Minutes of the Graduate Faculty Council Meeting

Tuesday, April 6, 2010

1) Meeting called to order at 4:05 pm.

**Members** (16): Bill Yarroch (ASE), James Pickens (SFRES), Beth Flynn (HU), Amy Marcarelli (Bio Sci), Steve Seidel (Comp Sci), Greg Waite (Geo), Dave Fritz (GSG), Ruth Archer (Bus), Shiyue Fang (Chem), Sam Sweitz (Env Pol), Carl Anderson (Eng), Jim Hwang (Mat Sci), Jianping Dong (Math), Craig Friedrich (ME-EM), Blair Orr (Peace Corp), Kim Fook Lee (Phy)

**Guests** (2): Heather Suokas (Grad Sch– recording secretary), Jackie Huntoon (Grad Sch)

2) Review and approval of 03/02/10 meeting minutes.

3) Note about the handouts: Some have Senate designated numbers because we are at the end of the academic year. This is the last GFC meeting of the academic year. The Senate’s last meeting is on 4/14 and these proposals needed to be added to the Senate agenda in advance. These will not advance to the Senate meeting unless GFC approves.

4) Old Business
   a. Graduate Certificate in International Profile Proposal (B. Orr): No updates. This will remain on the agenda.
   b. Graduate Certificate in HEDV Engineering (W. Yarroch/C. Anderson): All of the changes that the GFC recommended were incorporated into the proposal. The Curricular Committee asked for one additional change (to add the following text to the end of paragraph one): “The Certificate Advisor will be appointed by the Dean of the College of Engineering.” This is incorporated into the updated handout. This is an appropriate addition when pertaining to non-degree seeking students who may not have an advisor. Motion to approve the revised document passed.
   c. International Dual Graduate Degrees Proposal (J. Huntoon): The GFC already approved this proposal and it moved on to the Curricular Committee. The Curricular Committee feels that the Senate needs to see each proposal because they typically see exceptions to both the normal residency and transfer credit policies. As a result, section 4a was amended to say the Senate will review a concept proposal before it is worked into a contractual agreement. Motion to approve the revised document passed.
   d. Committee Reports (J. Huntoon):
      - Graduate Program Review: No new updates.
      - Dismissal/Appeal/Grievance Policy: No new updates.

5) New Business
   a. Residency Requirements for Graduate Students (W. Yarroch): Neither the Senate nor the Board has residency requirements in place for graduate students. It has been written in the graduate catalog for many years. The Curricular Committee took the paragraphs that appear in the graduate catalog and copied them into what became an amendment to proposal 11-01- REQUIREMENTS FOR GRADUATION (see the underlined statements on the handouts section of the GFC website). Questions: the underlined text in section (a) says “A minimum of two-thirds of the required non-research course-work credits required for the degree must be taken through Michigan Tech.” Mechanical engineering does not have required courses for their PhD program. Text will be added to say “in general, no more than ten credits may be transferred to Michigan Tech without the approval of the Graduate School.” Dean Huntoon will notify Bob Keen of this additional text in advance of the Senate meeting. As amended, motion to approve passed.
   b. Academic Good Standing (R. Archer): The current policy states that students must earn a B or
better in all graded courses used on a degree schedule. This requirement can be adjusted at the
discretion of the student’s graduate program to allow for use of up to six credits from outside the
student’s primary field of study for which grades of BC/C grades were received. This proposal
changes the text to state “students may earn up to nine credits of C grades, as long as a 3.0
average GPA is maintained.” The rationale being that even the best students may earn an average
grade at one time or another due to heavy course load, personal or family responsibilities, or
inadequate preparation in a particular area. A few average grades in an overall B average are
acceptable at many institutions. Michigan Tech’s current policy may result in grade inflation.
Faculty may feel pressured to give an undeserving student a B. This revision also will help
advisors identify students who are struggling. Questions/Comments: If this passes this academic
year can it pertain to students who receive a BC/C this semester (SP 10)? Yes, because this would
be applied upon graduation. Should this be degree type specific (course work only vs. research) or
departmental specific? Yes, that is a possibility. If this is implemented what distinguishes an
undergraduate degree from a graduate degree? Meaning, as the policy stands graduate student
expectations are high and should be. Why should we change expectations? Should the nine credits
be lowered to four credits? Students who receive a BC/C according to current policy have to
repeat the course. Courses are not offered each semester. The student may have to wait another
year to graduate. Students may lower their own expectations and effort if they are allowed to get a
BC/C. Ruth Archer will share the benchmarking data she collected with the committee. This will
impact Plan C and D degree plans the most. If a student receives a C it is said that they only
gained a certain amount of knowledge, yet they are able to proceed with their education and
continue taking courses that build off of the course where they only gained minimal knowledge.
Will this create more of a problem for the student? Students should have to gain maximum
knowledge from courses. Is there a way to get a waiver for individual students rather than passing
this policy? Yes, the department can recommend to the Graduate School that an exception be
made. Has this proposal been presented to the faculty of the Business School? Yes, there is
approval among the Business School faculty. Other possibilities for this proposal: Allow the
student nine credits with a BC or above rather than C/BC. Leave the proposal as it was before this
modification and change the following text: “graduate program to allow for use of up to six
credits from outside the student’s primary field of study for which grades of BC/C grades were
received” and leave out the word “outside.” This may discourage students from venturing outside
of their major for fear of getting less than a B. Michigan Tech tries to keep policies standardized
but should the Business School have their own policy? We want to attract students who will excel
and succeed here. Do we really want to drop the high standard? This doesn’t necessarily bring the
standard down; it brings the honesty up (referring to faculty and the pressure to give undeserving
grades). The GFC would like the benchmarking data and would like to know the opinions of the
faculty and staff in the Business School. Motion to table this proposal until next academic year
passed.

