Proposal for an Interdisciplinary Graduate Certificate: The International Profile Certificate

William I Rose
Geological Engineering & Sciences
Blair Orr
Forestry and Environmental Sciences
Alex Mayer
Civil and Environmental Engineering
John Gierke
Geological Engineering & Sciences
Andrew Storer
Forestry and Environmental Sciences

1. General Description
This proposal recommends the establishment of a Graduate Certificate called the International Profile. This non-departmental certificate would be available to all degree-seeking as well as nondegree-seeking students enrolled in the Graduate School at Michigan Technological University.

Title of Certificate: International Profile Certificate

Catalog Description

The International Profile Certificate recognizes advanced study of any field, but with a substantial international perspective that demonstrates an ability to bridge cultural and language barriers and collaborate effectively.

2. Rationale

Professional work in most fields demands work with diverse groups of people in a wide variety of physical and cultural environments. Educational programs could be expected to include exposure and demonstrated success in working all over the world, and in dealing with all aspects of work on a global basis, because it has a direct link to productivity in workplaces. The degree offerings of a university should reflect accurately the training of students in international contexts.

Michigan Tech has strong and growing international programs. Important examples of these are the Peace Corps associated Masters International Programs in six different academic departments (http://peacecorps.mtu.edu/). In these programs there is two years of volunteer duty in a foreign country and substantial language and cultural training. These programs have changed the focus of their home departments substantially, so that international work is developing even more rapidly than before. International exchange programs for graduate students, such as

EHaz: (http://www.geo.mtu.edu/EHaz/index.htm),

SustR: (http://www.geo.mtu.edu/%7Easmayer/sustr.htm)
have triggered significant international exchanges and multi-university course and degree programs. Both Forest Resources and Environmental Science and Geology have just proposed new joint graduate degree programs through EUAtlantis which will involve substantial mobility of MS students to Europe. The development of the Michigan Tech Chapter of Engineers Without Borders, the Aqua Terra Tech Enterprise and other international Senior Design efforts and the D80 Center are grass roots developments that have affected many different graduate programs. We believe that the International Profile is a necessary and appropriate educational opportunity for postgraduate students that will offer them an attractive supplement to their graduate degrees in this era of rapid paced technological change and with a strong need for international bridging. In addition to language and cultural coursework, students will spend one or more semesters abroad doing research, internships and/or coursework.

The International Profile Certificate is designed to:

1. encourage students to pursue international research, internship and course opportunities;
2. deepen students' understanding of world cultures and global issues;
3. develop a world wide perspective on science, engineering and social issues, such as global change and natural hazards;
4. encourage a basic proficiency in another language; and
5. enhance intercultural communication skills

3. Related Programs

Undergraduate minors such as “Study Abroad Minors” or “International Minors” exist at many universities (see University of Minnesota, Auburn). A 12 credit Ph D Minor exists in Global studies at the University of Indiana, and we expect that many such examples are now developing on other campuses. At Michigan Tech graduate minors do not exist, so a certificate seems the best current option.

4. Projected Enrollment

Based on likely faculty participants and current graduate enrollments, we estimate that approximately 20 students may be enrolled at any time. In time we anticipate that this program would become available to students via Distance Learning.

5. Scheduling Plans

This graduate certificate program is primarily a regular (daytime) program.
6. Curriculum Design

A total of 12 credits are required for an International Profile. Students must earn a grade of B or higher in each course to be applied toward the certificate. As an interdisciplinary certificate, a maximum of 6 credits is allowed in courses at the 3000- and 4000- levels.

(A) Foreign Language Requirement
A knowledge equivalent to two years of college coursework in a foreign language is a prerequisite. The student can demonstrate this either by taking such courses at Michigan Tech or another university, by scoring at the third year level or higher on the modern language test administered by the Humanities Department for Spanish, French or German, or by similar scores on modern language tests in other languages.

(B) International and Intercultural Awareness (3 credits minimum)
BA4710
BA4780
CE5993
CE5990, 5991, 5992
EC3100
FW5770
FW5720
GE5001
HU3253
HU3261
HU3262
HU3263
HU3264
HU3502
HU3545
HU3850
HU5050
PSY3070
SS3100
SS3410
SS3610
SS3620
SS3940
SS4210
UN4000
UN5990

(C) Required International Experience (6 credits) Students must have a minimum of six credits of coursework taken in a foreign country while concurrently enrolled as an Michigan Tech graduate student.

(D) Integrated International Studies
UN 5555 Integrated International Studies Seminar (1 credit)
UN 5555 will be proposed as a new course.

**UN5555 Integrated International Studies Seminar** (1 credit, fall, spring). Prerequisite: graduate standing, instructor approval, and a minimum of one semester of graduate study in a foreign country. Seminar discusses the cultural differences of implementing research in a foreign country. Case studies and history of universities in other countries are included.

For convenience, relevant course descriptions are given below:

**BA 4710 - International Management**
Study of managing work in a global context. Assesses impact of culture and the international environment (economic, social, legal, technological) on management, personnel, marketing, accounting, and finance strategies. Examines international business structures from licensing to joint ventures. Develops attitudes and skills leading to increased international effectiveness.

Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: On Demand
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior
Pre-Requisite(s): BA 3700 and EC 3100(C)

**BA 4780 - International Business Communications**
Studies the importance of intercultural communication competence for effective business relationships. Provides a theoretical and practical foundation for successful business communication by examining the communication processes and contextual units.

Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: On Demand
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore
Pre-Requisite(s): UN 1001 and (UN 1002 or UN 1003) and UN 2001 and UN 2002

**CE 5990 - Civil Engineering Graduate Seminar**
Detailed study and group discussions of current literature and graduate research projects related to the broad field of civil engineering. Topics will be combined to address the student's area of interest, including construction, environmental, geotechnical, structures, transportation, and water resources. External speakers discuss current related issues.

Credits: 1.0
Lec-Rec-Lab: (0-1-0)
Semesters Offered: Fall, Spring
Restrictions: Must be enrolled in one of the following Level(s): Graduate

**CE 5991 - Environmental Engineering Graduate Seminar I**
Presentations and discussion of current literature and research related to the broad field of environmental engineering.

Credits: 1.0
Lec-Rec-Lab: (0-1-0)
Semesters Offered: Fall

**CE 5992 - Environmental Engineering Graduate Seminar II**
Presentations and discussion of current literature and research related to the broad field of environmental engineering.

Credits: 1.0
Lec-Rec-Lab: (0-1-0)
Semesters Offered: Spring
CE 5993 - Field Engineering in the Developing World
Study of applying appropriate and sustainable engineering solutions and technology in the developing world. Concepts of sustainable development are covered. Topics are drawn from several areas of engineering, including water supply/treatment, wastewater treatment, materials, solid waste, construction, and watersheds.
Credits: 2.0
Lec-Rec-Lab: (0-1-2)
Semesters Offered: Spring
Restrictions: Must be enrolled in one of the following Level(s): Graduate

EC 3100 - International Economics
Introduction to international economics, including balance of payments, accounting, foreign exchange markets, international trade theory, barriers to trade, trade and development, regional economic integration, and current U.S. international economic issues.
Credits: 3.0
Lec-Rec-Lab: (3-0-0)
Semesters Offered: Fall, Spring, Summer
Pre-Requisite(s): EC 3001 or (EC 2002 and EC 2003) and UN 2002

FW 5720 - International Forestry Seminar
Seminar for students who have completed FW5730. Synthesizes field work in a theoretical framework. Covers macro aspects of development theory.
Credits: 1.0
Lec-Rec-Lab: (0-1-0)
Semesters Offered: Fall, Spring, Summer
Restrictions: Must be enrolled in one of the following Level(s): Graduate
Pre-Requisite(s): FW 5730

FW 5770 - Rural Community Development Planning and Analysis
Context, analysis, and monitoring of development processes of rural communities in tropical countries.
Credits: 2.0
Lec-Rec-Lab: (2-0-0)
Semesters Offered: Spring
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore, Junior

GE 5001 - Intercultural Natural Hazards Communication in Latin America
Credits: 2.0
Lec-Rec-Lab: (0-2-0)
Semesters Offered: Fall
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

HU 3261 - Communicating Across Cultures
Comparative study of interpersonal communication across cultures by both foreign and American students, with emphasis on cultural patterns, attitudes, values, and nonverbal behaviors. Instructor selects cultures for study from Third World, Western, or non-Western regions.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: On Demand
Restrictions: May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): UN 1002 or UN 1003
HU 3262 - Topics in Francophone Cultures
An introduction to Francophone cultures (in English) in a comparative perspective. Includes a survey of French history and its influence on modern-day French and Francophone societies through movies, media, and recent technologies, and a critical examination of cross-cultural differences between French and American cultures.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: On Demand
Restrictions: May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): UN 1002 or UN 1003

HU 3263 - Topics in German-Speaking Cultures
An introduction to German-speaking culture (in English) in a comparative perspective. Includes a survey of Central-European history and its influence on modern-day German-speaking societies through movies, media, and recent technologies, and a critical examination of cross-cultural differences between German and North-American cultures.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: On Demand
Restrictions: May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): UN 1002 or UN 1003

HU 3264 - Topics in Spanish-Speaking Cultures
An introduction to Spanish-speaking culture (in English) in a comparative historical perspective. Includes a survey and a critical cross-cultural examination of Latin-American culture and Spanish-speaking societies (European, Caribbean, and North, Central and South American) through literature, music, film, art and other media. Spanish-speaking cultures and North American society.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: Spring
Restrictions: May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): UN 1002 or UN 1003

HU 3502 - World Mythologies
Survey of the major mythological systems of the world with particular attention to those areas of commonality between the various civilizations. Films may provide contextual background.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: Spring - Offered alternate years beginning with the 2001-2002 academic year
Pre-Requisite(s): UN 1002 or UN 1003

HU 3545 - Literature Across Borders
Study of literary genres, themes, and movements, with emphasis on comparing and contrasting perspectives reflected in literatures from Western and non-Western cultures. Topics may focus on historical, social, aesthetic, and cultural factors as they influence these literatures. Films may be used.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: Fall - Offered alternate years beginning with the 2004-2005 academic year

HU 3850 - Cultural Studies
Examines the way that culture communicates values, feelings, beliefs; structures differential relations of power and possibility; creates difference and hierarchy. Considers the struggles over meaning that open up possibilities for diversity and change.
Credits: 3.0
Lec-Rec-Lab: (0-3-0)
Semesters Offered: Spring  
Pre-Requisite(s): UN 1002 or UN 1003

**HU 5050 - Intercultural Communication**
A critical examination of cross-language and cross-cultural equivalences and differences through the study of acculturation, values, traditions, role expectations, perceptions, stereotypes, and gender issues as well as other verbal and nonverbal problems and issues of communication. Emphasizes the dimensions of communication within a comparative cultural context.

**Credits:** 3.0  
**Lec-Rec-Lab:** (0-3-0)  
**Semesters Offered:** On Demand  
**Restrictions:** Must be enrolled in one of the following Level(s): Graduate

**PSY 3070 - Cross-Cultural Psychology**
Introduces the student to cross cultural psychology and sociocultural theory as it is applied to psychology. Examines research on cultural specific and universal behaviors. Emphasizes the benefits and challenges of diversity in organizations and diversity skills that promote interpersonal and organizational success.

**Credits:** 3.0  
**Lec-Rec-Lab:** (0-3-0)

**Semesters Offered:** On Demand  
**Pre-Requisite(s):** PSY 2000 and (UN 1002 or UN 1003)

**SS 3100 - Developing Societies**
An overview of the developing world. Asks "What is development?" in ecological, human, and economic terms. Explores variation among developing societies and elements of internal differentiation, including cultures, regions, classes, and genders. Emphasizes active student exploration of strategies for change, including technology, business, and political transformations.

**Credits:** 3.0  
**Lec-Rec-Lab:** (3-0-0)  
**Semesters Offered:** Spring - Offered alternate years beginning with the 2000-2001 academic year  
**Pre-Requisite(s):** UN 1002 or UN 1003

**SS 3410 - World Resources & Development**
Examination of the human geography and resources of various world regions. Emphasizes factors affecting prospects for development, including population dynamics, natural resource endowment, social and cultural systems, and spatial structure of society. Case studies of individual countries supplement general concepts and theories.

**Credits:** 3.0  
**Lec-Rec-Lab:** (3-0-0)  
**Semesters Offered:** Fall, Summer - Offered alternate years beginning with the 2001-2002 academic year  
**Pre-Requisite(s):** UN 2002

**SS 3610 - International Law**
Explores the principles, content, and logic of public international law, the law of nations. Students brief cases, prepare longer briefs to defend a side in a moot case, and engage in a moot court.

**Credits:** 3.0  
**Lec-Rec-Lab:** (3-0-0)  
**Semesters Offered:** Fall, Spring - Offered alternate years beginning with the 2000-2001 academic year  
**Pre-Requisite(s):** UN 2002

**SS 3620 - International Environmental Technology Policy**
Explores the relationship between markets and government policies in moving national economies and corporations toward "greener" technology choices. Topics may include industrial ecology, regulation, innovation, and pollution prevention. Course employs examples from U.S., Canada, EU, and Japan. When possible, students work on a real-life project for a client.
SS 3940 - World Affairs
The study of current issues and themes in world affairs and of significant world tension areas. Detailed examination of central issues in selected recent regional or international conflicts or high profile internal problems in selected countries.

Credits: 3.0
Lec-Rec-Lab: (3-0-0)
Semesters Offered: Fall, Spring - Offered alternate years beginning with the 2001-2002 academic year
Pre-Requisite(s): UN 2002

SS 4210 - Global Change in Culture and Society Since 1400
Explores the increasing interconnectedness of world cultures since 1400. The course examines the social, economic, and political changes that accompanied the rise of world capitalism from multiple theoretical perspectives. Themes include colonialism, agency, resistance, world-systems theory, and globalization.

Credits: 3.0
Lec-Rec-Lab: (3-0-0)
Semesters Offered: Spring - Offered alternate years beginning with the 2007-2008 academic year
Restrictions: May not be enrolled in one of the following Class(es): Freshman
Pre-Requisite(s): UN 1002

UN 4000 - Remote Sensing Seminar
A seminal series that covers topical issues in remote sensing, ecosystem research, and global change. Required for all students with a minor in remote sensing.

Credits: 1.0; Repeatable to a Max of 2
Lec-Rec-Lab: (0-1-0)
Semesters Offered: Fall, Spring
Restrictions: May not be enrolled in one of the following Class(es): Freshman, Sophomore

Library and other Learning Resources.
No additional library or learning resources are required.

6. Computing Access Fees
No computing access fees are required beyond those normally incurred by enrolled graduate students.

7. Faculty Resumes
Key faculty for this graduate certificate program include the three proposers, whose short vitae are attached at the end of this proposal: Numerous additional faculty and staff that are important to this program are those associated with the language programs in Humanities department and those who teach classes listed under section 6B (above), especially in HU and SS. This initiative recognizes a strong commitment to international perspectives in all study areas and receives broad support across the Michigan Tech campus. As such the main impact of this certificate may make these international classes more visible to graduate students.
Description of available/needed equipment.

8. Program Costs
There are no additional direct costs associated with establishing this graduate certificate program at this time. Foreign language courses are already in high demand and overbooked. The sustainability of offering UN5555 in the longer term may depend upon additional resources.

9. Space

No additional space is required.

10. Policies Regulations and Rules

All policies, regulations and rules are described in Section 6 and follow University Senate policy for Graduate Certificates. The committee of Peace Corps Masters International programs (including all of the proposers) will assist the Graduate School in the administration of this certificate. The committee may designate appropriate classes to qualify for the certificate in addition to those listed in this proposal. Recommendations for modification of the curricular requirements of this certificate shall be made through the to the Dean of the Graduate School.

11. Accreditation (Not applicable)

12. Internal Status of the Proposal

13. Planned Implementation

This program could begin starting in fall semester, 2009.

Vitae of organizers follows
WILLIAM I ROSE
Professor, Department of Geological Engineering and Sciences
Michigan Technological University
HOUGHTON, MI 49931 USA
906 487 2367; raman@mtu.edu
www.geo.mtu.edu/~raman

PROFESSIONAL PREPARATION:
Ph.D. in Geology, Dartmouth College, 1970;
A.B. in Geography, Geology, Dartmouth College, 1966.

APPOINTMENTS:
9/79-present: Professor of Petrology, Michigan Technological University, Houghton.
6/90- 6/ 98 Department Chair, (planned new building; hired 8 new faculty); 9/74-9/79: Associate
Professor of Petrology, 9/70-9/74; Assistant Professor of Petrology.
1/99-12/99: Visiting Leverhulme Fellow, Dept of Earth Sciences, University Of Bristol, UK.
8/85-6/86: Visiting Scientist, Los Alamos National Laboratory.
1/81-present: Geochemist (W.A.E. basis), USGS, Cascade Volcano Observatory, Vancouver,
WA; Alaska Volcano Observatory, Anchorage; VDAP.
8/77-8/78: Senior Visiting Scientist, Upper Atmosphere Group, National Center for Atmospheric
Research, Boulder, CO.
8/77-8/78: Visiting Scientist, Branch of Isotope Geology, USGS, Denver, CO.

RELATED PUBLICATIONS

Rose, W. I., D. J. Delene, D. J. Schneider, G. J. S. Bluth, A. J. Krueger, I. Sprod, C. McKee, H.

Rose, W. I., J J Bommer, D L Lopez, M J Carr and J J Major (eds), 2004, Volcanic Hazards in

Rose W I, G A Millard, T A Mather, D E Hunton, B Anderson, C Oppenheimer, B F Thornton, T
M Gerlach, A A Viggiano, Y Kondo, T M Miller and J O Ballenthin, 2006, The atmospheric
chemistry of a 33-34 hour old volcanic cloud from Hekla Volcano (Iceland): insights from
direct sampling and the application of chemical box modeling, J Geophys Res Atmospheres,

significance of small volume fall deposits at composite volcanoes: Insights from the October
14, 1974 Fuego eruption, Guatemala, Bull Volcanol, in press.

