Biology, Society, and Environment Major
2013 – 2014

Students in Biology, Society, and Environment (BSE) receive comprehensive training in biology combined with an in-depth examination of the relevance of biology to social or environmental issues. The science curriculum is complemented with supporting coursework in the Social Sciences and Humanities that focus on ethical, legal, political, social, and environmental aspects of human health, environment, and/or the biological and life sciences.

Degree Requirements
Students must complete at least 120 credits to graduate, including 68 major credits. BSE Curriculum is under development and you must make regular advising appointments in order to stay on track for graduation. The BSE major is interdisciplinary. You are not required to take 18 upper division credits outside the major. You are required to complete 48 upper division credits for your degree.

Important Notes
• Students must attend a BSE Information Session prior to declaring the major. See the advising calendar for dates (http://www.geog.umn.edu/ugrad/advising.html). Send an email to the BSE adviser (geogadv@umn.edu) to register for an upcoming session.
• Email is the preferred mode of communication for advising. Contact the departmental adviser at geogadv@umn.edu

Recommended Introductory Humanities and Social Science Courses
Students are encouraged to take one or more of the following 1xxx-level courses in humanities and social science disciplines as preparation for upper level courses within the major. Many lower division courses satisfy Liberal Education requirements, but these courses do not count toward major requirements. Some upper-division courses require 1xxx pre-requisite course.
• History of Science, Medicine, or Environment (HSci 1212, HSci 1814, HSci 1815)
• Ethics (Phil 1003)
• Culture, Group and Individual (Anth 1003W, CSCL 1001, Geog 1301W, Psy 1001, Soc 1001)

Required Courses

Section 1: BSE Core 3 courses (8-10 credits)
B. Take two of the following courses (no more than one from any set):
   **Ethics:**
   - BTHX 5325 – [3 cr, pre-req Jr./Sr.] – Biomed Ethics
   - ESPM 3011W – [3 cr] – Ethics in Natural Rsrcs (WI)
   - PHIL 3302W – [4 cr] – Moral Problems (CIV, WI)
   - PHIL 3305 – [4 cr] – Medical Ethics

   **Scientific Thought and Inquiry:**
   - PHIL 1005 – [4 cr, pre-req Fr./So.] – Scientific Reasoning
   - PHIL 3601W – [4 cr, pre-req one course in PHIL or science] – Scientific Thought (WI)
   - PHIL 4607 – [3 cr, pre-req course in PHIL or BIOL] – Philosophy of Biological Sciences

   **Science in Society:**
   - HSCI 3331 – [3 cr] – Tech and Am Culture (HIS, TS)
   - HMED 3040 – [3 cr] – Human Hlth, Dis, & Env (HIS)

Section 2: General Biology Lab Core (General Biology) 2 courses with labs (7-10 credits)
A. **Biol 1009** – [4 cr; pre-req CHEM1015 or 1061/1065] – General Biology
B. Select one of the following courses or course pairs. Requirement may only be satisfied with a lab course.
   **Anth 1001** – [4 cr] Human Evolution
   **Biol 2012** – [4 cr, pre-req Biol 1001 or 1009] – General Zoology
   **Biol 2022** – [3 cr, pre-req Biol 1001 or 1009] – General Botany
   **VBS 2032** – [5 cr, pre-req Biol 1002W or 1009 and Chem 1015] – General Microbiology w/ Lab
   **Phsl 3051** – [4 cr, pre-req Biol 1001 or 1009 and one year of college chemistry] – Human Physiology
   **Phsl 3061 & 3071** – [4+2 cr, see pre-req’s (chem, physics, calculus) AND special permission] – Principles of Physiology w/ Lab