6) Motion to adjourn at 5:02 pm.
Academic Good Standing

Current Policy with Proposed Changes

Good Standing http://www.mtu.edu/gradschool/administration/academics/policies-procedures/good-standing/

Students must maintain an overall 3.0 GPA to remain in good standing. In addition, students are expected to consistently receive a grade of "P" (progress) in research credits. Students whose overall graduate GPA falls below 3.0 (sample notification) or who receive a grade of "Q" (unsatisfactory) in research credits (sample notification) will be sent a notification of academic probation. After receiving this notification, graduate students must meet with their advisor and/or graduate program director as soon as possible to plan a course of action for resolving the situation.

All courses used on a student's degree schedule must be graded (that is not pass/fail, audit, or satisfactory/unsatisfactory).

Students may earn up to 9 credits of C grades, as long as a 3.0 average GPA is maintained. Students must earn a B or better in all graded courses used on a degree schedule. This requirement can be adjusted at the discretion of a student's graduate program to allow for use of up to 6 credits from outside the student's primary field of study for which grades of BC/C grades were received.

Grades in courses that are not on a degree schedule affect standing because they affect overall GPA. Graduate students are allowed to repeat courses in which they receive less than a "B" one time. The old grade will remain on the academic record, but will not be used in the calculation of overall GPA.

Courses not used on the degree schedule may be audited or taken pass/fail so as not to affect GPA.

Rationale:

A 'C' is defined as an 'average' grade. Even the best students may earn an average grade at one time or another due to having a heavy course load, personal or family responsibilities, or inadequate preparation in a particular area. If 'C' grades are balanced out or exceeded in number by 'outstanding' or 'A' grades, a student will maintain a 'B' average. A few average grades in an overall 'good' (or 'B'-average) GPA are acceptable at many institutions. For example, the University of Michigan requires an overall B-average and does not specify limits on the number of C (or lower) grades (see: http://www.rackham.umich.edu/policies/gsh/section1/#1312).

Michigan Tech's current policy of not allowing students to apply credits associated with 'C' grades toward a degree may result in grade inflation. Faculty know that giving a student a C (or lower) grade may require the student to spend an extra year on campus in order to retake the course and earn a B or better. By requiring students to maintain an overall 'B' average, while at the same time only allowing them to repeat a course in which they earned less than a B only one time, Michigan Tech will maintain the integrity of its degree programs while reducing pressure placed on faculty members.