Durant, A J, R A Shaw and W I Rose, 2007, Ice nucleation and overseeding of ice in
volcanic clouds, J Geophys Res, in press.
SYNERGISTIC ACTIVITIES


2. Since 1980: **Educational efforts shared with many other campuses**: Video based educational efforts in Optical Mineralogy, 1982; Volcanic Rock Textures, 1985; and video field trips: 1987-1993; Volcanic Rocks and their vent areas, Industry Short Courses (field trips and lectures); 1976-1985; Graduate Student field trip efforts, 1997 (Western Mexico and IAVCEI meeting); NSF funded International Travel Grant to IAVCEI Bali meeting, and associated Hawaii and Pinatubo field trips, July 2000; NSF Int Travel Grant for students to attend IAVCEI meeting in Chile, 2004. Special session exploring graduate volcanology educational efforts, AGU 2002. 2005-2009: **FIPSE-NAFTA 6 University Consortium in Earth Hazards (EHaz)**, funded by Dept of Education.


4. Since 1992: Development of Michigan Tech Remote Sensing Institute. Co-organizer and Interim Director of an institute with 35 faculty members from nine different MTU departments, Development of shared lab facilities, success with equipment funding as a NASA center of excellence, development of an interdisciplinary minor program in remote sensing; many interdisciplinary seminar series and several new interdisciplinary classes.


**RECENT COLLABORATORS EXTERNAL TO MICHIGAN TECH** (2000-2005)
Stephen Self (Open University); Andrew Harris (University of Hawaii); Luke Flynn (University of Hawaii); Hans Graf (Cambridge Univ); Fred Prata (CSIRO, Australia); Arlin Krueger (UMBC); Vincent Realmuto (NASA/JPL); Frank Marzano (University "La Sapienza" of Rome); Costanza Bonadonna (Univ So Florida); Christiane Textor (Max Planck Inst Meteorology); Alain Bernard (University of Bruxelles);

**THESIS ADVISEES AND POSTDOCTORAL SCHOLARS SPONSORED, LAST 5 YEARS**

Tianxu Yu, STC/NOAA Washington, DC
Song Guo, Canadian Centre for Remote Sensing, Montreal
Sebastien Darveille, Los Alamos National Lab
Demetrio Escobar, Volcanologist, SNET, El Salvador
Yingxin Gu, SAIC/USGS EROS Data Center, Sioux Falls, SD
I Matthew Watson, Bristol University UK
Matthew Patrick (current Post Doc) Owen P Mills, Adam Durant, Janelle Byman, Kelly Durst, John Lyons, Ellen Engberg, Hans Lechner, Adam Blankenbicker, Jemile Erdem, Karinne Knutsen, Ingrid Fedde (current graduate students)

GRADUATE STUDENTS SUPERVISED: 39 M.S. and 14 Ph.D.

GRADUATE ADVISOR: Richard E Stoiber, Dartmouth College, deceased.
BLAIR ORR  
School of Forest Resources and Environmental Science  
Michigan Technological University  

Professional Preparation  


Appointments  

2008 – present: Director of Peace Corps Programs. Michigan Technological University  
2006 – present: Professor of Forestry, Michigan Technological University  
1998 – 2006: Associate Professor of Forestry. Michigan Technological University  
1992 – 2006: Assistant Professor of Forestry. Michigan Technological University  
1988 – 1992: Assistant Professor of Forestry, The University of the South  

Five Relevant Publications  


Five Other Publications  


Synergistic Activities

Peace Corps Master’s International Program
EU-US Atlantis Program
TIES – FIPSE and SustR programs in Mexico; Veracruz Study Abroad Program
World Forestry Committee of the Society of American Foresters
International Society of Tropical Foresters

Courses and Workshops:

Trees in Agricultural Systems; Overseas Research; Graduate Tropical Forestry; International Forestry Practicum; International Forestry Seminar; Community Planning and Analysis, Master’s Graduate Seminar; Doctoral Graduate Seminar

Collaborators and Affiliations

Dr. James B. Pickens, Michigan Technological University
Dr. Alex S. Mayer, Michigan Technological University
Dr. Willem Beets, retired
Dr. Karlyn Eckman, University of Minnesota
Dr. James Mihelcic, U. of South Florida
Dr. Kathleen Halvorsen, Michigan Technological University
Dr. Miquel Armando Ramirez, Universidad Veracruzana
Dr. Martin Yemefack, Institute of Agricultural Research for Development, Cameroon
J. Cardenas Castillo, Oruru Technical School, Bolivia
Dr. Thomas Van Dam, Michigan Technological University

Graduate Advisor: Dr. J. Buongiorno, U. of Wisconsin – Madison

Graduate Students (M.S.)

Biographical Sketch
Alex S. Mayer
Department of Civil & Environmental Engineering
Michigan Technological University

Professional Preparation
Brown University, Sc.B. Civil/Environmental Engineering, 1981
University of North Carolina at Chapel Hill, M.S. Environmental Engineering, 1987
University of North Carolina at Chapel Hill, Ph.D. Environmental Engineering, 1992

Appointments
September 2005-present: Director, Michigan Technological University Center for Water & Society
September 2002-present: Professor
September 1998-August 2002: Associate Professor
March 1992-August 1998: Assistant Professor
  Department of Geological Engineering and Sciences
  Michigan Technological University, Houghton, MI
September 2000-May 2001: Visiting Professor
  Department of Civil Engineering and Geosciences
  Technological University of Delft, Netherlands
August 1995-November 1995: Visiting Professor
  Department of Chemical Engineering
  University of Sonora
1981-1985: Civil Engineer
  Water Resources Projects Section, Planning Division
  East Bay Municipal Utility District, Oakland, CA

Five Relevant Publications

Five Other Publications
Synergistic Activities
AQUA3, ExCIT, SustR, and TIES Programs in Water Resources Management: managed projects, recruited and advised graduate and undergraduate students from Mexico, U.S. and Canada, developed curriculum, developed and led field trips dealing with Mexican water resources issues, working with engineers, economists, sociologists, etc., has led to several collaborative research and education initiatives.

Textbook on groundwater contamination: co-edited and co-authored with engineers, geologists, and soil scientists, book accessible to university professors and students and practitioners, funded by Fulbright Scholarship.

Rio Yaqui basin modeling project: principal investigator for effort to develop integrated hydrologic-economic-institutional model, involves working with economists, policy-makers, government agencies.

Michigan Tech Center for Water and Society: Director and co-founder of university-wide effort to integrate research, education and outreach efforts at Michigan Tech, involves engineering, forestry and environmental sciences, biology, chemistry, humanities and social science departments; state and federal agencies, non-governmental organizations, etc.

Watershed management plan for Huron Creek: lead investigator on multi-disciplinary group of faculty and students and community advisory group developing watershed management plan for Huron Creek, a small, highly-impacted creek that empties into Lake Superior. Development of plan has included local K-12 teacher and student involvement in gathering data, producing a community watershed interpretive program, and participation in a watershed advisory committee.

Michigan Environmental Education Curriculum Support (MEECS) program: Developed and authored several modules for middle school environmental curricula made available to all middle school science teachers in Michigan.

Courses, Workshops or Special Courses Taught During the Past Three Years
Undergraduate Courses: Geohydrology, Water & Society, Environmental Engineering Senior Design Project, Geological Engineering Senior Design Project
Graduate Courses: Mathematical Modeling of Earth Systems, Field Engineering for the Developing World
Workshops: Watershed Management Certificate Program (Sonora, Mexico)

Collaborators & Other Affiliations
Asbornsen, H., co-investigator, University of Iowa
Chadde, J., co-investigator, Center for Science, Mathematics and Environmental Outreach; Houghton, MI
Garcia Ruiz, J.L., co-investigator, U. Sonora, Hermosillo, Mexico
Gorman, H., co-investigator, Michigan Technological University, Houghton, Michigan
Hand, D., co-author, Michigan Technological University, Houghton, Michigan
Halvorsen, K., co-investigator, Michigan Technological University, Houghton, Michigan
Hassanizadeh, S.M., co-author, U. Utrecht, Utrecht, The Netherlands
Mihelcic, J., co-investigator, University of South Florida, Houghton, Michigan
Perez Lugo, co-investigator, University of Puerto Rico Mayagüez
Sivapalan, M., co-investigator, University of Illinois
Solomon, B., co-author, Michigan Technological University, Houghton, Michigan
Watkins, D., co-investigator, Michigan Technological University, Houghton, Michigan
Zhang, Q., co-investigator, Michigan Technological University, Houghton, Michigan
Zimmerman, J., co-investigator, Yale University

Graduate Advisor: Miller, C.T., U. North Carolina, Chapel Hill, NC

Recent STEM Graduate Dissertation/Thesis/Project Advisees
Bau, D., Ph.D. Environmental Engineering, 2006
Ballard, M., Ph.D. Environmental Engineering, in progress
Betz, K., M.S. Geological Engineering, 2006
Endres, K., Ph.D. Environmental Engineering, 2004
Fitzgerald, K., M.S. Geological Engineering, in progress
Kersten, L. M.S. Environmental Engineering, 2008
Munoz Hernandez, A., Ph.D. Environmental Engineering, 2009
Ollila Ojeda, M., M.S. Environmental Engineering, 2006
Robles Morua, A., Ph.D. Environmental Engineering, in progress
Rodriguez Ibarra, W., M.S. Environmental Engineering, 2005
Van Grinsen, M., M.S. Geology, in progress
Biographical Sketch for John S. Gierke, Ph.D., P.E.,

a. Professional Preparation
Michigan Technological University  Civil Engineering  BSCE 1984
Michigan Technological University  Civil Engineering  MSCE 1986
Michigan Technological University  Environmental Engineering  Ph.D. 1990

b. Appointments
Associate Professor - September 1996 to Present; Michigan Technological University, Houghton, Michigan 49931-1295
Visiting Associate Professor - January 1999 through December 1999 University of Delaware, Newark, Delaware
Assistant Professor - July 1990 through August 1996 Michigan Technological University, Houghton, Michigan 49931-1295
Summer Research Faculty Visitor - June 1991 to August 1991
Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831.

c. Publications
(i) Five Relevant Publications

(ii) Five Other Significant Publications
d. Synergistic Activities

(1) Principal investigator for the Michigan Tech Remote Sensing for Hazard Mitigation and Resource Protection in Pacific Latin America Project, National Science Foundation Partnerships for International Research and Education, where research is conducted on developing, applying, and testing remote sensing in geologic hazards and water resources in Costa Rica, Ecuador, El Salvador, Guatemala, Nicaragua, and Panama; (2) Graduate advisor for M.S. students in Michigan Tech’s Masters International/Peace Corps programs in geohazards and in civil and environmental engineering where students conduct their masters research whilst serving in the U.S. Peace Corps; (3) Collaborating with faculty at the University of Puerto Rico—Mayaguez to involve their undergraduate geology students in remote sensing research in Pacific Latin America; (4) Organized a 1-day workshop on applications of remote sensing for characterizing groundwater aquifers in conjunction with the 9th Congress on Latin American Hydrogeology in Quito, Ecuador, July 7, 2008; (5) Research on hydrology of glacier melting in Alaska and invited for participating in a workshop (proposal pending) on the future impacts of climate change on glaciers and the ecology of the Andes.

e. Collaborators and Other Affiliations

(i) Collaborators and Co-Editors: Falta, Ronald W. (Clemson University), Imhoff, Paul (University of Delaware), McCray, John M. (Colorado School of Mines), Stewart, Bo (Praxis Environmental).

(ii) Graduate Advisor: Neil J. Hutzler, Michigan Technological University

(iii) Thesis Advisor for (last five years denoted in bold): Anderson, Cecilia P. (ERM-West), *Bachmann, Nancy-Jeanne (Emmons & Olivier Resources, Inc), Bruning, Jill N. (searching for employment), Carpenter, Michael D. (consulting), Castor, Meaghan G. (consulting), Ebisch, Jeffery (Coleman Engineering), El-Beshry, Manar, Fish, Randy E. (Peace Corps, serving in Tanzania), Fader, Caleb (Peace Corps, serving in Uganda), Fuchs, Valerie J. (Michigan Technological University), Gross, Essa L. (Michigan Technological University), Gu, Yingxin (McGill University), Harrison, Elizabeth (Los Alamos National Laboratory), Hegemann, Robert (Peace Corps, serving in Honduras), Hein, Gretchen, (Michigan Technological University), Huntzinger, Deborah N. (Post-doc, University of Michigan), *Hutchins, Margot J. (Michigan Technological University), Jenson, Jeremy (Peace Corps, serving in Benin), Keating, Gordon (Los Alamos National Laboratory), Kremer, Theodore J. (Malcolm Pirnie, Inc.), Kucharski, Matthew J. (Peace Corps, serving in Philippines), Mackenzie, Heidi L. (Grenkowitz) (Ford Motor Company), Muraski, Jennifer L. (Montgomery Watson), *Myre, Elizabeth A. (Engineering development work in Haiti), *Quinnman, Joseph (ARCADIS), *Ritchie, Beatrice, Rios Sanchez, Miriam (Michigan Technological University), Sanders, Deborah L. (ERM-West), Sawall, R. Hardy (Geotrans), Schmunk, Steven W. (Marquette Intermediate School District), Sherman, Heidi M. (Consulting), Shonsey, Cara W. (Michigan Technological University), Smith, Gwynneth (Peace Corps, serving in Suriname), Stright, Lisa E. (Stanford University), Taege, Deborah A. (AMEC), VanAntwerp, Darby J. (RMT), Vincent, Ashlee K. (Michigan Technological University), Wang, Congli (Consulting), Wojick, Christopher L. (Michigan Technological University). *Served/serving as co-advisor, **Served as co-advisor, student at different university.

Advisor for 20 M.S. and 2 Ph.D. graduates, co-advisor for 3 M.S. and 2 Ph.D. graduates; currently advising 2 Ph.D. students and 10 M.S. students and co-advising 1 Ph.D. student.
Biographical Sketch: Andrew J. Storer

School of Forest Resources and Environmental Science
Michigan Technological University,
1400 Townsend Drive, Houghton, Michigan, 49931, USA
Telephone: (906) 487-3470, Email: storer@mtu.edu, Fax: (906) 487-2915

Professional Preparation
St. Anne's College, University of Oxford. Pure and Applied Biology. B.A. (Hons) 1986
St. Anne's College, University of Oxford. M.A. 1993
Department of Zoology, University of Oxford. Forest Entomology. D.Phil. 1993

Appointments
2005 – Present  Associate Professor, Forest Insect Ecology, School of Forest Resources and
Environmental Science, Michigan Technological University
2007 – Present  Director, The Honors Institute, Michigan Technological University
2001 –2005  Assistant Professor, Forest Insect Ecology, School of Forest Resources and
Environmental Science, Michigan Technological University
1998 - 2001 Assistant Research Entomologist, Division of Insect Biology, University of California,
Berkeley.
1999 - 2001 Instructor, Department of Landscape Horticulture, Merritt College, Oakland.
1992 - 1997 Postdoctoral Researcher, Division of Insect Biology, University of California,
Berkeley.

Publications (5 most closely related – from work in Africa or other locations outside the US)

Publications (5 other)


**Synergistic Activities**

1) Active research in forest health and educational programs in global technological leadership in Ghana.

2) Director of the Honors Institute at Michigan Technological University. This institute encourages undergraduates to develop research and other professional experience during their undergraduate career.


4) Member of the editorial board of the Journal of Pest Science (Springer). Subject editor for Forest Entomology


**Collaborators and other affiliations**

a) Collaborators and coeditors
Abeney, EA (Forest Research Institute of Ghana), Bonello, Pierluigi (The Ohio State University), Cobinnah J.R. (Forest Research Institute of Ghana), Delisle, J. (Natural Resources Canada), Erbilgin, N. (University of Edmonton), Gordon, Thomas R. (University of California, Davis), Hyslop, MD (Michigan Technological University), Jurgensen MF (Michigan Technological University), Karnosky, David (Michigan Technological University), Marshall, J.M. (Michigan Technological University), McNee, William R. (Wisconsin Department of Natural Resources), McPherson, Brice A. (University of California, Berkeley), McCullough, Deborah (Michigan State University), Nagel, Linda M. (Michigan Technological University), Opuni-Frimpong, E. (Forest Research Institute of Ghana), Risch, AC (Swiss Federal Institute for Forest, Snow and Landscape Research), Ritokova, G. (UC Davis), Standiford, Richard B. (University of California, Berkeley), Schutz M (Swiss Federal Institute for Forest, Snow and Landscape Research), Shields JM (Michigan Technological University), Webster, CR (Michigan Technological University), Witter John A. (University of Michigan), Wood, David L. (University of California, Berkeley).

b) Graduate and Postdoctoral Advisors
Graduate: Martin R. Speight, University of Oxford; David Wainhouse, Forest Research, England
Postdoctoral: David L. Wood, UC Berkeley; Thomas R. Gordon, UC Davis

c) Thesis Advisor and Postgraduate Scholar Sponsor
Thesis Advisor to: Tara Bal (Michigan Technological University), Brian L. Beachy (deceased), Jessica A. Beachy (Michigan Technological University), Sarah Brodeur-Campbell (Michigan Technological University), Ryan DeSantis (University of Oklahoma), Michelle Freeman (Michigan Technological University), Elizabeth E. Graham (University of Illinois), Brian P. Henry (Washington DC), Jordan M. Marshall (Michigan Technological University), Emmanuel Opuni-Frimpong (Forest Research Institute of Ghana), Melissa Porter (Michigan Technological University), Bryan K. Roosien (Michigan Technological University), Justin M. Rosemier (Kentucky Wesleyan University).
Total advised: Graduate students: 13, Postdoctoral Scholars: 1
PROPOSAL FOR Ph.D. PROGRAM IN 
ENVIRONMENTAL AND ENERGY POLICY

Submitted by the
Department of Social Sciences
November 16, 2009 Version

Contact: Barry Solomon; bdsolomo@mtu.edu

1. General description and characteristics of program

This new Environmental and Energy Policy (EEP) Ph.D. program, to be administered in the Department of Social Sciences of Michigan Technological University (Michigan Tech) with 17 core and affiliated faculty from across campus advising students, will prepare students to conduct research in support of societal decisions regarding environmental- and energy-policy goals, strategies and programs. The doctoral program will train students to use the tools and approaches of multiple disciplines, including sociology, geography, anthropology, political science, economics, history, sustainability science, ecology, and hydrology in support of research programs involving an integrated assessment of environmental & energy-related policy choices. This program builds on the department’s existing M.S. program in Environmental Policy.