   **Note:** Phsl 3050 & VBS 2033 do not fulfill this requirement. Students may not receive credit for Phsl 3051 and 3061.

Section 3: Supporting Science Course Core (Additional Science Courses) 8 courses (22-23 credits)
A. **Chem 1061 & 1065** – [3+1 cr, pre-req Chem 1015 or score of at least 18 on placement exam] – Chemical Principles I and Lab
   **Chem 1062 & 1066** – [3+1 cr, pre-req Chem 1061&1065 or Chem1021] – Chemical Principles II and Lab
   **Chem 2301** – [3 cr, pre-req Chem 1022] – Organic Chemistry I
   **Biol 3021** – [3 cr, pre-req Bio 1009, Chem 2301] – Biochemistry
   **Math 1271** – [4 cr, pre req Math 1151] – Calculus I
   **Phys 1201W** (or 1301W or 1401V) – [5 cr, pre-req Math 1271 or high school calculus] – Intro. Physics for Biology & Pre-Medicine I
Section 4: Biology Concentration  4 courses (11-15 credits)
   A. Biology Concentration Core (Upper-Division Biology Concentration) – Select two courses
      1. Ecology (select one):
         Biol 3407, 3408W, or 3807 (Ecology at Itasca) — [3 cr, pre-req Biol 1001 or 1009, and Math 1142 or Math 1271]
      2. Genetics (select one):
         GCD 3022 — [3 cr, pre-req Biol 1002W or 1009] or Biol 4003 — [3 cr, pre-req BioC 3021 AND special permission]
      3. Cell Biology (select one):
         GCD 3033 — [3 cr, pre-req Biol 1002W or 1009] or Biol 4004 — [3 cr, pre-req Biol 4003 AND special permission]
         **Biol 4003/4004 only recommended for students planning graduate school in biology or careers requiring developmental biology background (usually not for pre-med or pre-health careers). Students may not receive credit for GCD3022&Biol4003 or GCD3033&Biol4004.
   B. Biology Concentration Electives (Sample Concentration Electives) – Select two courses in consultation with the departmental adviser
      Anat 3001 — [3 cr, pre-req bio course, Soph] — Human Anatomy
      or Anat 3601 & 3602 — [3 +2 cr, pre-req bio course, Soph] — Principles of Human Anatomy & Human Anatomy Lab
      or Anat 3611 & 3612 — [3 +2 cr, pre-req bio course, Soph] — Principles of Human Anatomy & Human Anatomy Lab
      or Anat 3001 or 3601 or 3611 & 3608H — [3 +2 cr, pre-req bio course, Soph, Honors] Human Anatomy or Principles of Human Anatomy & Human Anatomy Lab for Honors Students
      Anth 3310 — [3 cr] — Topics in Biological and Physical Anthropology
      Biol 3409 — [3 cr, pre-req Bio 1002W/1009] — Evolution
      Biol 4003 — [3 cr, pre-req BioC 3021 AND special permission] — Genetics
      Biol 4004 — [3 cr, pre-req Bio 4003 AND special permission] — Cell Biology
      Chem 2302 — [3 cr, pre-req Chem 2301] — Organic Chemistry II
      or Chem 2304 — [3 cr, pre-req Chem 2301] — Organic Chemistry II for the Life Sciences
      Chem 2311 — [4 cr, pre-req Chem 2301, concurrent 2302 allowed] — Organic Chemistry Lab
      Chem 2312H — [5 cr, pre-req Chem 2301, concurrent 2302 allowed] — Honors Organic Lab
      EEB 4609W — [3 cr, pre-req Bio 3407] — Ecosystem Ecology
      GCD 3022 — [3 cr, § Bio 4003, pre-req Bio 1002W/1009] — Genetics
      GCD 3033 — [3 cr, Biol 1002W or 1009] — Cell Biology
      GCD 4143 — [3 cr, pre-req GCD 3022 or Bio 4003] — Human Genetics
      Geog 3401 — [4 cr] — Geography of Environmental Systems
      MicB 3301** — [3 cr, pre-req Bio 1002W/1009, Chem 2301] — Microorganisms
      Phsl 3051** — [4 cr, pre-req Bio 1009/1 yr college bio, 1 yr college chem.] — Human Physiology

      **Note: MicB 3003 and Phsl 3050 do not fulfill this requirement

Section 5: BSE Theme Electives (Theme Requirements)  5 courses (15 credits minimum)
   Anth 3306W — [3 cr] — Medical Anthropology (GP, WI)
   Geog 3379 — [3 cr, pre-req soph, jr, or sr] — Environment and Development in the Third World (SOCS, ENV)
   Geog 3411W — [3 cr, § 5411] — Geography of Health and Health Care (WI)
   HMed 3001W — [3 cr, § HMed 3001V or HMed 5200] — Health Care in History I (HIS, WI)
   HMed 3002W — [3 cr] — Health Care in History II (HIS, WI)
   HMed 3040 — [3 cr] — Human Health, Disease, and the Env’t in History (HIS)
   HMed 3055 — [3 cr, § 5055] — Women, Health, and History
   HMed 3075 — [3-5 cr] — Technology and Medicine in Modern America (HIS, TS)
   HMed 5002 — [3 cr] — Public Health Issues in Historical Perspective
   HSci 3211 — [3cr, § 5211] — Biology and Culture 19/20th Century (HIS)
   HSci 3244 — [3 cr] — History of Ecology and Environmentalism (HIS, ENV)
   HSci 3331 — [3 cr] — Technology and American Culture (HIS, TS)
   HSci 3332 — [3 cr, § 5332] — Science and American Culture (HIS, DSJ)
   HSci 3333V — [3 cr] — Honors: Issues in American Science and Technology in the Past Century (HIS, CIV, WI)
   HSci 3401 — [3 cr] — Ethics in Science and Technology (HIS, CIV)
   HSci 4060 — [3 cr] — Special Topics in History of Technology
   Jour 3745 — [3 cr] — Mass Media and Popular Culture (AH, DSJ)
   Phil 3301 — [4 cr] — Environmental Ethics (ENV)
   Phil 3302W — [4 cr, §3322, 3402] — Moral Problems of Contemporary Society (CIV, WI)
   Phil 3304W — [4 cr] — Law and Morality
   Phil 3305 — [4 cr] — Medical Ethics
   Phil 3601W — [4 cr, pre-req one course in Phil or Nat Sci] — Scientific Thought (WI)
Section 5: BSE Theme Electives (Theme Requirements) continued...