Broadening the range of allowable grades will also help advisors identify students who are struggling. Advisors can then provide advice or assist the students in obtaining help or resources that will increase the likelihood they will successfully complete their degree program.
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)
and TIES (http://www.doe.mtu.edu/news/TIES_program_05.html)

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:

- encourage students to pursue international research, internship and course opportunities;
- deepen students' understanding of world cultures and global issues;
- develop a world wide perspective on science, engineering and social issues, such as global change and natural hazards;
- encourage a basic proficiency in another language; and
- 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.

**UN 5555 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 2002

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


SYNERGISTIC ACTIVITIES

   Ecuador: Cospec training, 1989; Lahars work, 2002. 
   Mexico: PhD student training, 1995-98; Collaborative visits from Hugo Delgado, 2002-4. 
   Chile: initial research collaborative visit, 1989. 
   Argentina: Initial visit 2002; field studies 2003. Several field projects in Guatemala and El Salvador funded by USGS/OFDA. Support for two Central American students via USGS/VDAP (CAMI). 

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 Dartevelle, 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

Blair Orr 2


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
Soilmon, 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), Ebsch, 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 L. (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), Taage, 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
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), 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

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
The University Senate of Michigan Technological University

Proposal XX-10
(Voting Units: Academic)

GRADUATE CERTIFICATE IN HYBRID ELECTRIC DRIVE VEHICLE ENGINEERING

1. General Description

This proposal recommends establishing a “Graduate Certificate in Hybrid Electric Drive Vehicle Engineering” through the College of Engineering of Michigan Technological University. Students completing this Certificate will develop competencies in advanced hybrid electric drive vehicle (HEDV) engineering. Students enrolling in this certificate will have a Bachelor's degree in Chemical, Electrical, Materials, or Mechanical Engineering, or a degree in a closely related field. The Certificate Advisor will be appointed by the Dean of the College of Engineering.

Catalog Description - The Graduate Certificate in Electric Drive Vehicle Engineering program provides the student with advanced knowledge of the design, calibration, and operating characteristics of electric drive and hybrid electric vehicles. It is expected that students beginning this Certificate have a working understanding of: i) thermodynamics equivalent to that gained in MEEM2220, or MY3100, or CM3230, ii) electric circuits equivalent to EE2110, or EE3010, and iii) programming, or simulation tools (e.g. MATLAB).

2. Rationale

The light vehicle industry is facing a shortage of engineering talent needed to retool for the use of electric drives as the primary source of motive power. In recognition of this, the State of Michigan and the US Department of Energy put in place programs to encourage universities to offer programs that help address these education needs.

Michigan Tech has received support from both the DOE and Michigan for this curricular development and is creating several new courses in this area. Michigan Tech should offer certificates to students who complete a set of new and existing courses in this area in order to give them a credential indicating their knowledge in this emerging field.

3. Related Programs

The Graduate Certificate in Electric Drive Vehicle Engineering is related to the proposed Certificate in Hybrid Electric Drive Vehicle Engineering at the undergraduate level. The Graduate Certificate uses twenty five existing courses in the Chemical, Electrical, Materials and Mechanical Engineering degree programs, several of which are being modified to include HEDV content. Seven new courses (some are dual listed between departments) are being developed under a DOE Transportation Electrification grant.

There are similar certificate programs being developed at Wayne State University, Purdue (leading a consortium of Indiana universities), Colorado State University, and Missouri
University of Science and Technology.

There are similar courses offered from the University of Michigan, University of Detroit – Mercy, NC State University, and West Virginia University.

4. Projected Enrollment

It is expected that we will have a steady state enrollment of 20-25 students. The graduate enrollments in the first three offerings of MEEM 5990DL, Advanced Propulsion Systems for Hybrid Vehicles, have been 96 in the Spring of 2009 (includes 30 on-campus students), 104 in the Fall of 2009, and 92 students in the Spring of 2010. It is not believed that these enrollments are sustainable for the certificate program, but they do reflect a strong demand for the technology.

5. Scheduling

No change in the regular scheduling of the existing courses is anticipated. The Departments delivering the new courses have agreed to fit them into their regular scheduling plans.