2. Rationale

Michigan Tech’s strategic plan calls for the university to establish “world-class research, scholarship, and innovation in science, engineering, and technology that promotes sustainable economic development.” In support of this goal, a doctoral program that focuses on policy-related research supporting societal decisions and choices toward a sustainable society is vital. Efforts to achieve sustainable interactions with Earth systems—and to do so in a socially just and economically efficient manner—involves more than simply developing new technologies, or a better understanding of natural environmental systems. It also involves reaching consensus on the goals that society hopes to achieve, assessing the different strategies associated with achieving those goals, and determining whether progress toward those goals is being made. For example, understanding the limits of corn-based ethanol as a transportation fuel, and the need for a second generation of non-food based biofuels, requires understanding of the life cycle greenhouse gas emissions, water and land use requirements, and effects on soils, but also the long-term economic costs and implications for food security. Thus, in investigations related to sustainability, research in the natural sciences and engineering should be tightly coupled with research into societal choices and policy tools.

Establishing a Ph.D. program in Environmental and Energy Policy (EEP) would:

- Improve Michigan Tech’s competitiveness in securing sustainability-related research funds.
- Improve Michigan Tech’s ability to attract promising scholars and quality graduate students.
• Complement existing strengths in sustainability-related research in engineering and the natural sciences, including programs currently coordinated by centers of research such as the Center of Energy Excellence, Power and Energy Research Center, the Center for Water and Society, and the Sustainable Futures Institute.

• Represent the logical extension of the Masters Degree in Environmental Policy currently administered by the Department of Social Sciences. Such a new PhD program was strongly recommended by the Department of Social Science’s Periodic External Review in 2002. Scholars with expertise in ecological economics, sustainability science, computational social science, environmental & natural resource sociology, environmental geography, environmental anthropology, and environmental history are already in place and would form the core of the faculty needed to implement the Ph.D. program.

The proposed doctoral program faculty already has significant expertise in the field of environmental sustainability, especially with regard to energy policy. They have collaborated extensively across disciplinary and departmental boundaries to pursue energy and environmental sustainability questions, including those related to the development of woody bioenergy forms in the Upper Midwest, the siting of wind farms, waterborne disease-related risk perceptions in Mexico, the regulation of on-site sewage systems in the Great Lakes, payment for ecosystem services in a variety of settings, the political economy and ecology of agricultural and industrial systems, the dynamics of watershed management groups, and brownfield redevelopment. As a group, they also support a range of methodologies, including survey research, ecological and environmental economics, anthropological and historical analysis, spatial analysis, and the modeling of decision-making agents.

As shown in Appendix B, the 17 Core and Affiliated faculty have substantial experience in securing external research support. While in most cases the existing Environmental Policy faculty members have been co-PIs on projects rather than PIs, in a substantial number of cases there has been graduate student funding provided by external agencies, which helps to demonstrate the capacity of the EEP program to support doctoral students. While additional EEP faculty, such as (Alex) Mayer and Storer, have generally not supported Environmental Policy students in the past, they would like to collaborate and be affiliated with this program and would be pleased to help support doctoral students in EEP. Appendix B thus provides a good general indicator of the extent of funding available in EEP, and the important role of socioeconomic and policy dimensions. The EEP program expects to be competitive in winning future support from the NSF, U.S. EPA, U.S. Department of Energy, U.S. Department of Education, USDA Forest Service, U.S. Agency for International Development, Michigan Department of Environmental Quality, Michigan Department of Education, and the Michigan Economic Development Corp. In some cases the masters program in Environmental Policy has been precluded from playing a larger role, such as was the case in the sustainability IGERT, which supports doctoral students. Thus a doctoral program in EEP will remove this constraint in such cases, and allow students to be involved in research projects of larger scope and scale. It is expected that 2-4 doctoral students will be supported as RAs through such external funding in the early program years.

This faculty group also has 13 years of experience administering and graduating students in the existing and highly successful Masters in Environmental Policy. This program has graduated around 40 students who have gone on to pursue PhDs, law degrees, and careers in industry, non-
profits, consulting firms, government agencies, and academia. The gender ratio of students in the masters program in environmental policy has been 55% female and 45% male and 36% international, with a 50-50 gender split anticipated in the proposed doctoral program. The new PhD program would expect to place graduates in a similar mix of areas, with about 60% ending up in academic and research positions, and 40% finding employment in government agencies, non-profits, industry and consulting firms. National trends and studies by the National Research Council, American Association for the Advancement of Science, and other prestigious groups have shown environmental and energy policy to be strong growth areas for employment.

3. Discussion of related programs within Michigan Tech and at other universities

There are no programs at Michigan Tech similar to this doctoral degree proposal. In the North Central states there are four such similar programs: at Indiana University, University of Michigan, Michigan State University (MSU), Southern Illinois University at Carbondale (SIU).

Each program in the region is organized somewhat uniquely, and is different from the one proposed here, although all such doctoral programs are united by the need to develop and implement practical solutions to environmental problems. Indiana University, which is consistently ranked in the top two or three graduate programs in environmental policy nationwide, offers a Ph.D. in public affairs with a focus on environmental policy, and a Ph.D. in public policy that is jointly administered by the School of Public and Environmental Affairs (SPEA) and the Department of Political Science. Environmental policy students are also strongly encouraged to take courses in environmental sciences in SPEA. At the University of Michigan a Ph.D. is offered in the School of Natural Resources and Environment with a focus on resource policy and behavior. In contrast, at MSU students may seek a Ph.D. specialization in environmental science and policy, but since there is no home department that offers this degree the student must pursue it through one of many existing doctoral programs. Another related doctoral program is at SIU in Environmental Resources and Policy. It is designed similarly to MSU’s program, and currently has three co-directors from three different departments.

There are also several environmental policy programs that are embedded in programs in environmental science and schools of forestry (e.g., Yale, Duke, UC Santa Barbara). Of the other doctoral programs in environmental policy four deserve special mention. The University of California at Berkeley has a department of environmental science, policy and management within a College of Natural Resources, with a large doctoral program that covers issues ranging from ecosystem science to environmental history, environmental policy, and international forest management. Three other such programs have a stronger emphasis on energy: the University of Delaware through its Center for Energy and Environmental Policy, Georgia Tech through its School of Public Policy, and a small doctoral program in Energy, Resources and Environment at the School of Advanced International Studies of the Johns Hopkins University. The program at SIU also offers a concentration in energy. As shown below in Table 1, there are four basic program models for structuring a doctoral program in environmental and energy policy.

The intellectual foundation for this proposal is the belief that there is a significantly growing need for innovative and interdisciplinary solutions to the growing problems of sustainable energy development and mitigation of global climate change, which requires in-depth study and analysis.
beyond a 2-year masters degree. The proposed program at Michigan Tech will therefore expand upon our masters-level curriculum and uniquely combine interdisciplinarity in support of the Michigan Tech and national goal of sustainable development, with a strong focus on energy as well as environmental policy. Such a doctoral program is lacking in the State of Michigan and few exist nationwide. This requires the addition of a few courses that focus on energy resources, energy efficiency, and energy and sustainability policy. It will be structured as a hybrid that combines elements of the MSU/SIU and Delaware models, though on a smaller scale, and would take advantage of our strong skills in working across social, natural and applied sciences in the pursuit of research and teaching on environmental sustainability. Moreover, housing the central administration in the Department of Social Sciences will help to give the program a clear home, identity, and center of authority and responsibility. However, if other units at Michigan Tech, especially the School of Business and Economics, add new faculty with specialties that complement this proposal, it is envisioned that the proposal may be modified so that other academic units can play an even larger role. Our major focus on energy is reflected in the research publications and projects of EEP program faculty, many of whom are currently actively engaged in interdisciplinary bioenergy-related research projects and teaching. This is expected to be a distinct advantage as there are very few doctoral programs in the U.S. in energy policy.

Table 1. Alternative Models for a Ph.D. Program in Environmental & Energy Policy

<table>
<thead>
<tr>
<th>Model</th>
<th>Administration</th>
<th>Strength</th>
<th>Weakness</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Policy, Internat. Studies</td>
<td>Separate School or College</td>
<td>Institutional Support</td>
<td>One of Several Foci</td>
<td>Indiana, Georgia Tech, Johns Hopkins, Maryland</td>
</tr>
<tr>
<td>Environmental Science, Forestry, or Natural Resources</td>
<td>Separate School or College</td>
<td>Institutional Support</td>
<td>Less Visibility</td>
<td>UC Berkeley, Yale, Duke, Michigan, UCSB</td>
</tr>
<tr>
<td>Independent</td>
<td>Research Center or Single Dept.</td>
<td>Autonomy</td>
<td>Less Buy-in</td>
<td>Delaware</td>
</tr>
<tr>
<td>Umbrella</td>
<td>Campus-wide</td>
<td>Greater Buy-in Too Diffuse</td>
<td></td>
<td>MSU, SIU</td>
</tr>
</tbody>
</table>

4. Projected enrollment. We project an enrollment of between 5-10 students at any given time. While some students will enter the Ph.D. program following completion of an M.S. in environmental policy at Michigan Tech, eventually most students are expected to be new entrants to Michigan Tech from other states and nations.

5. Scheduling plans (Extension, Evening, Regular). All courses will be taught during regular daytime hours.

6. Curriculum design

Admitted students will have a B.S. or, preferably, an M.S. degree in one or more fields related to social sciences, public policy, or the environment. Assuming an M.S. degree in environmental
policy or the social dimensions of environmental issues, the student coursework requirement would take 2 years. If students do not have an M.S. degree in this field they would be expected to take 3 years of courses. These would include courses in research methods, research design, policy theory, advanced environmental policy analysis, and three courses in a specialty area preparing them for their dissertation focus. All students must meet the prerequisite of at least one microeconomics and one statistics course.

Once admitted to the Ph.D. program, students must:

- Complete 60 credits of coursework past their B.S. undergraduate degree. Thirty credits may come from their Masters degree work.
- Pass a comprehensive oral and written exam of their knowledge in areas related to their dissertation. This exam will be administered by a committee of 4 faculty members, at least one of who will be from outside the Department of Social Sciences.
- Conduct significant research supporting some aspect of a societal or organizational choice related to an environmentally related policy or program.
- Write and defend a dissertation as a final product.

The required coursework must satisfy the following (Bold = new course):

A) Core courses (12 credits)

All students will be required to take the following:

- **SS 5550 Global Environmental History (3 credits)** – will replace SS5100
- **SS 5300 Environmental Policy and Politics (3 credits)** – will be re-titled Environmental and Energy Policy
- SS 5400 Sociology of the Environment (3 credits)
- **SS5310 Ecological Economics (3 credits)** or EC 5650 Environmental Economics (3 credits)

B) Research Design and Methods courses (10-11 credits)

Students will be required to take the following two courses (additional methods courses can be taken to fit each student’s research needs):

- **SS 6002 Research Design (3 credits)**
- **SS 5001 Advanced Social Science Methods (4 credits)**

In addition, all students will also be required to take one of the following statistics courses:

- EC 4200 Econometrics (3 credits)
- PSY5220 Advanced Statistical Analysis and Research Design II (4 credits)
- MA 5701 Statistical Methods (3 credits)
C) Concentration courses (9 credits)

Students must choose at least three courses from one policy area: a) Energy Policy; b) Environmental and Natural Resources Policy; and c) Sustainable Development.

a. Energy Policy

EC 5620 Energy Economics
SS 6XXX Advanced Seminar in Energy Policy
MEEM 4200 Principles of Energy Conversion
MEEM 5990 Fuel Cell Technology
MET 4900 Alternative Energy Systems
EE 5200 Advanced Methods in Power Systems
EE 5260 Wind Power

b. Environmental and Natural Resources Policy

FW 4380 Landscape Ecology (will be renumbered as a SS 5000 level course)
SS/FW 5111 Advanced Natural Resource Policy
SS 5635 Environmental Diplomacy and Law
SS 4200 Environmental Anthropology
EC 5640 Natural Resource Economics
EC 5650 Environmental Economics
FW 55510 Advanced Forest Health

c. Sustainable Development

SS 5313 Sustainability Science, Policy and Assessment
ENG/SS 5510 Sustainable Futures I
ENG/SS 5520 Sustainable Futures II
ENG/SS 5530 Graduate Colloquium in Sustainability
BA 4790 Ecological Sustainability and Organizations
BA 5760 Corporate Social Responsibility & Business Ethics
UN 5100 Water Resource Colloquium

D) Unspecified credits (28-29 credits)

These credits include reading courses, research credits (between 12-18 credits), and any courses related to the student’s research interests.

7. New course descriptions

We will accommodate the teaching of new courses (some of which will replace existing courses) through moving existing graduate courses to every other year and through the addition of four EEP faculty hired to start between Spring 2009 & Fall 2010 (Mayer, Rouleau, Sinha & Mineyte).
SS 5550 Global Environmental History. Earth systems are now so entangled with human activity that it is difficult to understand one without considering the other. This course is a history of the interaction of the two. It links major developments in world history and environment change with important changes in how humans have interacted with and perceived their relationship to the rest of nature. Of particular interest are changes, debates, and choices that place the challenge of sustainability in historical perspective.

SS 6002 Research Design. The objective of this course is to explore the fundamentals of research design and analysis, particularly as these are applied to identifying, initiating, carrying out, and completing a thesis or dissertation research in Environmental and Energy Policy. The course would examine the concepts and structure of scientific inquiry such as inductive and deductive reasoning, ethical issues in research, and the nature of research design. During the course, the students would learn how to formulate appropriate research questions, and how to turn these into valid assessments of the real world. The course will briefly review various qualitative, quantitative and mixed methods used in social science research, and students would learn to understand the nature of variables, as well as how to collect and analyze. The course would also consider the use of primary historical and secondary sources of data.

SS 5001 Advanced Social Science Methods. This course provides a graduate-level introduction to social science methodology and highlights its role in research design, data construction, and data analysis. It exposes students to a variety of social science methods, emphasizing quantitative or mixed-methods approaches such as survey research. The course uses practical examples to highlight key concepts and techniques including: sample design, sampling error, data collection, hypothesis testing, linear and non-linear regression analysis, and advanced statistical or computational methods (i.e., GIS or computer simulation for experimentation). The course also underscores the importance of sampling frames, context and wording of survey questions, non-response data, interviewer/interviewee relations, sample estimation and error, and alternative research designs. The goal is to provide proficiency and encourage critical thinking for students preparing to engage in quantitative research in the social sciences.

SS 5310 Ecological Economics. This course will survey the emerging transdisciplinary field of ecological economics, which combines theories and methods from neoclassical economics, systems ecology, and other fields. Ecological economics starts with the preanalytical vision that the economy is a sub-system of the Earth’s ecological systems, not vice versa. Foundational issues include examination of the optimal scale of the human economy, efficient allocation of resources, and the equitable distribution of resource flows among populations and between humans and other species. Major applications of ecological economics, such as to energy and climate change problems, will also be reviewed.

SS 5313 Sustainability Science, Policy and Assessment. This course will cover foundational scientific concepts, such as dynamic systems and catastrophe theory, as applied to socioecological systems, and the use of indicators and their aggregation into quantitative indices to track the progress of these systems towards sustainability targets and goals. The course will also review policies that have been implemented at the local, national, and global scale to guide the sustainable development of socioecological systems.
SS/FW 5111 Advanced Natural Resource Policy. This course surveys basic important federal policies related to water, land, forest, mineral, and wildlife and fisheries management. It uses policy analysis tools to understand the theory and study of policy development and implementation.

SS 6XXX Advanced Seminar in Energy Policy. This course will examine current issues in energy policy, both domestically and internationally. Emphasis will be placed on policy instruments and treaties to develop renewable and sustainable energy sources and energy efficiency technologies, in the context of international efforts to reduce greenhouse gas emissions and growing scarcity of fossil fuels.

UN 5100 Water Resource Colloquium. This seminar will cover current topics in water resources. Objectives: (1) build towards a common literacy on water resources issues; (2) identify areas of common interest among students and faculty in water resources topics.

8. Additional resources required

Most of the resources required to construct this Ph.D. program are already in place serving the existing M.S. Program in Environmental Policy (EP). As of Fall 2010, the program will have 11 core and 6 affiliated faculty, 11 of whom have their primary appointments within the Department (Appendixes A). If the School of Business and Economics hires additional faculty in the environmental and energy fields, it is envisioned that additional economics faculty members may be added to this list. The current M.S. program is built around four core courses that are taught yearly. The faculty members who deliver these courses generally teach one graduate course per year, with the remainder of their teaching effort devoted to undergraduate students. The graduate courses taught as part of the M.S. program serve not only EP students, but graduate students across campus as well. The M.S. program will remain in place after the introduction of the Ph.D. program but will be re-evaluated after three years of experience with the Ph.D. program.

The proposed Ph.D. program will make several additional graduate courses—not all of which will need to be taught yearly—available to EP students and graduate students across campus. These will be met through making new and existing graduate courses offered on an every other year basis and through the participation of new faculty who have already been hired (two of whom are replacement hires and two of who are SFHI hires).

Given that the existing core faculty and the new required positions are also expected to support undergraduate departmental programs and the university’s general education program new PhD teaching assistantship lines are needed. Increasing the capacity of the core faculty to focus on funded research projects would require four graduate teaching assistantship (GTAs) positions to free up faculty resources now devoted to general education courses. Thus, some of the new PhD students will be expected to teach some of the department’s general education courses when the students have sufficient qualifications in the social sciences. These GTA lines would also provide a baseline of financial assistance for students in the program; beyond that baseline, students would be funded through extramural support associated with faculty research projects.
9. **Library and other learning resources.** The existing library hard copy and electronic journal, report, and book resources as augmented through occasional interlibrary loans are sufficient to support ongoing and future environmental and energy-related social science research.

10. **Computing Access Fee.** Same as for other graduate students in the department, current at $285 per student per academic year, which may need to rise to $325.

11. **Description of available/needed equipment.** Laboratory and office computers, same as for other graduate students in the department.

12. **Program costs, years 1 through 3.** $300,000. The major costs to the university will be the requested support for 4 additional Ph.D. GTAs based on fall plus spring term stipend of $11,769 (soon to rise) and tuition and fees of $13,134 per student, for a total of approximately $100,000 per year, or $300,000 total for years 1 through 3 (which assumes some annual increase. Note the EP Masters program currently has 5 GTAs). We would expect the Ph.D. students to teach some of the Department’s share of UN courses when they have sufficient qualifications and skills.

A second need is for space for several additional students beyond that associated with the current M.S. program. We anticipate that the new doctoral students will be housed in the existing Environmental Policy graduate student office, where space is limited. The Department will work with the Dean of Sciences and Arts to resolve space issues as they arise.

