology & the Environment (3cr, F)HP
- Soil 3416 Plant Nutrients in the Environment (3 cr, S)
- Soil 5555 Wetland Soils (3 cr, F)

**GEOSPATIAL/RESOURCE ANALYSIS (MINIMUM 3 CREDITS)**

- ESPM 3031 Applied Global Positioning Systems for GIS (3 cr, S)
- ESPM 3211 Survey, Measurement, & Modeling for Envtl Anlys (3 cr, S)
- *ESPM 4021W Problem Solving: Environmental Review (4 cr, S) WI
- ESPM 4295W: GIS in Environmental Science & Management (4 cr, S) WI
- FNRM 3218 Assessment and Modeling of Forests (3 cr, S)
- FNRM 3262 Remote Sensing of Natural Resources & Envrt.(3 cr, F)
- FNRM 5412 Digital Remote Sensing (3 cr, S)
- FW 5051 Analysis of Spatial Distributions (3 cr, S)
- GIS 5571 Introduction to Arc/Info (3 cr, F)

**FIELD EXPERIENCE**

- Field Course (choose minimum 2 credits from this list)
  - Soil 3521 Soil Judging (1 cr, F)
  - Soil 4511 Field Study of Soils (2 cr, May)
  - ESPM 3031 Applied Global Positioning Systems for GIS (3 cr, S)
  - ESPM 3111 Hydrology and Water Quality Field Methods (3 cr, S)
  - FNRM 2101, 2102, 2104 Forest Plants, Forest Ecology & Forest Measurement Techniques (4 cr, Summer, Cloquet)
  - PBio 4321 Minnesota Flora (3 cr, F)

**SOCIAL SYSTEMS (MINIMUM 3 CREDITS)**

- ESPM 3202W Conflict Mgmt, Leadership, & Planning (3 cr, S) WI
- ESPM 3604 Environmental Systems & Strategy (3 cr, F)
- ESPM 4242 Methods for Environmental and Natural Resource Policy Analysis (3 cr, F)
- *ESPM 3241W Natural Resource & Env Policy (3 cr, S) CIV, SS, WI
- *ESPM 3271 Human & Environmental Behavior Policy (3cr, F) CIV, SS

H. Liberal Ed: Diversified Core, Designated Themes and WI Requirements (3 additional credits)

Students are strongly encouraged to take classes that fulfill multiple liberal education requirements. **Students must complete four of the five Themes**

**Completed through required coursework:**

- X F Freshman Composition Requirement
- X M Mathematical Thinking
- X B Biological Science
- X P Physical Science
- X SS Social Science
- X E Environment Theme
- X CIV Civic Life and Ethics Theme

Can be completed through indicated required or contract course work (or must be completed by taking other courses):

- X L Literature (ENGL 3501)
- X AH Arts/Humanities (WRIT 3315)
- X TS Technology & Society Theme (FNRM 3131)
- X HP Historical Perspective (HSCI 3244)
- X DSJ Diversity and Social Justice in United States Theme (WRIT 3315)

**GP Global Perspectives Theme (3 cr)**

**Writing Intensive Courses (WI)**

Required: 4 WI courses, 2 of them 3xxx OR 4xxx, at least one is in your major. We recommend you take all your WI as contract courses.

- X ESPM 4041W or 4021W
- X (Completed if ESPM 3241W taken instead of ESPM 3271)
- X Additional writing intensive course
- X Additional writing intensive course

I. Free Electives (22 Credits)

Students are encouraged to choose courses that strengthen their expertise in an area and/or provide comparative understanding from another culture or discipline. To this end, students should strongly consider using free electives to complete a University minor, study abroad experience, or a student designed content area. Students construct these expertise areas with the help of their advisors, and such areas can be integrated as contract courses.

**Experiential Learning and Interdisciplinary Requirements**

Beginning Fall 2013, all students entering CFANS are required to complete at least one course approved for the Experiential Learning designation (EL) and one course approved for the Interdisciplinary designation (ID). Several of the ESPM Integrated Core courses are approved for these designations, so these requirements should not require completing additional courses.

**Please Note:**

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 advisor prior to commencing an international experience is required to plan how courses tie into ESPM program and the CRM track.

ESP CRM Track – last updated May 2015