6. Curriculum Design

Required Courses (9 credits): NEW courses in Boldface

EE/MEEM 5295 Adv. Propulsion Systems for Electric Drive Vehicles (3)

Any two of the following:

EE/MEEM 4295 Intro. to Propulsion Systems for Electric Drive Vehicles (3)
EE 4227 Power Electronics (3)
MY/CM 5760 Vehicle Battery Cells and Systems (3)
EE 5221 Advanced Electrical Machines (3)
MEEM 5450 Vehicle Dynamics (3)

Electives Courses (6 credits):

EE/MEEM 4295 Intro. to Propulsion Systems for Electric Drive Vehicles (3)
EE 4227 Power Electronics (3)
MY/CM 5760 Vehicle Battery Cells and Systems (3)
EE 5221 Advanced Electrical Machines (3)
MEEM 5450 Vehicle Dynamics (3)
EE/MEEM 4296 Intro. to Propulsion Systems for Electric Drive Vehicles Laboratory (1)
EE/MEEM 5296 Adv. Propulsion Systems for Electric Drive Vehicles Laboratory (1)
EE/MEEM 4750/5750 Distributed Embedded Control Systems (3)
EE 5200 Advanced Methods in Power Systems (3)
EE 3120 Electric Energy Systems, not EE and not CPE, (3)
EE 4221 Power System Analysis 1 (3)
EE 4222 Power System Analysis 2 (3)
EE 5223 Power System Protection (3)
EE 5230  Power System Operations (3)
EE 5290  Selected Topics in Power Systems (3)
MEEM 4220  IC Engines 1 (3)
MEEM 5250  IC Engines 2 (3)
MEEM 5670  Experimental Design in Engineering (3)
MEEM 5680  Optimization (3)
MEEM 5700  Dynamic Measurement and Signal Analysis (3)
MEEM 5715  Linear Systems (3)
MEEM 4260/5220  Fuel Cell Technology (3)
MY 4165  Corrosion and Environmental Effects (3)
MY 5100  Thermodynamics and Kinetics I (3)
MY 5110  Thermodynamics and Kinetics II (3)
MY 5410  Materials for Energy Applications (3)
CM/Ent 3974  Fuel Cell Fundamentals (1)
CM/Ent 3977  Fundamentals of Hydrogen as an Energy Carrier (1)
CM/Ent 3978  Hydrogen Measurements Laboratory (1)

Total of 15 credits are required for the certificate. Up to 6 credits of 3000 and 4000 level courses are allowed.

7. New Course descriptions

EE/MEEM 4295 Introduction to Propulsion Systems for Hybrid Electric Drive Vehicles - Hybrid electric drive vehicle analysis will be developed and applied to examine the operation, integration, and design of powertrain components. Model based simulation and design is applied to determine vehicle performance measures in comparison to vehicle technical specifications. Power flows, losses, energy usage, and drive quality are examined over drive-cycles via application of these tools.

EE/MEEM 4296 Introduction to Propulsion Systems for Hybrid Electric Drive Vehicles Laboratory - Hybrid electric drive vehicles and their powertrain components will be examined from the aspects of safety, testing and analysis, energy conversion, losses, and energy storage, and vehicle technical specifications and vehicle development process. The lab will culminate with vehicle testing to perform power flow and energy analysis during a drive-cycle.

EE/MEEM 5295 Advanced Propulsion Systems for Hybrid Electric Drive Vehicles - Hybrid electric drive vehicles (HEDV) will be studied and simulated using advanced powertrain component analysis and modeling. An in-depth analysis and study of power flows, losses and energy usage are examined for isolated powertrain components and HEDV configurations. Simulation tools will be developed and applied to specify powertrain and vehicle components and to develop control and calibration for a constrained optimization to vehicle technical specifications.