13. **Policies, regulations and rules.** No additional policies, regulations, or rules beyond those mandated by the Graduate School.

14. **Accreditation requirements.** Accreditation is not necessary for this program.

15. **Internal status of the proposal.**

   Department of Social Sciences, **September 23, 2009**, Date Approved **October 19, 2009**
   
   Dean, College of Sciences and Arts, **October 20, 2009**, Date Approved ____________
   
   Provost, __________, 2009, Date Approved ________________
   
   Graduate Faculty Council, __________, 2009, Date Approved ________________
   
   University Support Units, __________, 2009, Date Approved ________________
   
   University Senate, __________, 2009, Date Approved ____________
   
   Academic Affairs Officers, __________, 2009, Date Approved ________________
   
   Board of Control, __________, 2009, Date Approved ________________

16. **Planned implementation date.** Fall 2010
APPENDIX A: Affiliated Faculty Specialty Areas & Faculty Resumes (* designates core faculty). Curriculum vitae included at the end.

Bradley Baltensperger*, Geography (CLS)

Dr. Baltensperger is a geographer with particular interests in agriculture, ethnicity, natural hazards, and global environmental systems. His recent work has focused on improvement of geoscience, geography, environmental and history education in K12 schools through programs that enhance teachers’ content knowledge and ability to improve student learning. He has advised 21 master’s students and has served on over 35 other masters and doctoral committees at Michigan Tech.

William Breffle, Environmental Economics (SBE)

Dr. Breffle is an applied microeconomist specializing in environmental and natural resource economics. His areas of expertise include non-market valuation, discrete choice modeling, benefit-cost analysis, restoration program planning, and health economics for over ten years. Prior to joining Michigan Tech, he conducted and managed economic research primarily for testimony for large Natural Resource Damage Assessments (typically at Superfund sites) involving mining injuries, petroleum spills, health advisories, groundwater contamination, and other injuries. He has done work in 13 states for a variety of Federal, state, local, and tribal clients. He has supervised 1 masters student at Michigan Tech.

Gary Campbell*, Mineral Economics (SBE)

Dr. Campbell is the Director of the M.S. Program in Applied Natural Resource Economics in the School of Business and Economics at Michigan Tech. He has experience in China, Ethiopia, Mongolia, and South Africa. Metal markets and mining sustainability are areas of current research interest. He has supervised 10 masters students and served on 40 other masters and doctorate committees. He has also been the external examiner on 5 doctorate theses for the University of Witwatersrand, South Africa.

Mary Durfee, Political Science (SS)

Dr. Durfee publishes on the Great Lakes of North America and international environmental law. Her research interests are in two areas. First is third-party intervention before international courts and duties erga omnes in public international law. Second is information transparency in the development of treaties. She currently serves as an appointed member of the EPA Science Advisory Board’s Homeland Security Advisory Committee. She was a Fulbright Scholar to Malta in 2007-08 where she taught international law and international relations as well as various speaking and environmental education events at the request of the U.S. Embassy.

Louise Nelson Dyble, History and the Built Environment (SS)

Dr. Dyble specializes in the history of technology, infrastructure and the built environment, and metropolitan government and governance. Her book, Paying the Toll: Local Power, Regional Politics, and the Golden Gate Bridge (2009), traces the history of the bridge in the context of regional politics, development and planning. Her ongoing research includes a study of road and highway financing in the United States with a focus on turnpike authorities and the changing politics of public enterprise and privatization. She is also engaged with study of business/government relations and the development of California agriculture.
Hugh Gorman*, Environmental History and Policy (SS)

Dr. Gorman is a historian trained at the intersection of environmental history and the history of technology. He studies interactions between policy choices, technological innovation, and environmental change—with the goal being to inform efforts to construct policies that reward sustainable practices. He is working on a book that examines how industrial society first learned to bypass ecological limits associated with production of fixed nitrogen and now is learning to manage the consequences. Past work includes a history of how, in the period 1890 to 1990, socio-technological systems for producing, transporting, and refining oil evolved in response to pollution-related concerns and policies aimed at addressing those concerns.

Kathleen Halvorsen*, Sociology of Natural Resources (2/3 SS/1/3 SFRES)

Dr. Halvorsen is a sociologist of natural resources specializing in water and forest policy processes. Her current emphases are in woody bioenergy, climate change, and water resources policies. Her projects focus in the U.S. and Mexico. She has advised 20 masters and doctoral students and sat on an additional 40 doctoral and masters student committees from across campus during her career at MTU.

Carol MacLennan*, Anthropology (SS)

Dr. MacLennan is an anthropologist specializing in environmental anthropology and history. Her research on industrialization and environmental policy is both historical and ethnographic and currently located in Hawai‘i, and the Western U.S. She studies water histories, landscapes, and toxics in mining and sugar plantation communities. She has supervised nine graduate students in Environmental Policy and Industrial Archaeology and served on over 40 MS and Ph.D. graduate committees.

Audrey Mayer*, Sustainability Science (2/3 SS/1/3 SFRES)

Dr. Mayer is an ecologist with additional expertise in environmental policy. Her current research is focused on sustainability assessment, sustainable forest management, and biodiversity conservation. She has mentored graduate students while at the U.S. Environmental Protection Agency and at the University of Helsinki, and currently serves as the major advisor to one master’s student and one doctoral student, as well as a committee member for several theses and dissertations.

Alex Mayer*, Hydrology (CEE/GMES)

Dr. Mayer is Professor of Environmental and Geological Engineering and Director of the Center for Water & Society at MTU. His teaching and research focuses on human-biophysical interactions in water systems, water resources management and modeling, and groundwater flow, transport, and remediation and includes computational, field, and laboratory studies. The primary geographic settings for this work are the Laurentian Great Lakes and northwest Mexico. He has supervised 9 PhD and 19 masters committees and has sat on an additional 112 graduate student committees.

Diana Mincyte*, Rural and Environmental Sociology (SS)

Dr. Mincyte is currently a research fellow at the Rachel Carson Center for Environmental Studies, Ludvig Maximilians University-Munich and will join MTU’s Department of Social Sciences in 2010. As an environmental sociologist, she examines how the implementation of sustainable development policies affects land-use and occupational structures in the Global South. Her book project focuses on post-
socialist Europe and considers how local farmers and consumers negotiate the EU agro-food reforms and environmental regulations with their daily practices and incomes.

**Mark Roberts, Natural Resource Economics (SBE)**

Dr. Roberts studies the cycles in mineral and energy prices, especially metals and petroleum. He is currently writing a textbook on energy economics. Dr. Roberts has advised 22 master’s students, is currently advising six master’s students, and served on an additional 6 doctoral and 35 masters student committees from across campus during his career at Michigan Tech.

**Fredric L. Quivik, Environmental History (SS)**

Dr. Quivik is an historian of technology who has worked for fifteen years as an expert witness in Superfund and related environmental litigation. He has also worked for more than three decades documenting, preserving, and interpreting historic sites that have an industrial or engineering character. He studies the history of industrial systems, industrial landscapes, and energy history.

**Mark Rouleau*, Political Science (SS)**

Dr. Rouleau specializes in the application of advanced computational methods to complex international problems and processes. He has used Agent-Based Modeling to explore many environmental topics, such as land-use decision-making, the development of water-quality markets, international environmental policy-making, and the interplay of environmental factors and civil violence.

**Deb Ranjan Sinha*, Geography (SS)**

Dr. Sinha specializes in environment and development policy issues. His research uses the political ecology framework, and incorporates environmental history and GIS analysis. His past research include implementation of community forestry in Nepal, land use/land cover change in response to market liberalization in India, and impact of legacy pollution on redevelopment in deindustrialized urban spaces in the U.S.

**Barry Solomon*, Ecological Economics and Economic Geography (SS)**

Dr. Solomon is a specialist in energy and environmental policy, and policy instruments for environmental protection. He serves as the director of Michigan Tech’s masters program in environmental policy. His current research emphases include sustainable biofuels, wind power, climate change, greenhouse gas markets, and nuclear waste management. His main projects focus on the U.S. and Sweden. He has advised 10 masters and doctoral students and sat on an additional 24 doctoral and masters student committees.

**Andrew Storer, Insect Ecology (SFRES)**

Dr. Storer studies insect/fungus/plant interactions, impacts of exotic species on forest ecosystems, interactions among fire, insects and disease in forests and urban forest health. His research projects currently focus on insect, disease, weed and fire issues in the U.S. Midwest, California and Ghana. He has advised or is advising 22 masters and doctoral students and has sat on an additional 22 doctoral & masters student committees.
Barry D. Solomon  
Professor of Geography and Environmental Policy  
Department of Social Sciences  
Michigan Technological University  
1400 Townsend Drive  
Houghton, MI 49931-1295  
phone: (906) 487-1791; email: bdsolomo@mtu.edu

Education
University of California, Irvine, B.A. Social Ecology, 1977  
Indiana University, M.P.A. Environmental Policy, 1979  
Indiana University, Ph.D. Regional Analysis & Planning, 1983

Experience

2003 - date  Professor of Geography & Environmental Policy, Michigan Technological University, Dept. of Social Sciences. Associate, Sustainable Futures Institute.  
2008, fall  Visiting Scholar, Center for Public Sector Research, University of Gothenburg, Sweden.  
2002 - 2003  Visiting Associate Professor, Bren School of Environmental Science & Management, University of California at Santa Barbara, and Department of Environmental Studies, University of California at Santa Cruz.  
1995 – 2002  Associate Professor of Geography and Environmental Policy, Michigan Technological University, Department of Social Sciences.  
1984, fall  Consumer Energy Council of America, Washington, DC, Research Associate.  
1982 - 1984  West Virginia University, Visiting Assistant Professor of Geography & Energy Economics, and Research Associate, Regional Research Institute.

Selected Publications (over 160 total)

Solomon, B.D. and Johnson, N.H. Valuing climate protection through willingness to pay for biomass


Synergistic Activities

Dr. Solomon is the founder and past president of the United States Society for Ecological Economics. At Michigan Tech, environmental and energy policy research by Dr. Solomon has been conducted since 2003 under the auspices of the Sustainable Futures Institute (SFI) at Michigan Technological University (MTU), which he helped to establish, and he has been working with several collaborators since the late 1990s. The SFI has been an especially effective way to collaborate across disciplines on complex problems in the environmental, natural resources, economics, and energy fields. In addition, he previously worked on several interdisciplinary, sponsored research projects at MTU’s Institute of Materials Processing, Power and Energy Research Center, and the former U.S. EPA supported Center for Clean and Industrial Treatment Technologies.

Current Professional Organizations

U.S. Society for Ecological Economics (founder and past president)
International Society for Ecological Economics
Association of American Geographers
International Association for Society and Natural Resources
American Association for the Advancement of Science
Kathleen E. Halvorsen
Associate Professor of Natural Resources Policy
Joint Appointment Department of Social Sciences/
School Forest Resources and Environmental Sciences
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Education


Experience

2002 – date Associate Professor, Michigan Technological University.
1995- 2001 Assistant Professor, Michigan Technological University.

Selected Relevant Peer-Reviewed Publications


- **Supervised student**

**Synergistic Activities**


Lead organizer (with Dennis R. Becker and Clare Hinrichs) of Sessions 1-5 on the Social Dimensions of Biomass Energy at International Symposium on Society and Resource Management (ISSRM) at Burlington VT. June 2008.

Graduate Director, Environmental Policy Masters Program; Sustainability Faculty Hiring Initiative Committee Member; Advisory Board Member Center for Water and Society, Affiliated Faculty Member with the Sustainable Futures Institute and the Center for Water and Society at Michigan Technological University.

Associate Editor, \textit{Society and Natural Resources}; Editorial Board, \textit{Environmental Management}; 2\textsuperscript{nd} Vice President, \textit{Society for Human Ecology}; Council Member, \textit{International Association on Society and Natural Resources}.

**Collaborators:** Clare Hinrichs, Pennsylvania State University; Theresa Selfa, Kansas State; Dennis Becker, University of Minnesota; Cass Moseley, University of Oregon; Sarah McCaffrey and Pamela Jakes, USFS. PhD Advisor: Margaret Shannon, University of Vermont.

**Graduate advisees currently (6):** PhD in Forest Science, Andrew Kozich; MS in Environmental Policy: Susan Balint, Karl Makinen, Chris Hohnholt, Brian Pattullo. Co-advising Doctoral Student in Environmental Engineering with Alex S. Mayer: Agustin Robles Morua. **Graduated within past three years (5):** Smriti Dahal (MS in Environmental Policy), Gerald K Greer (MS Environmental Policy), Matthew Zumstein (MS Forestry), Joy Wang (MS Environmental Policy), Melanie Barbier (MS Environmental Policy).
Hugh S. Gorman  
Associate Professor of Environmental History and Policy

Department of Social Sciences  
Michigan Technological University  
Houghton, Michigan 49931  
hsgorman@mtu.edu  
(906) 487-2366 (office)  
(906) 487-2468 (fax)

Education
Ph.D., History and Policy, Carnegie Mellon University, August 1996.  

Academic Positions
Associate Professor of Environmental History and Policy, Michigan Technological University 2002 - present
Haas Fellow, Beckman Center for the History of Chemistry, Chemical Heritage Foundation, 2003 - 2004  
Assistant Professor of Environmental History and Policy, Michigan Technological University 1996 - 2002

Research Interests
I study the historical interactions between policy choices, technological innovation, and environment change, with the main goal being to inform efforts to construct policies that are environmental sustainable, economically viable, and socially just.

Publications

Books

Edited Volumes
Hugh S. Gorman and Alex Farrell, eds., Monitoring the Environment: Taking a Historical Perspective, special issue of Environmental Monitoring and Assessment 106 (July 2005).

Journal Articles and Book Chapters

Courses Taught

Environmental Decision Making (1997 to 2006): Graduate-level group practicum in which students study and contribute to an environmental decision-making process.

Global Environmental Systems (2006-present). Graduate-level course that examines different approaches to understanding links between economies and ecologies.

U.S. Environmental History (1997 to present): Examines how environments, uses of the environment, and perceptions of nature have changed since colonization.

Science, Technology, and Society: Interactions and Interrelationships (1996 to present): Examines how scientific advances and technological innovations have influenced and been influenced by ethical and political choices.

Institutions: Capitalism, Democracy, and Globalization (2000 to 2006): Introductory course that examines how key institutional systems have changed over time.


Western Civilization (1996 to 2000): A one semester course in Western Civilization.

Current Professional Organizations

American Society for Environmental History
Society for the History of Technology
    Treasurer, 2008 – present
    Envirotech special interest group, co-chair 2006 - present
Education

University of California, San Diego. History. B.A. 1970
University of California, Berkeley. Anthropology. M.A. 1971
University of California, Berkeley. Anthropology. Ph.D. 1979

Experience

Associate Professor of Anthropology. Social Sciences Department. Michigan Technological University. 1985- present.
Lecturer, Department of Anthropology. Sonoma State University. 1978
Community Development Specialist, Hopi Tribal Council, Oraibi, AZ. 1973-74.

Professional Societies


Honors, Awards, Professional Service


Research Fields

Political ecology, industrial communities (mining, sugar cane), environmental policy (toxics; mining), democracy and public policy
Publications

Audrey L. Mayer  
Assistant Professor in Ecology and Environmental Policy  
Michigan Technological University  
Department of Social Sciences &  
School of Forest Resources and Environmental Sciences  
209 AOB, 1400 Townsend Dr.  
Houghton, MI 49931  
+1.906.487.3448  
almayer@mtu.edu

Education:

Major: Ecology and Evolutionary Biology (minor in Environmental Policy)  
Dissertation: Cape Sable seaside sparrow (Ammodramus maritimus mirabilis) habitat and the Everglades: Ecology and conservation.

Major: Biology/Public Policy Analysis  
Theses: Habitat selection of the California gnatcatcher (Polioptila californica); The Natural Communities Conservation Plan: A problematic solution to species conservation.