- Phil 3602 — [3 cr] — Science, Technology, and Society
- Phil 3607 — [4 cr, pre-req one course in Phil or Psy] — Philosophy of Psychology
- Phil 4607 — [3 cr, prereq courses in philosophy or biology] — Philosophy of Biological Science
- Psy 3061 — [3 cr, pre-req Psy 1001 or Biol 1009, § 5061] — Introduction to Biological Psychology
- Psy 3135 — [3 cr, pre-req Psy 1001 and 2801, § 5135] — Introduction to Individual Differences
- Psy 3604 — [3 cr, pre-req Psy 1001, § 5604] — Abnormal Psych
- Psy 5137 — [3 cr, pre-req Psy 1001 and 3001W] — Introduction to Behavioral Genetics
- PubH 3004** — [4 cr, § 3001, 3003] — Basic Concepts in Personal and Community Health
- Stat 3011 — [4 cr, pre-req two yrs high school math, §5021] — Introduction to Statistical Analysis (MATH)
- Urbs 3751 — [3 cr] — Understanding the Urban Environment (ENV)
- Writ 3152W — [4 cr] — Writing on Issues of Science and Technology (WI)

**Note: PubH 3001 and PubH 3003 may be taken instead of PubH 3004

Learning Abroad / HECUA / National Student Exchange.
BSE encourages students to undertake learning opportunities that engage them with other cultures, sub-cultures, and local/regional/global communities. If you would like to use such coursework to fulfill major requirements, it must be negotiated prior to participation in the experience. Select proposed course(s) prior to meeting with the BSE adviser. No more than two courses will be approved as part of the Thematic Concentration. Science courses may be approved only if they are equivalent to UMTC courses.

Section 6: Senior Project 1 course (2-4 credits)
In most cases, students complete the senior project one semester prior to graduating. Students are strongly advised to begin planning their senior project with potential faculty mentors and/or the departmental adviser at least two semesters prior to registering for academic credit. Note that most options require prior approval by the potential faculty mentor and some options may be limited during any specific semester.

Option 1
Course number varies by department. Register for 3-4 credits in a Directed Research or Directed Studies course with a faculty member having expertise in the subject of the proposed project. Supervisor consent AND pre-approval by the BSE Advisor or Director of BSE required. Honors students should register for the honors section of a Directed Research course.

- BSE 3996 - Senior Project Directed Research (3.0-4.0 cr)
- or BSE 3996H - Honors: Senior Project Directed Research (3.0-4.0 cr)

Option 2: Extra Credit Registration
Course number varies by department offering co-enrollment course. Register concurrently for 2 additional credits with a BSE Core or BSE Theme Elective course related to your interest (in consultation with BSE advisor). Instructor permission required. If taking 2 Extra Credits with Geog 3361W, 3379, 3381W, or 3401, register for 2 additional credits in BSE 3997. Honors students should register for the honors section, BSE 3997H.

- BSE 3997 - Senior Project (2.0 cr)
- or BSE 3997H - Honors: Senior Project (2.0 cr)

Option 3: Senior Project Seminars
Register for 3-4 credits in a senior seminar course. Students must complete at least one upper-division GEOG course prior to Geog 3985 or at least one upper-division HSCI/HMED course prior to HMED 4960.

- GEOG 3985W – Geography Senior Project Seminar [WI] (4.0 cr)
- or GEOG 3985V – Geography Honors Senior Project Seminar [WI] (4.0 cr)
- or HMED 4960 - Senior Research Topics in Medical History (3.0-4.0 cr)

Other Important Program Information
- Students should continue to consult with their CLA advisor about CLA requirements (e.g., 4 semester language requirement, Liberal Ed requirements, etc.
- Double-dipping policies:
  - Liberal Education (CLA) Requirements: Many of the required and elective courses taken by BSE students also satisfy CLA Liberal Education requirements. Students ARE allowed to “double-dip” their liberal education requirements and major requirements.
  - Major Requirements: Double-dipping is NOT allowed within the BSE Major. ONE COURSE EQUALS ONE REQUIREMENT. In other words, students may NOT double-dip between BSE Core/Theme Electives or between General Biology/Biology Concentration Core/ Biology Concentration Elective categories. Students take at least 8 BSE courses and 12 Science courses. While some courses appear as options in more than one requirement category, one course may only be used to fulfill a single requirement.
- Transfer student’s should schedule a meeting with the BSE advisor upon major declaration to discuss which courses from other institutions can count for their major.
- UofM faculty frequently teach special topics courses that may be eligible for BSE major credit. If students wish to propose alternative courses for the Biology Concentration Elective and/or BSE Theme Elective Categories, they should talk with the BSE advisor.
- Honors students have additional requirements. Please consult your Honors advisor.