EE/MEEM 5296 Advanced Propulsion Systems for Hybrid Electric Drive Vehicles Laboratory - Hybrid electric drive vehicles (HEDV) and their components will be examined in a series of laboratories. This includes quantification of power flows and losses in components, calibration of component models based upon experimental data, measurement and quantification of drive quality, failure Mode & Effects Analysis, calibration practices and trade-offs. A HEDV model will be tuned and validated through analysis and fitting to vehicle test data.
**MEEM 4450/5450 Vehicle Dynamics** - This course will develop the necessary models to predict performance and handling and compare analytical results to selected measured data from hybrid vehicle test data. Topics to be covered include: acceleration and braking performance, hybrid electric powertrain architecture, drivetrain performance, vehicle handling, suspension modeling, tire models, steering and steering control, 2DOF dynamics model, and multi-body dynamics. This will culminate in a design project which will require the design of a hybrid vehicle to meet a given vehicle technical specification. Credit may not be received for both MEEM4450 and MEEM5450.

**MY/CM 5760 Vehicle Battery Cells and Systems** - The behavior and application of batteries will be examined by introducing concepts from thermodynamics, materials science, transport processes and equivalent circuits. The non-ideal power source behavior of rechargeable batteries in applications will be treated using electrolyte: electrode transport and electrode materials chemistry.

**EE/MEEM 4750/5750 Distributed Embedded Control Systems** - This course will develop an understanding for the design and application of embedded control systems. Topics to be covered include: embedded system architecture, model-based embedded system design, real-time control, communication protocols, signal processing, and human machine interface. Embedded applications in advanced hybrid electric vehicles will also be introduced.

**8. Library and other Learning Resources**

Students in this program will need only the Library resources presently available to all enrolled students.

**9. Computing Access Fee**

On campus Students will be charged the appropriate department computer access fees. Online students will not be charged computer access fees. Online students will be charged online learning fees.

**10. Faculty Resumes**

- Jeff Naber  
  http://www.me.mtu.edu/meem/facultybio/naber.html
- Jeff Allen  
  http://www.me.mtu.edu/meem/facultybio/allen.html
- Bo Chen  
  http://www.me.mtu.edu/meem/facultybio/b_chen.html
- Wayne Weaver  
  http://www.ece.mtu.edu/pages/faculty/Weaver.html
- Leonard Bohmann  
  http://www.ece.mtu.edu/pages/faculty/Bohmann.html
- John Beard  
  http://www.me.mtu.edu/meem/facultybio/beard.html
- Bruce Mork  
  http://www.ece.mtu.edu/faculty/bamork.html
- Jason Keith  
  http://www.chem.mtu.edu/chem_eng/faculty/jmkeith.htm
- Steve Hackney  
  http://www.mse.mtu.edu/faculty/hackney.html

**11. Equipment**
A mobile laboratory needed for the introductory and advanced propulsion systems courses is being fabricated using funds from a United States Department of Energy (DOE) grant. An existing portable chassis dynamometer will also be used. Some upgrades to the chassis dynamometer will be required, with the funding from those upgrades coming from the same DOE grant as the mobile laboratory. AVL, a partner in the DOE grant will be providing an additional $750,000 in support for the mobile laboratory.

12. Program Costs

The new courses developed or modified for this certificate are funded from a DOE grant. The remaining courses are presently being taught on a regular basis.

Funding for Michigan Tech's Educational Technology Services to support the development of the new online courses is available from a DOE grant.

13. Space

The mobile laboratory including the portable chassis dynamometer, and the hybrid electric vehicles will be housed at KRC.


Credits earned for this certificate may also be applied toward a single graduate degree at Michigan Technological University.

15. Accreditation Requirements

None

XVI. Internal Status of the proposal.

Approved by the College of Engineering

XVII. Planned Implementation Date

Fall 2010
The University Senate of Michigan Technological University

Proposal XX-10
(Voting Units: Academic)

INTERNATIONAL DUAL GRADUATE DEGREES

Definitions:
Dual degrees are defined as arrangements whereby a student, upon completion of a course of study, receives two parallel degrees, one from each of the institutions participating in the arrangement. These may entail adjustments to accommodate the differences in the rules and expectations of the two institutions, but the student has not completed two distinct curricula and has not written two separate theses or dissertations. Dual degrees can not be arranged ad hoc; they must be administered under the rubric of an established formal agreement.

International graduate degrees are defined through arrangements between Michigan Tech and one other comparable institution in a country outside of the U.S.