Positions Held:

Assistant professor, Ecology and Environmental Policy, Michigan Technological University (01/2009 to present)  
Docent (adjunct professor) in Environmental Policy, University of Helsinki (02/2007 to date)  
Researcher, University of Helsinki, Faculty of Biosciences (01/2007 to 12/2008)  
Researcher, University of Tampere, School of Economics and Business Administration (01/2006 to 12/2006)  
Ecologist, US Environmental Protection Agency, Office of Research and Development, National Risk Management Research Laboratory, Sustainable Technologies Division, Sustainable Environments Branch (06/2002 to 01/2006)  
Adjunct assistant professor, University of Cincinnati, Department of Biological Sciences (04/2002 to 01/2006)  
Post-doctoral research associate, USEPA, ORD, NRMRL, STD, SEB (09/2001 to 06/2002)  
Post-doctoral research associate, University of Cincinnati, Department of Biological Sciences (02/2000 to 09/2001)

Courses Taught:

Michigan Technological University
SS 3300 “Environmental Problems” (Spring 2009, 2010)  
SS 3930 “Environmental Issues” (Fall 2009)  
UN 1001 “Developing a Sustainability Mindset” (Fall 2009)  
FW 4380 “Landscape Ecology” (Spring 2010)

University of Helsinki
“Natural scientific literature on environmental protection”, University of Helsinki (Spring 2007)
University of Cincinnati
BS 604 “Ornithology”, University of Cincinnati (Fall 2003)
“Foundations of Ecology” graduate seminar, University of Cincinnati (Fall 2002)
“All about birds”, University of Cincinnati – Communiversity (Fall 2001 and 2002)

University of Tennessee, Knoxville (Graduate Teaching Assistant, Fall 1995 through Fall 1999)
Tutor, biology, ecology, genetics and animal sciences, Women’s Athletic Department (Fall 1996
through Spring 1998)

Pomona College
General Biology instructor (Spring 1995)

Selected Recent Peer-Reviewed Publications:

Mayer AL, L Vihermaa, N Nieminen, A Luomi, M Posch. 2009. Epiphytic macrolichen community
correlates with modeled air pollutants and forest conditions. Ecological Indicators 9:992-1000.
Mayer AL. 2008. Ecologically-based approaches to evaluate the sustainability of industrial systems.
Mayer AL. 2008. Strengths and weaknesses of common sustainability indices for multidimensional
Cabezas H, CW Pawlowski, HW Whitmore, and AL Mayer. 2007. On the sustainability of an integrated
model system with industrial, ecological, and macroeconomic components. Resources, Conservation
and Recycling 50:122-129.
Hopton ME and AL Mayer. 2006. Using Self-Organizing Maps to explore patterns in species richness
Mayer AL and PM Tikka. 2006. Biodiversity conservation incentive programs for privately owned
Mayer AL, CW Pawlowski and H Cabezas. 2006. Fisher information and dynamic regime
Mayer AL, PE Kauppi, PM Tikka, and PK Angelstam. 2006. Conservation implications of exporting
domestic wood harvest to neighboring countries. Environmental Science and Policy 9:228-236.
Mayer AL, PE Kauppi, PK Angelstam, Y Zhang and PM Tikka. 2005. Importing timber, exporting
Diana Mincyte

US Office Address: Department of Advertising
University of Illinois, Urbana-Champaign
103 Gregory Hall
810 S. Wright Street
Urbana, IL 61820

Home Address:
403 W. Hill Street. Apt. #4
Champaign, IL 61820

Email: mincyte@illinois.edu
Phone: 217-352-7737

Education

PhD University of Illinois at Urbana-Champaign, IL; Sociology, October 2006
Dual MA Bowling Green State University, OH; American Culture Studies and Popular Culture, August 1999
MA Vytautas Magnus University, Lithuania; English, June 1997
BA Vytautas Magnus University, Lithuania ; English, June 1995

Experience

October 2009 – Present Research Fellow, Rachel Carson Center for Environmental Studies, Ludvig Maximilians University-Munich, Germany
August 2006 – August 2009 Visiting Assistant Professor, Advertising; University of Illinois, Urbana-Champaign

Research Areas

- Environmental Justice, Land-Use, Global Inequalities
- Food Systems, Alternative Agro-Food Economies
- Consumer Societies and Gender
- East Europe, Post-Socialism, Globalization, Westernization
- Historical and Qualitative Research Methods, Video Ethnography

Selected Publications

Edited Volumes:


Articles:


Teaching Experience

List of Excellent Teachers as Ranked by Their Students 2005-Present, Eight Courses

Undergraduate Courses (University of Illinois, Urbana-Champaign unless noted otherwise)

Environmental Communications; Sustainability and Consumption; Body Image in Consumer Culture; Global Studies in Consumer Culture; Post-Socialism: Economy; Culture and Power in East Europe; Africa in World Perspective; Introduction to Popular Culture (Bowling Green State University)

Graduate Courses (University of Illinois, Urbana-Champaign)

Green Consumerism and Environmental Advocacy; Globalization and Anti-Globalization; Advertising in Communications; Consumer Behavior and Decisions
Bradley H. Baltensperger  
Professor of Geography  
Chair, Department of Cognitive & Learning Sciences  
Michigan Technological University  
Ph: 906-487-2425; Email: brad@mtu.edu

Education

Ph.D., 1974, Clark University, Geography  
B.A., 1969, University of Nebraska, History

Employment

1974-present  Michigan Technological University  
2001-present  Chair, Department of Cognitive & Learning Sciences  
1995-2001  Director, Environmental Policy Program  
1994-present  Professor of Geography  
1987-1990  Head, Department of Social Sciences  
1990-1991  Gastprofessor and Fulbright Fellow, Philipps-Universität, Marburg, Germany

Selected Publications

Book


Articles

Reviews


Papers Presented

Approximately 30 papers presented in Germany, Czech Republic, Canada, Barbados, and the U.S., including to the Association of American Geographers, the International Geographical Union, Western History Association, American Society for Engineering Education, Society for Risk Analysis, and the Eastern Historical Geography Association.

Public Service

Michigan Association of School Boards, Board of Directors, 1992-present; President, 1999-2000
Convener and Chair, Michigan Education Accountability Task Force, 1999-2001
Houghton-Portage Township School Board, 1988-present; President, 1997-2000; 2006-present
Copper Country Association of School Boards; President, 1999-2000

Selected Professional Activities

Association of American Geographers
International Research and Scholarly Exchange Committee, 1994-2000
Chair, Rural Development Specialty Group, 1994-98

Manuscript Referee for:

- Great Plains Research
- Journal of Geography
- Professional Geographer
- Johns Hopkins University Press
- Oxford University Press
- John Wiley & Sons
- McGraw-Hill

- Great Plains Quarterly
- Agricultural History
- Journal of Soil and Water Conservation
- Prentice-Hall
- University of Nebraska Press
- Harper Collins
- W. H. Freeman & Co.

Proposal Referee for:

- National Science Foundation
- Smithsonian Institution
EDUCATION

Present
George Mason University
PhD Computational Social Science

5/2006
University of Delaware
MA Political Science and International Relations

5/2004
Michigan Technological University
BS Computer Science (Minor in Social Sciences)

EXPERIENCE

George Mason University
Funded by the Office of Naval Research (MURI)
Partners: Yale University and the U.S. Dept. of State
Research Assistant
Developed a computer simulation that explored the interplay between environmental constraints and civil unrest/war using Agent-Based Modeling.

U.S. Department of Agriculture
Assistant Economist
Led a pilot study investigating the application of Agent-Based Modeling in the development of water quality trading markets. Also involved in efforts to assess the economic impact of ethanol transportation to fueling facilities.

George Mason University
Funded by The Joyce Foundation
Partner: Harvard University
Research Assistant
Developed an automated voter-redistricting program utilizing computational optimization techniques (i.e. Simulated Annealing).

University of Delaware
Funded by The National Science Foundation
Research Assistant
Developed an Agent-Based Model to investigate the emergence of international environmental norms and to assess their impact upon international climate change and global warming negotiations.
AWARDS

- Nominated Outstanding Teaching Assistant (Fall 2005)
- Recognition of Outstanding Research at George Mason (Fall 2008)
- Selected as George Mason’s representative to Virginia’s Outstanding Research forum (February 2009)

PUBLICATIONS


PAPERS & POSTERS PRESENTED


2009 (Feb.) Rouleau, Mark. “Agent-Based Modeling in the Social Sciences,” presented at the Virginia Outstanding Research Forum in Richmond, VA.


Deb Ranjan Sinha
Department of Social Sciences
Michigan Technological University
Phone: 906-487-1843
Email: debsinha@mtu.edu
Internet: www.singho.net/deb

EDUCATION

2009  Ph.D. Geography, Graduate School of Geography, Clark University, Worcester, USA.
2003  M.A. Geography, Department of Geography, University of Illinois, Urbana-Champaign, USA.
1998  M.S. Ecology, Salim Ali School of Ecology and Environmental Sciences, Pondicherry University, Pondicherry, India.
1996  B.Sc. (Honors) Zoology, Hindu College, University of Delhi, New Delhi, India.

AREAS OF SPECIALIZATION

- Political Ecology (Third World, First World, Urban)
- Geography of Development
- Environmental History
- Spatial Analysis & Modeling using GIS

ACADEMIC ACHIEVEMENTS

Publications

Peer-reviewed Publications

Thesis and Dissertation

Fellowship/Scholarship/Financial Aid Received

- Pruser Holzhauer Graduate Enhancement Funds ($500) from Clark University.
- Human Dimensions of Environmental Systems Scholars Fellowship ($5,000) from the University of Illinois, Urbana-Champaign.
- Travel grant ($1,000) from the Department of Geography, from the University of Illinois, Urbana-Champaign.
- Graduate College Fellowship ($1,000) from the University of Illinois, Urbana-Champaign.
- **Fred W. and Demetra Foster Fellowship** ($1,000) from the Department of Geography at the University of Illinois, Urbana-Champaign.
- **Fellowship** (INR 10,000) from the French Institute of Pondicherry for Master’s Thesis research.
- Recipient of **Teaching Assistantships** and **Full Tuition Waivers** from the University of Illinois and Clark University.

**Professional Membership** – Association of American Geographers.

---

**PROFESSIONAL EXPERIENCE**

**Research Experience**

- **May 2005 – July 2007**<br>**Research Assistant**, Strengthening Vulnerable Communities in the Worcester Built Environment Project, George Perkins Marsh Institute, Clark University
- **May 2004 – April 2005**<br>**Brownfield Assistant**, City of Worcester, Worcester, USA.
- **November 2000 – August 2001**<br>**GIS Consultant and Researcher**, for Center for the Study of Institutions, Populations and Environmental Change (CIPEC), Indiana University, Bloomington, USA.

**Teaching Experience**

- **August 2009 – ongoing**<br>**Assistant Professor**, Department of Social Sciences, Michigan Technological University, Houghton, USA.
- **August 2008 – May 2009**<br>**Instructor**, Department of Geography and Urban Studies, Temple University, Philadelphia, USA.
- **August 2002 – May 2004**<br>**Teaching Assistant**, Graduate School of Geography, Clark University, Worcester, USA.
- **August 2000 – May 2002**<br>**Teaching Assistant**, University of Illinois, Urbana-Champaign, USA.

**Non-Profit Work Experience**

- **August 1998 – September 1999**<br>**Program Officer**, World Wide Fund for Nature – India (WWF-India), New Delhi, India. Coordinated and monitored conservation projects funded by the organization; liaised with various funding agencies regarding ongoing and future projects.
- **June 1998 – July 1998**<br>**Research Associate**, Centre for Women’s Development Studies (CWDS), New Delhi, India. Conducted literature review on the role of women in the Joint Forest Management program in the state of West Bengal, India.

**COMPUTER SKILLS**

- **Statistical Softwares**: SPSS, S-Plus, STATISTICA.
- **Other Softwares**: MS Office Suite, Endnote.
- **GPS**: Garmin, Magellan and Trimble.
Mary H. Durfee  
Associate Professor of Government  
Department of Social Sciences  
Michigan Technological University  
Houghton, MI 49931-1295  
906-487-2112, mhdurfee@mtu.edu.

Education  
M.A. Cornell, 1983  

Professional Service and Consulting  
Member, E.P.A. Science Advisory Board’s Homeland Security Advisory Committee. 2005-  
Consultant, WestED, for an NSF IGERT program review 2001-2002. Also, consulted at the ABT  
Consultant/member of Environmental Protection Agency, Science Advisory Board, Committee on  
Environmental Engineering, Subcommittee on the Diffusion and Adoption of Innovations in Environmental  
Visiting Professor/consultant, University of Malta, 2008-Present

Selected Recent Publications  
Collaborative Effort to Improve Sanitation in a Marginalized Community in Northwest Mexico,”  
Haapala, K. R., M. J. Hutchins, J. L. Rivera, V. Kumar, A. R. Clarke, T.D. Eatmon, R. A. Harris, M. H.  
Durfee, J. R. Mihelcic, D. R. Shonnard, and J. W. Sutherland, 2007, “Education, Research, and  
Training Aspects of the Sustainable Futures NSF IGERT Project,” *Proceedings of the 2007 ASEE  
North Midwest Sectional Conference*, September 20-22, Houghton, MI  
Shamir, M., Shamir, L., and M.H. Durfee, “The Application of Fuzzy Logic to the Precautionary  

Teaching  
In the past I taught Environmental Decision making, International Environmental Technology Policy, and  
co-taught with David Shonnard (Chemical Engineering) Sustainable Futures I. In spring 2010 I’ll teach a  
new course, International Environmental Law and Diplomacy.
MS Environmental Policy Student Theses Directed

*Public Participation and the Creation of a Sewage Lagoon in Tesopaco, Mexico by Agustin Robles Morua, 2005.

* chaired.
Louise Nelson Dyble  
Department of Social Sciences  
Michigan Technological University  
(906) 487-2189  
dyble@mtu.edu

EDUCATION

M.A., History, University of California, Berkeley 1999.

EXPERIENCE

2009-              Assistant Professor of History, Department of Social Sciences, Michigan Technological University, Houghton MI

2007-2009          Associate Director for Research, Keston Institute for Public Finance and Infrastructure Policy, School of Planning, Policy and Development, University of Southern California, Los Angeles, CA

2006-2007          Weisman Fellow, Division of the Humanities and Social Sciences, California Institute of Technology, Pasadena CA

2005-2006          Visiting Assistant Professor, St. Martin’s University, Lacey WA

2003-2005          Postdoctoral Fellow, Department of Environmental Science, Policy, and Management, University of California, Berkeley.  
                    Kevin Starr Fellow in California Studies (2004-2005)

SELECTED PUBLICATIONS


“Reconstructing Transportation: Linking Tolls and Transit for Place-Based Mobility,” Technology and Culture 50 (July 2009).

“Revolt Against Sprawl: Transportation and the Origins of the Marin County Growth Control Regime.” Journal of Urban History 34 (Nov. 2007). Michael C. Robinson Award for best essay or article in public works history.


CURRENT RESEARCH

Paying for Pavement: Turnpikes, Toll Roads and Economic Ideology - A book project exploring the changing political economy of transportation infrastructure in global context from the 1970s to the present. With funding from the Keston Institute and the Smith Richardson Domestic Public Policy Fellowship, 2008-2009.

Indulgence or Innovation? Alternative Foods in the San Francisco Bay Area, a collaborative book co-authored with Michael De Alessi, Sally K. Fairfax, Matthew Gerhart, Greig Tor Guthey, Lauren Gwin, and Jennifer Sokolove. Sponsored by the Department of Environmental Science, Policy and Management, UC Berkeley.

Controlled Cornucopia: California Agriculture the Industrialization of Fruit and Vegetables in America - A book project exploring post-1945 agricultural policy with a focus on state-level government and politics and the consolidation and standardization of production, distribution, and marketing.

TEACHING

The History of Planning and Development. University of Southern California School of Planning, Policy and Development upper-division lecture course, Fall 2008.


American Environmental History. St. Martin’s University upper-division seminar, Spring 2006.


From Railroads to Automobiles: Politics, Development, and Transportation in United States History. UC Berkeley upper-division seminar, Fall 2000.

San Francisco Politics, 1850-1950. UC Berkeley senior research seminar, Spring 1999.


PROFESSIONAL ACTIVITIES AND SERVICE

Board of Trustees, Public Works Historical Society, July 2009-present.
Board of Directors, Urban History Association, January 2008-present.
Society for American City and Regional Planning, Conference Arrangements Committee, 2009.
Kenneth Jackson Award Committee (best book), Urban History Association, 2008.
Fredric L. Quivik  
Department of Social Sciences  
Michigan Technological University  
flquivik@mtu.edu

Education

University of Pennsylvania, PhD, History and Sociology of Science, 1998

Columbia University, M.S. in Historic Preservation, 1977

University of Minnesota, Bach. of Environmental Design, School of Architecture, 1975

St. Olaf College, B.A. in Art, 1971

Recent Employment History

Associate Professor of History, Michigan Technological University, beginning in January 2010.


Select Scholarly Publications

“Engineering Nature: The Souris River and the Production of Migratory Waterfowl,” forthcoming in *History and Technology*.


Recent Scholarly Presentations


Courses Taught

“Energy in American History” University of Pennsylvania
“Law, Environment, and Technology in America”
“Introduction to Environmental History”
“History of American Technology”

“Technology and the American Experience” University of California at Berkeley
“Technology and Society”
“History of American Science and Technology”

“History of American Architecture” Montana State University
“History of Gothic and Renaissance Architecture”
Gary A. Campbell  
School of Business and Economics  
Michigan Technological University  
1400 Townsend Drive  
Houghton, Michigan 49931-1295  
Telephone: (906) 487-2808  
e-mail: gacampbe@mtu.edu

EDUCATION

M.S., Economics (natural resources economics), 1980, Iowa State University.  
B.S., Economics, 1977, University of Missouri-Rolla.

EXPERIENCE

1982-2008: Professor of Natural Resource Economics, Adjunct Professor of Geological  
Mining & Engineering & Sciences (1994-present), Michigan Technological University.

March-May 2001: Visiting Lecturer, Department of Management and  
Economics, China University of Mining and Technology-Beijing

May-June 1998: Visiting Lecturer, Department of Mining Engineering,  
University of Witwatersrand (South Africa)

1990-91: Fulbright Visiting Professor of Economics, Addis Ababa University  
(Ethiopia).

University.

ADMINISTRATIVE DUTIES

Developed and established Michigan Technological University's M.S. program in Mineral  
Economics (name changed to Applied Natural Resource Economics). Currently, Program  
Coordinator.

RECENT COURSES TAUGHT

Economics of Natural Resources (undergraduate & graduate), Principles of Economics,  
International Economics, and Global Competition.
SELECTED JOURNAL ARTICLES


SELECTED PAPER PRESENTATIONS


“Copper in the Global Economy.” Invited Opening Presentation at the ALTA 2009 Copper Conference, May 28-29, 2009, Perth, Australia with Mark Roberts. Published in the *ALTA 2009 Copper Conference Proceedings*.


“The Debate over the Impact of Mining on the Environment and Sustainability in the Local Community,” with Christa Walck, Presented at the Annual Society for Mining, Metallurgy and Exploration Meeting, February 27, 2008, Salt Lake City, Utah.


William S. Breffle
Associate Professor of Environmental Economics
School of Business & Economics, Economics
Michigan Technological University
(906) 487-1959
Email: wsbreffl@mtu.edu

Education

Ph D, University of Colorado at Boulder, 1999.
Major: Economics
Supporting Areas of Emphasis: Environmental and natural resource economics, econometrics
Dissertation Title: Issues in Recreation Demand
Major: Economics
Supporting Areas of Emphasis: International finance and trade, quantitative economics, econometrics
BA, University of Colorado at Boulder, 1990.
Major: Economics

Experience

Associate Professor – School of Business & Economics (2007-2009).
Instructor, University of Colorado at Boulder. (2006).

TEACHING

Michigan Tech
EC 3001, Principles of Economics, 2 courses, Total SCH: 351.
EC 3100, International Economics, 4 courses, Total SCH: 552.
EC 4650, Environmental Economics, 1 course, Total SCH: 39.
EC 5650, Environmental Economics, 1 course, Total SCH: 15.
EC 5999, Graduate Research, 2 courses, Total SCH: 12.

Graduate Student Advising

Master's Thesis Committee Chair, Kristen Maroney, School of Business & Economics - Economics. (September 5, 2006 - May 2, 2008).
Selected Publications

Book Chapters


Refereed Journal Articles


Conference Proceedings

Mark C. Roberts  
Professor of Natural Resource Economics  
School of Business and Economics  
Michigan Technological University  
1400 Townsend Drive, Houghton, MI 49931  
Phone: 906-487-2771, Fax: 906-487-2944, mroberts@mtu.edu

EDUCATION

1974. B.S. (Mining Engineering). New Mexico Institute of Mining and Technology.

ACADEMIC EXPERIENCE

School of Business and Economics, Michigan Technological University  
8/99 to present. Professor of Mineral Economics  
8/90 to 8/99. Associate Professor of Mineral Economics.  
8/85-8/90. Assistant Professor of Mineral Economics.

BUSINESS and PROFESSIONAL EMPLOYMENT


SELECTED PUBLICATIONS


SELECTED RESEARCH GRANTS
• 2008. SBE Faculty Development Grant Award, “Travel for Energy Economics book Research” Funded for $3021.

SELECTED CONSULTING
• 1990-93: Expert witness for Richard D. Reed, Attorney representing the Township of Republic, Michigan in litigation concerning the specific iron ore tax for the Republic Mine, Michigan.
• Winter, 1987-88: Provide an independent review of the impact of proposed mining operations on the Town of Ladysmith and Rusk County, Wisconsin (with Dr. Gary Campbell).

CURRENT INSTRUCTIONAL ACTIVITIES
• Economic Decision Analysis (Engineering Economy)
• Econometrics
• Advanced Engineering Economy (graduate)
• Energy Economics (undergraduate)
• Energy Economics (graduate)
Alex S. Mayer

Department of Geological & Mining Engineering & Sciences
1400 Townsend Dr.
Michigan Technological University
Houghton, MI 49931-1295

Office: (906) 487-3372
Fax: (906) 487-3371
Home: (906) 483-0818
Cell: (906) 370-1287
Email: asmayer@mtu.edu

Education
Brown University, Sc.B. Civil/Environmental Engineering, 1981
University of North Carolina at Chapel Hill, M.S. Environmental Engineering, 1987
University of North Carolina at Chapel Hill, Ph.D. Environmental Engineering, 1992

Experience
September 2005-present: Director, Michigan Technological University Center for Water & Society
September 2002-present: Professor
September 1998-August 2002: Associate Professor
March 1992-August 1998: Assistant Professor
Department of Geological Engineering and Sciences
Michigan Technological University, Houghton, MI
September 2000-May 2001: Visiting Professor
Department of Civil Engineering and Geosciences
Technological University of Delft, Netherlands
August 1995-November 1995: Visiting Professor
Department of Chemical Engineering
University of Sonora
1981-1985: Civil Engineer
Water Resources Projects Section, Planning Division
East Bay Municipal Utility District, Oakland, CA

Selected Publications (66 refereed journal articles, proceedings articles and book chapters)


**Current Research Projects**

GK12: GlobalWatershed: Integrating Rural and Global Perspectives with Research and Technological Advances, PI, National Science Foundation, $2,500,000, 9/09 to 8/14.

Biocomplexity of Hydrological Service Payments and Watershed Sustainability in Mexico, co-PI, National Science Foundation, Planning Grant, $38,500, 9/09 to 8/10.

Enhancing the Capacity for Sustainable Forest Management and Ecosystem Service Provisioning in Chiapas and Oaxaca, PI, US Agency for International Development, $290,000, 09/08 to 08/11.

SustR: Sustainable Development for Rural Communities- Social, Health, Economic, and Environmental Advances, PI, US Department of Education, $180,000, 09/08 to 08/12.

Graduate Student Scholarships to Advance a Global Outlook of Economic and Social Prosperity that Protects the Environment, co-PI, National Science Foundation, Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) $599,978, 6/08 to 5/12.

Modeling and Analyzing the Use, Efficiency, Value and Governance of Water as a Material in the Great Lakes Region through an Integrated Approach, PI, National Science Foundation, $1,078,000, 09/07 to 08/12.

Sustainable Wastewater Management in the Rio Sonora Basin, Mexico, PI, Consejo Nacional de Ciencia y Tecnologia (Mexico), $80,000, 01/04 to 12/10.

**Selected, Past Projects**

Watershed Management Plan for Huron Creek Watershed, PI, Michigan Department of Environmental Quality, $74,000, 09/07 to 12/08.

Michigan Tech-UNISON Linkage: Training a Core of Water Resources Experts, PI, U.S. Agency for International Development, $787,000, 03/03 to 08/06.

Multi-Objective Decision-Making for Environmental Remediation, PI, Environmental Protection Agency, $292,000, 09/98 to 05/03.

Multi-Scale Investigation of Mass Transfer Limitations in Surfactant-Enhanced Aquifer Remediation, PI, Environmental Protection Agency, $474,000, 11/96 to 10/01.
Andrew J. Storer  
School of Forest Resources and Environmental Science  
Michigan Technological University,  
1400 Townsend Drive, Houghton, Michigan, 49931, USA  
Telephone: (906) 487-3470, Email: storer@mtu.edu, Fax: (906) 487-2915

Education

St. Anne's College, University of Oxford. Pure and Applied Biology. B.A. (Hons) 1986  
St. Anne's College, University of Oxford  
Department of Zoology, University of Oxford. Forest Entomology. D.Phil. 1993

Experience

2009 – Present  Professor, Forest Insect Ecology, School of Forest Resources and  
Environmental Science, Michigan Technological University
2007 – Present  Director, The Honors Institute, Michigan Technological University
2005 – 2009  Associate Professor, Forest Insect Ecology, School of Forest Resources and  
Environmental Science, Michigan Technological University
2001 –2005 Assistant Professor, Forest Insect Ecology, School of Forest Resources and  
Environmental Science, Michigan Technological University
1998 - 2001 Assistant Research Entomologist, Division of Insect Biology, University of  
California, Berkeley.
1999 - 2001 Instructor, Department of Landscape Horticulture, Merritt College,  
Oakland.
1992 - 1997 Postdoctoral Researcher, Division of Insect Biology, University of  
California, Berkeley.

Recent Publications

types for the detection of emerald ash borer (Coleoptera: Buprestidae). Environmental  
Entomology, In press.
soil macroinvertebrates in North America north of Mexico. Diversity and Distributions  
14: 893–904.
of ambrosia and bark beetles to coast live oaks infected by Phytophthora ramorum.  
introduction of Formica lugubris to North America from Europe. Journal of Applied  
Entomology 132: 276-280.
Marshall JM, AJ Storer, and B Leutscher. 2008. Comparative analysis of plant and ground  
dwelling arthropod communities in lacustrine dune areas with and without Centaurea  
biebersteinii (Asteraceae). American Midland Naturalist 159: 261-274


**Synergistic Activities**

1) Director of the Honors Institute at Michigan Technological University. This institute encourages undergraduates to develop research and other professional experience during their undergraduate career.


3) Member of the editorial board of the *Journal of Pest Science* (Springer). Subject editor for Forest Entomology

4) Active research in forest health and educational programs in global technological leadership in Ghana.


**Collaborators and other affiliations**

a) Collaborators and coeditors
Abeney, EA (Forest Research Institute of Ghana), Bonello, Pierluigi (The Ohio State University), Cobbinah J.R. (Forest Research Institute of Ghana), Delisle, J. (Natural Resources Canada), Erbilgin, N. (University of Edmonton), Gordon, Thomas R. (University of California, Davis), Hyslop, MD (Michigan Technological University), Karnosky, David (Michigan Technological University), Marshall, J.M. (Michigan Technological University), McNee, William R. (Wisconsin Department of Natural Resources), McPheron, Brice A. (University of California, Berkeley), McCullough, Deborah (Michigan State University), Nagel, Linda M. (Michigan Technological University), Opuni-Frimpong, E. (Forest Research Institute of Ghana), Risch, AC (Swiss Federal Institute for Forest, Snow and Landscape Research), Ritokova, G. (UC Davis), Standiford, Richard B. (University of California, Berkeley), Schutz M (Swiss Federal Institute for Forest, Snow and Landscape Research), Shields JM (Michigan Technological University), Webster, CR (Michigan Technological University), Witter John A. (University of Michigan), Wood, David L. (University of California, Berkeley).

b) Graduate and Postdoctoral Advisors
Graduate: Martin R. Speight, University of Oxford; David Wainhouse, Forest Research, England
Postdoctoral: David L. Wood, UC Berkeley; Thomas R. Gordon, UC Davis
## APPENDIX B: Current and Past Funding

**Barry D. Solomon**

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center of Energy Excellence for Cellulosic Ethanol: Project 1: Feedstock Supply Chain Model (Co-PI)</td>
<td>Michigan Economic Development Corp.</td>
<td>2009-11</td>
<td>$385,000</td>
</tr>
<tr>
<td>Hydrogen Education Curriculum Path at Michigan Technological University (Co-PI)</td>
<td>U.S. Department of Energy</td>
<td>2008-11</td>
<td>$375,000</td>
</tr>
<tr>
<td>Evaluation of Low Greenhouse Gas Bio-Based Energy Technologies (Co-PI)</td>
<td>Caterpillar, Inc.</td>
<td>2006</td>
<td>$150,000</td>
</tr>
<tr>
<td>Biocomplexity: Renewable Energy From Forest Resources: An Investigation into the Viability of Large-Scale Production of Sustainable Transportation Fuels from Lignocellulosic Biomass (Co-PI)</td>
<td>National Science Foundation MUSES Program</td>
<td>2005-10</td>
<td>$1,800,000</td>
</tr>
<tr>
<td>Biocomplexity: Renewable Energy From Forest Resources: Investigating the Complex Interrelated Issues Associated with Generating Automotive Fuels from Lignocellulosic Biomass (Co-PI)</td>
<td>NSF MUSES Planning Grant</td>
<td>2004-05</td>
<td>$114,498</td>
</tr>
<tr>
<td>Novel Direct Steel Making by Combining Microwave, Electric Arc and Exothermal Heating Technologies (Senior Personnel)</td>
<td>U.S. Department of Energy</td>
<td>2001-03</td>
<td>$500,000</td>
</tr>
<tr>
<td>A Safe Minimum Standards Analysis of the Florida Manatee (PI)</td>
<td>MTU Faculty Development Grant</td>
<td>2000-01</td>
<td>$2500</td>
</tr>
<tr>
<td>Title</td>
<td>Sponsor</td>
<td>Project Start &amp; End Date</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>--------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Compliance Assistance Center for the Chemical Industry (ChemAlliance)</td>
<td>U.S. Environmental Protection Agency</td>
<td>1998-2003</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Workshop to Establish a United States Society for Ecological Economics</td>
<td>MTU Faculty Development Grant</td>
<td>1998-99</td>
<td>$1200</td>
</tr>
<tr>
<td>Habitat Management and Endangered Species (PI)</td>
<td>MTU Faculty Development Grant</td>
<td>1996-97</td>
<td>$2300</td>
</tr>
</tbody>
</table>

Kathleen E. Halvorsen

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocomplexity of Hydrological Service Payments and Watershed Sustainability in Mexico (Senior Personnel; PI Heidi Asbjornsen, Iowa State University)</td>
<td>NSF OISE</td>
<td>2009-10</td>
<td>$34,600</td>
</tr>
<tr>
<td>Enhancing the Capacity for Sustainable Forest Management in Chiapas and Oaxaca (Co-PI)</td>
<td>USAID TIES</td>
<td>2009-11</td>
<td>$249,999</td>
</tr>
<tr>
<td>Center of Energy Excellence for Cellulosic Ethanol: Project 2: Increasing availability of feedstocks and ensuring sustainability (Co-PI)</td>
<td>Michigan Economic Development Corp.</td>
<td>2009-11</td>
<td>$520,894</td>
</tr>
<tr>
<td>GK12: Global Watershed: Integrating Rural and Global Perspectives with Research and Technological Advances (Senior Personnel)</td>
<td>NSF GK12</td>
<td>2009-14</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Engaging Social Scientists in the WATERS Initiative (Co-PI)</td>
<td>NSF</td>
<td>2008-9</td>
<td>$10,600</td>
</tr>
<tr>
<td>Biocomplexity: Renewable Energy From Forest Resources: An Investigation into the Viability of Large-Scale Production of Sustainable Transportation Fuels from Lignocellulosic Biomass (Co-PI)</td>
<td>NSF MUSES</td>
<td>2005-10</td>
<td>$1,800,000</td>
</tr>
<tr>
<td>Cellulosic Ethanol Potentials and Obstacles in the Upper Midwestern United States (PI)</td>
<td>USDA</td>
<td>2006-09</td>
<td>$21,000</td>
</tr>
<tr>
<td>Title</td>
<td>Sponsor</td>
<td>Project Start &amp; End Date</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------</td>
<td>--------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>The Effect of Climate Change Beliefs and Values on Support/Use of</td>
<td>NSF SURF (MTU competition)</td>
<td>2008</td>
<td>$3000</td>
</tr>
<tr>
<td>Alternative Fuels Like Cellulosic Ethanol (Co-PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Effects of Lignocellulose Biofuel Production in the Upper</td>
<td>NSF SURF (MTU competition)</td>
<td>2007</td>
<td>$3000</td>
</tr>
<tr>
<td>Midwest (Co-PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creation of Center for Water and Society (Co-PI)</td>
<td>MTU Research Excellence Fund</td>
<td>2005-06</td>
<td>$55,000</td>
</tr>
<tr>
<td>Wind Energy in the Upper Midwest (PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2006-07</td>
<td>$1000</td>
</tr>
<tr>
<td>Land Use Planning in the Western Upper Peninsula of Michigan (PI)</td>
<td>USDA McIntire Stennis:</td>
<td>2003-06</td>
<td>$21,000</td>
</tr>
<tr>
<td>Biocomplexity: Renewable Energy From Forest Resources: Investigating</td>
<td>NSF MUSES Planning Grant</td>
<td>2004-05</td>
<td>$114,498</td>
</tr>
<tr>
<td>the Complex Interrelated Issues Associated with Generating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive Fuels from Lignocellulosic Biomass (Co-PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaps in Great Lakes Septic Regulatory Programs (Co-PI)</td>
<td>Joyce Foundation</td>
<td>2002-04</td>
<td>$81,000</td>
</tr>
</tbody>
</table>

**Hugh S. Gorman**

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Society’s Changing Interaction with and Knowledge of the Nitrogen</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2007-08</td>
<td>$2350</td>
</tr>
<tr>
<td>Cycle (PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Evolution of NO\textsubscript{X} Air Quality Monitoring (PI)</td>
<td>Chemical Heritage Foundation, Haas Fellowship</td>
<td>2003-04</td>
<td>$55,000</td>
</tr>
<tr>
<td>Monitoring the Environment: Scales, Methods, and Systems in</td>
<td>Society for the History of Technology</td>
<td>2003</td>
<td>$10,000</td>
</tr>
<tr>
<td>Historical Perspective, Society for the History of Technology, in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>support of a 2-day workshop (PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaps in Great Lakes Septic Regulatory Programs (Co-PI)</td>
<td>Joyce Foundation</td>
<td>2002-04</td>
<td>$81,000</td>
</tr>
<tr>
<td>Title</td>
<td>Sponsor</td>
<td>Project Start &amp; End Date</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>The Evolution of Pollution Control Efforts in the Oil Industry (PI)</td>
<td>MTU Faculty Development Grant</td>
<td>1998-99</td>
<td>$1800</td>
</tr>
</tbody>
</table>

**Carol A. MacLennan**

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Development for Rural Communities: Social, Health, Economic, and Environmental Advantages (Co-PI)</td>
<td>U.S. Department of Education, FIPSE</td>
<td>2008-11</td>
<td>$180,000</td>
</tr>
<tr>
<td>Manuscript Completion for <em>Sovereign Sugar</em> (PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2007</td>
<td>$2000</td>
</tr>
<tr>
<td>Sugar Industry and Environment in Hawaii, 20th Century (PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2006</td>
<td>$3500</td>
</tr>
<tr>
<td>Huron Mining Complex: Mapping and History (PI)</td>
<td>City of Houghton, Michigan</td>
<td>2003</td>
<td>$5000</td>
</tr>
<tr>
<td>Hawaiian Sugar and Sovereignty (PI)</td>
<td>MTU Faculty Development Grant</td>
<td>1997</td>
<td>$5000</td>
</tr>
<tr>
<td>Travel to Collections Grant, Hawaiian Sugar Plantation Archives (PI)</td>
<td>National Endowment for Humanities</td>
<td>1993</td>
<td>$500</td>
</tr>
<tr>
<td>Hawaiian Sugar Industry (PI)</td>
<td>Wenner-Gren Foundation for Anthropological Research</td>
<td>1990-91</td>
<td>$9500</td>
</tr>
</tbody>
</table>

**Mary H. Durfee**

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGERT: Achieving Environmental, Industrial, and Societal Sustainability via the Sustainable Futures Model (Co-PI)</td>
<td>NSF</td>
<td>2004-10</td>
<td>$3,400,000</td>
</tr>
</tbody>
</table>
### Diana Mincyte

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Fellowship: The Politics of Subsistence and Sustainability in Post-Industrial Europe (PI)</td>
<td>Rachel Carson Center for Environmental Studies, Ludvig Maximilians University, Munich</td>
<td>2009-10</td>
<td>$73,183</td>
</tr>
<tr>
<td>Global Patterns of Sustainable Consumption - Focal Point Research Grant/Graduate Student Training Grant (Co-PI)</td>
<td>University of Illinois</td>
<td>2009</td>
<td>$15,000</td>
</tr>
<tr>
<td>On-Line Course Development Grant (Co-PI)</td>
<td>European Union Center, University of Illinois</td>
<td>2009</td>
<td>$5000</td>
</tr>
<tr>
<td>Food Culture, Globalization and Nationalism – Collaborative Research Grant (PI)</td>
<td>National Endowment for the Humanities</td>
<td>2008</td>
<td>$15,000</td>
</tr>
<tr>
<td>Funding to organize workshop, “Ecologies of Consumption” (Co-PI)</td>
<td>University of Illinois &amp; Environmental Council of Illinois</td>
<td>2008</td>
<td>$21,000</td>
</tr>
<tr>
<td>Nutritional Health and the Media – Government Research Award (PI)</td>
<td>Government of Lithuania</td>
<td>2008</td>
<td>$5000</td>
</tr>
</tbody>
</table>

### Bradley H. Baltensperger

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Watershed: Integrating Rural and Global Perspectives with Research and Technological Advances (Co-PI)</td>
<td>NSF GK-12</td>
<td>2009-14</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Michigan Tech Noyce Scholars Program (PI)</td>
<td>NSF Noyce Scholars Program</td>
<td>2009-14</td>
<td>$900,000</td>
</tr>
<tr>
<td>Michigan Teacher Excellence Program (MiTEP): A Model for Improving Earth Science Education Nationwide (Co-PI)</td>
<td>NSF Math and Science Partnerships</td>
<td>2008-13</td>
<td>$3,800,000</td>
</tr>
<tr>
<td>Increasing Expertise in Earth Science Education (PI)</td>
<td>NSF Geoscience</td>
<td>2006-10</td>
<td>$139,000</td>
</tr>
<tr>
<td>Improving Teacher Quality: World History and Geography (Co-PI)</td>
<td>Michigan Department of Education</td>
<td>2007-09</td>
<td>$275,000</td>
</tr>
<tr>
<td>Title</td>
<td>Sponsor</td>
<td>Project Start &amp; End Date</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>--------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Field Training for Teachers in Earth System Science (Co-PI)</td>
<td>Michigan Space Grant Consortium</td>
<td>2006-10</td>
<td>$20,000</td>
</tr>
<tr>
<td>Improving Teacher Quality: Partnerships for Professional Development: Community Land Use (PI)</td>
<td>Michigan Department of Education</td>
<td>2003-05</td>
<td>$212,000</td>
</tr>
<tr>
<td>Improving Teacher Quality: Partnerships for Professional Development: Watershed Investigations (PI)</td>
<td>Michigan Department of Education</td>
<td>2003-05</td>
<td>$212,000</td>
</tr>
<tr>
<td>Building GIS Capacity for the Industrial Archaeology and Environmental Policy Programs at MTU (Co-PI)</td>
<td>MTU Research Excellence Fund</td>
<td>1998</td>
<td>$32,500</td>
</tr>
<tr>
<td>Social Dimensions of the Greenhouse Effect (PI)</td>
<td>GTE Foundation</td>
<td>1989</td>
<td>$4000</td>
</tr>
<tr>
<td>Community Risk Perception (PI)</td>
<td>MTU Creativity Grant</td>
<td>1985</td>
<td>$7000</td>
</tr>
<tr>
<td>Energy Decisions and the Upper Midwest (PI)</td>
<td>U.s. Department of Energy</td>
<td>1981</td>
<td>$18,000</td>
</tr>
<tr>
<td>Hedgerow Distribution and Removal in the Non-forested Regions of the Midwest (PI)</td>
<td>MTU Faculty Development Research Grant</td>
<td>1980</td>
<td>$4500</td>
</tr>
</tbody>
</table>

### Alex S. Mayer

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>GK12: Global Watershed: Integrating Rural and Global Perspectives with Research and Technological Advances (PI)</td>
<td>NSF</td>
<td>2009-14</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Biocomplexity of Hydrological Service Payments and Watershed Sustainability in Mexico (Co-PI)</td>
<td>NSF, Planning Grant</td>
<td>2009-10</td>
<td>$38,500</td>
</tr>
<tr>
<td>Enhancing the Capacity for Sustainable Forest Management and Ecosystem Service Provisioning in Chiapas and Oaxaca (PI)</td>
<td>USAID</td>
<td>2008-11</td>
<td>$290,000</td>
</tr>
<tr>
<td>SustR: Sustainable Development for Rural Communities- Social, Health, Economic, and Environmental Advances (PI)</td>
<td>US Department of Education</td>
<td>2008-12</td>
<td>$180,000</td>
</tr>
<tr>
<td>Graduate Student Scholarships to Advance a Global Outlook of Economic and Social Prosperity that Protects the Environment (Co-PI)</td>
<td>NSF</td>
<td>2008-12</td>
<td>$599,178</td>
</tr>
<tr>
<td>Project Description</td>
<td>Funding Agency</td>
<td>Start Year</td>
<td>End Year</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Modeling and Analyzing the Use, Efficiency, Value and Governance of Water as a Material in the Great Lakes Region through an Integrated Approach (PI)</td>
<td>NSF</td>
<td>2007-12</td>
<td>$1,078,000</td>
</tr>
<tr>
<td>Sustainable Wastewater Management in the Rio Sonora Basin, Mexico (PI)</td>
<td>Consejo Nacional de Ciencia y Tecnologia (Mexico)</td>
<td>2004-10</td>
<td>$80,000</td>
</tr>
<tr>
<td>Watershed Management Plan for Huron Creek Watershed (PI)</td>
<td>Michigan Department of Environmental Quality</td>
<td>2007-09</td>
<td>$74,000</td>
</tr>
<tr>
<td>Engaging Social Scientists in the WATERS Initiative: Special Sessions at the 2008 International Symposium on Society and Resource Management (PI)</td>
<td>NSF</td>
<td>2008-09</td>
<td>$18,000</td>
</tr>
<tr>
<td>Center for Water and Society (PI)</td>
<td>MTU</td>
<td>2005-06</td>
<td>$45,000</td>
</tr>
<tr>
<td>Michigan Tech-UNISON Linkage: Training a Core of Water Resources Experts (PI)</td>
<td>USAID</td>
<td>2003-06</td>
<td>$787,000</td>
</tr>
<tr>
<td>Multi-Objective Decision-Making for Environmental Remediation (PI)</td>
<td>U.S. Environmental Protection Agency</td>
<td>1998-03</td>
<td>$292,000</td>
</tr>
<tr>
<td>AQUA3: North American Alliance for Sustainable Water Resources Management (PI)</td>
<td>U.S. Department of Education</td>
<td>2001-05</td>
<td>$214,000</td>
</tr>
<tr>
<td>Ph.D. Fellowships in Computational Engineering and Sciences (PI)</td>
<td>U.S. Department of Education</td>
<td>2001-04</td>
<td>$453,000</td>
</tr>
<tr>
<td>Computational Facilities for MTU's CS&amp;E Program (Co-PI)</td>
<td>NSF</td>
<td>1998-01</td>
<td>$260,000</td>
</tr>
<tr>
<td>Metrics for Optimization of Environmental Remediation Problems (PI)</td>
<td>NSF</td>
<td>2001-03</td>
<td>$111,000</td>
</tr>
<tr>
<td>Multi-Scale Investigation of Mass Transfer Limitations in Surfactant-Enhanced Aquifer Remediation (PI)</td>
<td>U.S. Environmental Protection Agency</td>
<td>1996-01</td>
<td>$474,000</td>
</tr>
<tr>
<td>A Mathematical Modeling Approach to Determine the Advance of Saline Intrusion in the Guaymas Valley, Sonora, Mexico (Co-PI)</td>
<td>Consejo Nacional de Ciencia y Tecnologia (Mexico)</td>
<td>1997-99</td>
<td>$38,000</td>
</tr>
<tr>
<td>Title</td>
<td>Sponsor</td>
<td>Project Start &amp; End Date</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>--------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Monitoring and Assessment of Northern Hardwoods Groundwater Remediation Efforts (PI)</td>
<td>Mead Paper Company</td>
<td>1996-00</td>
<td>$84,000</td>
</tr>
<tr>
<td>Capillary Desaturation of Nonaqueous Phase Liquids in Porous Media (PI)</td>
<td>MTU Research Excellence Found</td>
<td>1997-98</td>
<td>$32,000</td>
</tr>
<tr>
<td>In Situ Subsurface Remediation Technologies: Integration into an Interdisciplinary Engineering Curriculum (CO-PI)</td>
<td>NSF</td>
<td>1994-98</td>
<td>$465,000</td>
</tr>
<tr>
<td>Mechanistic Relationships for Physical Nonequilibrium Phenomena in Vadose Zone Solute Transport (PI)</td>
<td>NSF</td>
<td>1993-97</td>
<td>$142,000</td>
</tr>
<tr>
<td>Environmental Treatment Design Options Tool (ETDOT) (Co-PI)</td>
<td>MTU/EPA Center of Excellence</td>
<td>1993-96</td>
<td>$184,000</td>
</tr>
<tr>
<td>Environmental Fate and Risk Assessment Tool (EFRAT) (Co-PI)</td>
<td>MTU/EPA Center of Excellence</td>
<td>1995-96</td>
<td>$126,000</td>
</tr>
<tr>
<td>In Situ Containment of Heavy Metals in Soils and Groundwater through Chemical Precipitation (Co-PI)</td>
<td>Michigan Tech Research Excellence Fund</td>
<td>1994-96</td>
<td>$36,000</td>
</tr>
<tr>
<td>Enhanced Visualization for Analysis of Groundwater Modeling Efforts (Co-PI)</td>
<td>MTU Research Excellence Fund</td>
<td>1992-94</td>
<td>$130,000</td>
</tr>
<tr>
<td>Enhanced Visualization for Analysis of Groundwater Modeling Efforts (PI)</td>
<td>Cray Research Corp.</td>
<td>1993-94</td>
<td>$170,000</td>
</tr>
<tr>
<td>Characterization of a Large Fault Zone as a Barrier to Fluid Flow: The San Andreas Fault near Desert Hot Springs, CA (PI)</td>
<td>Petroleum Research Fund</td>
<td>1994-96</td>
<td>$29,000</td>
</tr>
</tbody>
</table>

**Andrew J. Storer**

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Multistate Comparison of Emerald Ash Borer Trapping and Survey Tools (PI)</td>
<td>USDA APHIS</td>
<td>2009-10</td>
<td>$84,610</td>
</tr>
<tr>
<td>Beech Bark Disease and Resistance in American Beech (PI)</td>
<td>USDA Forest Service</td>
<td>2009-12</td>
<td>$225,000</td>
</tr>
<tr>
<td>Project Description</td>
<td>Funding Agency</td>
<td>Fiscal Year</td>
<td>Amount</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>Phloem Reduction in Support of Slow Ash Mortality (SLAM) project (PI)</td>
<td>USDA Forest Service</td>
<td>2009-10</td>
<td>$55,000</td>
</tr>
<tr>
<td>Project Coordinator for the Slow Ash Mortality (SLAM) Project (PI)</td>
<td>USDA Forest Service</td>
<td>2009-10</td>
<td>$65,000</td>
</tr>
<tr>
<td>Ash Inventory, Trapping and Treatment in Support of the Slow Ash Mortality (SLAM) Project (PI)</td>
<td>USDA Forest Service</td>
<td>2009-10</td>
<td>$138,000</td>
</tr>
<tr>
<td>2008 Detection Survey for <em>Sirex noctilio</em> in Michigan (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2008-09</td>
<td>$212,080</td>
</tr>
<tr>
<td>2008 Michigan and Wisconsin Emerald Ash Borer Detection Survey: Trap Trees and Purple Traps (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2008-09</td>
<td>$275,000</td>
</tr>
<tr>
<td>Multistate Comparison of Emerald Ash Borer Trapping and Survey Tools (PI)</td>
<td>USDA Forest Service, Northeast Region/Animal Plant Health Inspection Service</td>
<td>2008-09</td>
<td>$77,000</td>
</tr>
<tr>
<td>2007 Michigan and Wisconsin Emerald Ash Borer Detection Survey – Supplement (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-09</td>
<td>$55,000</td>
</tr>
<tr>
<td>2007 Ash Damage Survey: Ground Evaluation of Aerial Imagery (PI)</td>
<td>USDA Forest Service, Forest Health Monitoring</td>
<td>2007-08</td>
<td>$61,000</td>
</tr>
<tr>
<td>Identification of Wood and Bark Infesting Beetle Species Caught in Sirex Woodwasp Detection Traps in Michigan (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2006-07</td>
<td>$6,000</td>
</tr>
<tr>
<td>Effects of Invasive Earthworms on Ecosystem Function, Forest Health &amp; Biodiversity in Northern Hardwood and Hemlock Forest Systems (PI)</td>
<td>USDA Forest Service, Northern Research Station</td>
<td>2006-11</td>
<td>$5,000</td>
</tr>
<tr>
<td>Insect Incidence Following Prescribed Fire in Upper Michigan (PI)</td>
<td>McIntire Stennis Program</td>
<td>2006-08</td>
<td>$21,000</td>
</tr>
<tr>
<td>Project Description</td>
<td>Funding Agency</td>
<td>Year</td>
<td>Cost</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>Implementation of Ash Phloem Model (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-09</td>
<td>$107,241</td>
</tr>
<tr>
<td>Living with Emerald Ash Borer - Refinement of Trap Tree Technologies (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-08</td>
<td>$81,331</td>
</tr>
<tr>
<td>Determination of the Impact of Emerald ash Borer in Core Areas - Developing a Catalog of Live Trees (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-08</td>
<td>$39,365</td>
</tr>
<tr>
<td>2007 detection survey for Sirex noctilio in Michigan (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-08</td>
<td>$209,000</td>
</tr>
<tr>
<td>2007 Michigan and Wisconsin emerald ash borer detection survey (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-08</td>
<td>$392,790</td>
</tr>
<tr>
<td>Supplement to 2006 emerald ash borer detection survey (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2007-08</td>
<td>$5300</td>
</tr>
<tr>
<td>Evaluation of public awareness of issues relating to the movement of firewood and the exotic emerald ash borer (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2006-07</td>
<td>$16,000</td>
</tr>
<tr>
<td>Detection survey for emerald ash borer on state land in Wisconsin (PI)</td>
<td>Wisconsin DNR</td>
<td>2006-07</td>
<td>$49,854</td>
</tr>
<tr>
<td>Multistate comparison of emerald ash borer trapping tools (PI)</td>
<td>USDA Animal Plant Health Inspection Service</td>
<td>2006-07</td>
<td>$131,617</td>
</tr>
<tr>
<td>2006 Michigan and Northern Wisconsin emerald ash borer detection survey (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2006-07</td>
<td>$367,568</td>
</tr>
<tr>
<td>Michigan and Northern Wisconsin Emerald ash borer detection survey 2005 (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2005-06</td>
<td>$359,204</td>
</tr>
<tr>
<td>Towards sustainable timber production in Ghana (Co-PI)</td>
<td>International Tropical Timber Organization</td>
<td>2005-08</td>
<td>$335,047</td>
</tr>
<tr>
<td>Modeling phloem removal from ash stands to reduce the density of emerald ash borer while maximizing genetic diversity of ash (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2005-07</td>
<td>$99,207</td>
</tr>
<tr>
<td>Risk assessment and suppression of garlic mustard invasion in Michigan (Co-PI)</td>
<td>USDA Forest Service</td>
<td>2005-07</td>
<td>$47,000</td>
</tr>
<tr>
<td>Description</td>
<td>Funding Organization</td>
<td>Year(s)</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>Interactions among prescribed fire, mechanical treatments, insect pests and pathogens in red pine (PI)</td>
<td>USDA Forest Service, Forest Health Monitoring</td>
<td>2004-08</td>
<td>$89,257</td>
</tr>
<tr>
<td>Michigan Statewide trap-tree emerald ash borer detection survey, 2004 (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2004</td>
<td>$287,572</td>
</tr>
<tr>
<td>Constraints imposed on Plantation mahogany production in West Africa by the mahogany shoot moth (Co-PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2002</td>
<td>$3000</td>
</tr>
<tr>
<td>Effects of fire and mechanical treatments in a post harvest jack pine forest (PI)</td>
<td>McIntire Stennis program</td>
<td>2004-06</td>
<td>$21,000</td>
</tr>
<tr>
<td>Effect of invasive earthworms on fungal and soil invertebrate diversity of northern hardwood and hemlock forest ecosystems (PI)</td>
<td>Huron Mountain Wildlife Foundation</td>
<td>2004-05</td>
<td>$5060</td>
</tr>
<tr>
<td>Monitoring and evaluating health of ash trees on Michigan's rural forests (University of Michigan Portion) (Co-PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2004-06</td>
<td>$438,362</td>
</tr>
<tr>
<td>Monitoring and evaluating health of ash trees on Michigan's rural forests (Michigan Tech Portion) (PI)</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2004-06</td>
<td>$317,265</td>
</tr>
<tr>
<td>Effect of invasive earthworms on fungal and soil invertebrate diversity of northern hardwood and hemlock forest ecosystems (Co-PI)</td>
<td>Huron Mountain Wildlife Foundation</td>
<td>2004-05</td>
<td>$5059</td>
</tr>
<tr>
<td>A predictive model for exotic plant species for the great lakes network of the U.S National Park Service (PI)</td>
<td>National Park Service</td>
<td>2004-07</td>
<td>$45,000</td>
</tr>
<tr>
<td>The distribution of red wood ants in North American forests (Co-PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2005</td>
<td>$2500</td>
</tr>
<tr>
<td>Research on pitch canker on Regeneration of Monterey pine forests and impacts of pitch canker (PI)</td>
<td>Del Monte Forest Foundation</td>
<td>2002</td>
<td>$15,500</td>
</tr>
<tr>
<td>Research on pitch canker on Regeneration of Monterey pine forests and impacts of pitch canker (PI)</td>
<td>Pebble Beech Company</td>
<td>2003</td>
<td>$42,500</td>
</tr>
<tr>
<td>Survey of exotic earthworm invasion of Huron Mountain Club lands (Co-PI)</td>
<td>Huron Mountain Wildlife Foundation</td>
<td>2004</td>
<td>$2500</td>
</tr>
<tr>
<td>Project Title</td>
<td>Institution/Grantor</td>
<td>Year</td>
<td>Funding</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>------</td>
<td>-----------</td>
</tr>
<tr>
<td>Entomology and Pathology data collection and presentation: Blodgett</td>
<td>U.C. Berkeley</td>
<td>2004</td>
<td>$14,474</td>
</tr>
<tr>
<td>Forest Research Station site of the national fire and fire surrogate study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactions of bark and ambrosia beetles with Phytophthora ramorum,</td>
<td>University of California,</td>
<td>2002-05</td>
<td>$136,238</td>
</tr>
<tr>
<td>cause of sudden oak death in coast live oaks and their role in tree failure</td>
<td>Integrated Pest Management Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Senior personnel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Updated integrated pest management systems for pitch canker: Known and</td>
<td>University of California,</td>
<td>2002-05</td>
<td>$90,663</td>
</tr>
<tr>
<td>potential insect vectors (Senior personnel)</td>
<td>Integrated Pest Management Project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entomology and Pathology data collection &amp; presentation: Blodgett</td>
<td>UC Berkeley</td>
<td>2002</td>
<td>$6111</td>
</tr>
<tr>
<td>Forest Research Station site of the national fire and fire surrogate study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactions of bark and ambrosia beetles with Phytophthora ramorum,</td>
<td>USDA Forest Service, Pacific</td>
<td>2002-04</td>
<td>$75,000</td>
</tr>
<tr>
<td>in coast live oaks and their roles in tree failure (Co-PI)</td>
<td>Southwest Research Station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and evaluating health of ash trees on Michigan's rural forests</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2003-04</td>
<td>$65,000</td>
</tr>
<tr>
<td>(Michigan Tech Portion) (PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and evaluating health of ash trees on Michigan's rural forests</td>
<td>USDA Forest Service, Northeast Region</td>
<td>2003-04</td>
<td>$65,000</td>
</tr>
<tr>
<td>(University of Michigan Portion) (Co-PI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research on pitch canker on the Monterey peninsula, CA (PI)</td>
<td>Pebble Beech Company</td>
<td>2002-03</td>
<td>$7500</td>
</tr>
<tr>
<td>Biological control and impacts of exotic weeds (PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2003</td>
<td>$3000</td>
</tr>
<tr>
<td>Development of detection and monitoring techniques for emerald ash borer</td>
<td>USDA Forest Service, Forest Health Technology</td>
<td>2003</td>
<td>$164,762</td>
</tr>
<tr>
<td>(Co-PI)</td>
<td>Enterprise Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk assessment for sudden oak death in Michigan (PI)</td>
<td>Michigan DNR</td>
<td>2002</td>
<td>$2500</td>
</tr>
</tbody>
</table>
### William S. Breffle

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing the Carrying Capacity of the Great Lakes Natural Environment of Western Michigan (PI)</td>
<td>Colcom Foundation</td>
<td>2008-09</td>
<td>$115,088</td>
</tr>
</tbody>
</table>

### Mark C. Roberts

<table>
<thead>
<tr>
<th>Title</th>
<th>Sponsor</th>
<th>Project Start &amp; End Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel for Energy Economics book Research (PI)</td>
<td>MTU Faculty Scholarship Grant</td>
<td>2008</td>
<td>$3000</td>
</tr>
<tr>
<td>Travel for Energy Economics book Research (PI)</td>
<td>MTU School of Business &amp; Economics, Faculty Development Grant</td>
<td>2008</td>
<td>$3021</td>
</tr>
<tr>
<td>Symposium on Economic Instruments for the Implementation of Zero Discharge of Persistent Toxic Chemicals in the Lake Superior Basin (Co-PI)</td>
<td>U.S. Environmental Protection Agency</td>
<td>1993</td>
<td>$51,088</td>
</tr>
</tbody>
</table>
Outstanding Graduate Student Teaching Award

Each academic school or department may recommend at least one and no more than 20% of its graduate students to receive this award each academic-year semester. Degree candidates carrying the title of instructor or lecturer are not eligible for this award.

To be eligible for nomination, a graduate student must have had sole responsibility for instruction in a lecture or laboratory course or section at any level for at least two semesters within the past academic year.

The nominee should have exhibited exceptional ability as a teacher and should have received excellent evaluations from students. The teaching ability of the nominee should also be respected by faculty in the nominee’s department. The names of the nominee(s) for this award should be forwarded to the Dean of the Graduate School at least 9 weeks prior to fall or spring commencement.

These awards will be presented at the Graduate Student Council award ceremony which is held in the spring. Certificates will be mailed to students who have already left campus. If possible, the students receiving the awards will be identified by name in the commencement programs.
Proposal:
Masters Program in Security and Medical Informatics

Guy C. Hembroff
School of Technology
Chair, CNSA Program, Assistant Professor

I. General Description
This proposal recommends the establishment of a Graduate Program in Security and Medical Informatics at Michigan Tech University. Marquette General Health System (MGHS), a prominent teaching medical institution located in the Upper Peninsula of Michigan, will partner with the School of Technology to provide a comprehensive education and research entity for this Graduate Program.

II. Rationale
Security and medical informatics are two rapidly developing fields in our society. Medical informatics is the intersection of information science, computer science, and healthcare. This field deals with the resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health and biomedicine. Securing computer network systems has become a vital part of our global society. Many institutions and organizations depend on electronic data to conduct operations daily. This includes areas such as the healthcare, financial, military, and academic sectors. Established regulations such as the Health Insurance Portability and Accountability Act (HIPAA) and Graham-Leach-Bliley Act (GLBA) include specific security and compliance provisions for their respective sectors. With the advancement of technology in the medical field, accompanied by the need to keep this information confidential, a graduate program that addresses the education and research needs of these two closely related fields is critical.

Michigan Tech University has established strong and growing research in the areas of security and medical informatics. Likewise, the university has recently made a significant commitment to education and research in this field by supporting the strategic faculty hiring initiative in the area of Health. The addition of the Security and Medical Informatics Graduate Program would strongly support the Health initiative and align with the strategic plan of the university.

The Masters of Science in Security and Medical Informatics is designed to:
1. deepen students’ understanding and knowledge of medical informatics and security engineering;
2. provide students with research opportunities within the intersecting fields of medical informatics and security;
3. provide a flexible curriculum to allow for both traditional and nontraditional graduate students.

III. Related Programs
Graduate programs in medical informatics or closely related fields exist at a few other institutions, including South Dakota State University, Drexel University, Johns Hopkins, Stanford, and the University of Illinois Chicago. Most of the mentioned programs focus strictly on management and technical aspects of medical informatics. Johns Hopkins provides a similar security infrastructure to accompany their health related courses, but our program has a stronger emphasis on patient records, the electronic medical records system, and the interoperability of these systems.

IV. Projected Enrollment
We estimate the Graduate Program to have 15-20 students enrolled over the first three years with an anticipated steady-state enrollment of 30-40 students. We expect 25% of the students in the program to be traditional students and the remainder to be nontraditional students enrolled strictly through distance learning. An additional 15 non-degree seeking students are expected annually. These students would take courses that can be applied to professional certifications such as the Certified Professional in Heath Information Technology (CPHIT). These courses are highlighted in the next section.
V. Curriculum Design

The Security and Medical Informatics Graduate Program requires 33 credits of course work and research for graduation.

Course work – Minimum of 27 credits must be taken from the following courses:
1. TSMI 5111 - Security and Privacy* +
2. TSMI 5121 - The Healthcare System* +
3. TSMI 5131 - System Analysis and Design* +
4. TSMI 5141 - Electronic Health Records and e-Health Implementation*
5. TSMI 5151 - Application Integration and Interoperability*
6. TSMI 5161 - Database Management and Security*
7. TSMI 5211 - Java Security
8. TSMI 5221 - Protocols and Systems for Internet and Web Security
9. TSMI 5231 - Statistical Methods for Intrusion Detection
10. TSMI 5241 - Designing Security Systems
11. TSMI 5251 - Advanced Topics in Network Security
12. TSMI 5261 - Health Informatics Decision and Support
13. TSMI 5271 - HIPAA Implications for Public Health +

* HIT Certification course
+ Course instructed by Marquette General Health System

Research Thesis – 6 credits
15. TSMI 5999 - Master's Research

Course Descriptions:

1. **TSMI 5111 Security and Privacy**
   - Examines key health information security, policy and procedures. Investigates how to distinguish elements of a security audit and key security policies. Analyzes the roles of people maintaining health information security and explains elements of these roles within the organization.
   - Credits: 2.0
   - Lec-Rec-Lab: (2-0-0)
   - Semesters Offered: Fall
   - Restrictions: Must be enrolled in one of the following Levels: Graduate

2. **TSMI 5121 The Healthcare System**
   - Provides an overview of healthcare's transition from paper to electronic format and examines characteristics of healthcare organizations, the interrelationships among healthcare components, the role that government, regulatory, professional and accreditation agencies play within healthcare, and describes the roles of healthcare professionals and the organizational structure in which they work.
   - Credits: 2.0
   - Lec-Rec-Lab: (2-0-0)
   - Semesters Offered: Spring
   - Restrictions: Must be enrolled in one of the following Levels: Graduate

3. **TSMI 5131 System Analysis and Design**
   - Provides in-depth knowledge of tools that are available to perform systems analysis, examines the key factors to be considered in a systems design, emphasizes the importance of communication through both of these processes, and an understanding of the primary factors in measuring the benefits of systems implementation. Course will also examine strategies and key factors in purchasing systems. This includes analysis of opportunities and risk of integrating single vendor, hybrid, and other factors when examining system acquisition.
   - Credits: 3.0
   - Lec-Rec-Lab: (3-0-0)
   - Semesters Offered: Fall
   - Restrictions: Must be enrolled in one of the following Levels: Graduate
4. **TSMI 5141 Electronic Health Records and e-Health Implementation**  
Explores the difference between Electronic Medical Record (EMR) and Electronic Health Record (EHR). Discusses challenges and implementation of both EMR and EHR. Provides security analysis of both types of records and the maintenance of these systems.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

5. **TSMI 5151 Application Integration and Interoperability**  
Defines and explains the role of interoperability in the development of a functioning EHR. Analyzes predominant standardization in the healthcare field such as ASTM and HL7. Examines the challenges to the development of interoperability in healthcare.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Fall  
Restrictions: Must be enrolled in one of the following Levels: Graduate

6. **TSMI 5161 Database Management and Security**  
Identifies database solutions and key elements of an enterprise data warehouse. Explains how to apply best practices for development of data warehouses and distinguish between a clinical data repository and enterprise data warehouse. Investigates the role of Master Patient Index and the aggregation of patient data in databases. Finally, the course defines security practices for a database environment.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

7. **TSMI 5211 Java Security**  
This course provides comprehensive coverage of the security aspects of the Java platform. Java's security model and the VM and language features that support security are covered. Java APIs and Java Cryptography APIs are addressed in security in the Java 2 Enterprise Edition (J2EE). This course analyzes Java security platforms and Java APIs within the healthcare sector.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Fall  
Restrictions: Must be enrolled in one of the following Levels: Graduate

8. **TSMI 5221 Protocols and Systems for Internet and Web Security**  
Course focuses on the most widely used systems and protocols for security on the Internet and on the Web. The Internet refers to the infrastructure or the underlying protocols and routing. The Web describes applications that run on the Internet. Detailed focus is on browsers, web servers, and communication protocols on the Internet, as well as how to deal with viruses and distributed denial of service attacks. Some of the protocols/systems covered in detail are TCP/IP, SSUTLS, IPsec, SSH, PGP, firewalls, IDS systems, and Kerberos.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

9. **TSMI 5231 Statistical Methods for Intrusion Detection**  
This course will provide an introduction to the data and methodologies of computer intrusion detection. The focus will be on statistical and machine learning approaches to detection of attacks on computers. Topics include network monitoring and analysis, network based attacks such as probes and denial of service attacks, host-based attacks such as buffer overflows and race conditions, and malicious code such as viruses and worms. Statistical pattern recognition methods will be described for the detection and classification of attacks.  
Credits: 3.0  \( \text{Lec-Rec-Lab: (2-0-1)} \)  
Semesters Offered: Fall  
Restrictions: Must be enrolled in one of the following Levels: Graduate
10. **TSMI 5241 Designing Security Systems**  
This course provides an overview of techniques used in the design of secure systems. Primary focus of the course will be on real-world case studies. Students will examine attacks on deployed systems and then investigate how these vulnerabilities have been subsequently addressed. Additionally, the course will examine the practical advantages and shortcomings of several notions of provable security. Students will be expected to read, understand, and present recent research papers to the class.  
Credits: 3.0  
Lec-Rec-Lab: (3-0-0)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

11. **TSMI 5251 Advanced Topics in Network Security**  
This course focuses on advanced research topics in communications security. The course is structured as a research seminar where students present research papers to the class. Topics include protocol analysis, security in inter-domain routing, broadcast authentication protocols, covert channels and anonymous communication, key management, advanced trace-back schemes, and attack propagation modeling. A course project is required.  
Credits: 3.0  
Lec-Rec-Lab: (3-0-0)  
Semesters Offered: Fall  
Restrictions: Must be enrolled in one of the following Levels: Graduate

12. **TSMI 5261 Health Informatics Decision and Support**  
This course addresses issues related to decision modeling based on health sciences data in terms of analysis, construction, and evaluation. Clinical decision support architectures are examined. An array of decision support tools is considered, and the knowledge representations employed in these tools are discussed.  
Credits: 3.0  
Lec-Rec-Lab: (3-0-0)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

13. **TSMI 5271 HIPAA Implications for Public Health**  
This course focuses on the administrative and technical provisions of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which mandates a variety of healthcare standards as well as rules for electronic transactions and code sets. This course is designed to provide system implementers in the public health field with an understanding of and hands-on experience with HIPAA regulations, implications, and a perspective of the impact on the future of the health care information infrastructure regarding the use of information technologies.  
Credits: 3.0  
Lec-Rec-Lab: (3-0-0)  
Semesters Offered: Spring  
Restrictions: Must be enrolled in one of the following Levels: Graduate

14. **TSMI 5281 Healthcare Security Management**  
This course will address information security in the public health and medical fields, with special emphasis on clinical care, research and the role of the academic medical center. Course will also focus on disaster recovery and response, anonymization of records, billing, communication of public health information to EHRs, along with physical and administrative security.  
Credits: 3.0  
Lec-Rec-Lab: (3-0-0)  
Semesters Offered: Fall  
Restrictions: Must be enrolled in one of the following Levels: Graduate

15. **TSMI 5999 Master's Research**  
The study of an acceptable security and medical informatics research problem and the preparation of a thesis.  
Credits: variable to 6.0; Repeatable to a Max of 6; Graded Pass/Fail Only  
Semesters Offered: Fall, Spring, Summer  
Restrictions: Permission of department required; Must be enrolled in one of the following Levels: Graduate
VI. Library and other Learning Resources
To be defined

VII. Computing Access Fees
A computer access fee of $210 per semester will be required for students enrolled in this program and
additional Distance Learning fees may be required for on-line courses.

VIII. Faculty
Key faculty members for this graduate program are listed below:
- Yu Cai – Assistant Professor, School of Technology
  (http://www.tech.mtu.edu/people/yu_cai_CV.pdf)
- Chunming Gao – Assistant Professor, School of Technology
  (http://www.tech.mtu.edu/people/chunming_gao_CV.pdf)
- Guy C. Hembroff – Chair, CNSA Program/Assistant Professor, School of Technology
  (http://www.tech.mtu.edu/people/guy_hembroff_CV.pdf)
- Liran Ma – Assistant Professor, School of Technology
  (http://www.tech.mtu.edu/people/liran_ma_CV.pdf)
- Xinli Wang – Assistant Professor, School of Technology
  (http://www.tech.mtu.edu/people/xinli_wang_CV.pdf)

IX. Description of Available/Needed Equipment
The following contains a list of hardware and software needed for this Graduate program:
- Computer PCs/Laptops
- Selected Software (i.e. EMR software, database software, virtualization software)
- Routers/Switches/Firewalls
- Biometric Devices
- VoIP Technologies
- Smart Cards

X. Program Costs
Program Costs display the overall funding mechanism to illustrate a comprehensive budget and
demonstrate forecasting to achieve revenue and sustainability for this graduate program. Steady state
enrollment occurs in year four.

Non-degree seeking students are individuals who are registered to take courses, possibly to obtain their
CPHIT certificate, but are not registered in the Security and Medical Informatics Graduate program.

<table>
<thead>
<tr>
<th>PROGRAM REVENUE</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Years 4-n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment (MS students)</td>
<td>8</td>
<td>18</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Enrollment (non-degree seeking)</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Tuition revenue (MS students - 18 credits/year at $595/credit)</td>
<td>$85,680</td>
<td>$192,780</td>
<td>$214,200</td>
<td>$214,200</td>
</tr>
<tr>
<td>Tuition revenue (non-degree seeking - 16 credits/year)</td>
<td>$57,120</td>
<td>$114,240</td>
<td>$142,800</td>
<td>$142,800</td>
</tr>
<tr>
<td>Total tuition revenue</td>
<td>$142,800</td>
<td>$307,020</td>
<td>$357,000</td>
<td>$357,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROGRAM REVENUE (cont.)</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Years 4-n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incentive returned to program</td>
<td>$11,250</td>
<td>$22,500</td>
<td>$30,000</td>
<td>$41,250</td>
</tr>
<tr>
<td>Total annual revenue</td>
<td>$154,050</td>
<td>$329,520</td>
<td>$387,000</td>
<td>$398,250</td>
</tr>
</tbody>
</table>
PROGRAM EXPENSES

Additional Michigan Tech Faculty

<table>
<thead>
<tr>
<th>Year</th>
<th>Salary (($80,000 \times 1.4))</th>
<th>$112,000</th>
<th>$112,000</th>
<th>$112,000</th>
<th>$112,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>$196,001</td>
<td>$196,001</td>
<td>$196,001</td>
<td>$196,001</td>
</tr>
</tbody>
</table>

MGH Faculty

<table>
<thead>
<tr>
<th>Year</th>
<th>Salary (($65,000 \times 1.4))</th>
<th>$84,000</th>
<th>$84,000</th>
<th>$84,000</th>
<th>$84,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>$196,001</td>
<td>$196,001</td>
<td>$196,001</td>
<td>$196,001</td>
</tr>
</tbody>
</table>

Journals (5% annual increase)

| Year | \$5,350 | \$5,618 | \$5,899 | \$6,194 |

Graduate Assistantships ($20k/year)

| Year | \$40,000 | \$40,000 | \$60,000 | \$60,000 |

Computer equipment ($5k/year towards replacement)

| Year | \$5,000 | \$5,000 | \$5,000 | \$5,000 |

Total non-salary

| Year | \$50,350 | \$50,618 | \$70,899 | \$71,194 |

Total annual expenses

| Year | \$246,351 | \$246,619 | \$266,900 | \$267,195 |

REVENUE – EXPENSES

| Year | -\$92,301 | \$82,901 | \$120,100 | \$131,055 |

One-time startup costs:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing &amp; Recruiting</td>
<td>$10,000</td>
</tr>
<tr>
<td>Library and Monographs</td>
<td>$3,000</td>
</tr>
<tr>
<td>Online Infrastructure</td>
<td>$50,000</td>
</tr>
<tr>
<td>Computer Equipment</td>
<td>$20,000</td>
</tr>
<tr>
<td>Graduate Computer Research/Course Lab</td>
<td>$215,000</td>
</tr>
<tr>
<td>Total One Time Costs:</td>
<td>$298,000</td>
</tr>
</tbody>
</table>

Potential Department of Labor (DoL) Grant Funding

**Submitted October 6, 2009**

- Funding 2010 | $198,350
- Funding 2011 | $20,000
- Funding 2012 | $80,000
- Projected DoL Funding | $298,350

XI.  Space

Graduate Research/Course Lab (funding specifics listed above)

XII.  Accreditation

Not applicable

XIII.  Planned Implementation

This program would begin offering courses fall semester 2010.