Concept proposal is a written document used in the Michigan Tech preliminary approval process.

Formal agreement, such as a Memorandum of Understanding, is legally negotiated between the two, or more, institutions in the arrangement.

Policy:
The Graduate School will entertain concept proposals for establishment of programs to award international dual graduate degrees. Once approved, these degrees will be articulated through formal agreements between Michigan Tech and one or more collaborating universities.

Students enrolled in an international dual graduate degree program must complete all of the requirements (both content and credit) for a degree at Michigan Tech. Students enrolled in an Dual International Degree program must also earn at least 50% of the credits required for a Michigan Tech degree through Michigan Tech. (Note that this is inconsistent with the general requirement that 2/3 of the graduate course work be taken in residence; see Board of Control Policy 8.5 for mechanism for approval of variance.)

Students pursuing an international dual graduate degree will receive a degree and diploma from both Michigan Tech and the collaborating university. When the degree and diploma awarded from each collaborating university are in the same academic area, up to 50% of the credits required for each degree may be used to fulfill degree requirements at Michigan Tech and another university. When the degree and diploma awarded from each collaborating university are in different academic areas, students may double-count up to 33% of the credits required for each degree (if the academic content covered by those credits can be appropriately applied toward each degree).

Each participating student’s final Michigan Tech transcript will indicate that the degree was earned as part of an international dual degree program and will provide the name(s) of the collaborating universities.
Students enrolled in international dual graduate degree programs will complete a thesis or dissertation and will be co-advised by a qualified faculty member from Michigan Tech and the primary collaborating university. If more than one collaborating university is involved in an agreement, the primary collaborating university will be the one at which a participating student will earn the most credits (in addition to the credits earned at Michigan Tech). Students will defend their thesis or dissertation at Michigan Tech and the primary participating university, either on-site or through the use of video or web-based conferencing.

Equivalence of Michigan Tech credits and credits earned at a collaborating university will be determined based on the basic principal that full-time enrollment at Michigan Tech requires the same amount of student effort as full-time enrollment at the collaborating university.

International dual graduate degree programs can only involve degrees that are already available at Michigan Tech. New degree programs cannot be developed initially as international dual graduate degrees.

Proposals for New International Dual Graduate Degrees:

1) Initial concept proposals will be developed by a member of the Michigan Tech Graduate Faculty. Faculty seeking assistance or guidance in developing proposals are encouraged to contact the Graduate School. Concept proposals should identify the proposing faculty member, the name of the Michigan Tech graduate program that will offer the degree, a statement of the benefits of the proposed dual degree to Michigan Tech and the appropriate intellectual community, the name of the collaborating university(s), and the name of a correspondent faculty member at the collaborating university(s).

Concept proposals must also attend to the following elements: financial arrangements, including insurance; the time period of student attendance at Michigan Tech; the disciplinary scope of the agreement; clear exposition of credit and other academic equivalencies presumed; policies with regard to the comprehensive, qualifying, and final examinations; any anticipated intellectual property issues; arrangements for renewal and termination of the agreement; and an evaluation process and timeline for program evaluation.

2) Concept proposals must be approved by the faculty of the department or school that hosts the degree program. For non-departmental degrees, initial approval can be granted by the dean of the college or school in which the proposing faculty member has their primary academic appointment.

3) Concept proposals must be approved by the dean of the college or school that hosts the degree program. For non-departmental degrees, initial approval can be granted by the dean of the college or school in which the proposing faculty member has their primary academic appointment.

4) After initial approvals are completed (steps 1-3) proposals will be submitted to the dean of the Graduate School for review. Upon successful preliminary review, the dean of the Graduate School will:

   a. Submit the concept proposal to the University Senate for review, and upon approval;
b. Submit the concept proposal to the manager of Sponsored Operations who will develop an initial draft formal agreement. The draft formal agreement will be based on the Michigan Tech Standard Template for International dual graduate Degrees, or a similar document from one of the dual agreement institutions.

5) The draft formal agreement will then be reviewed by the dean of the Graduate School, the faculty review committee, the director of International Programs and Services, and the University’s legal counsel. Recommendations for modification will be acted upon by the manager of Sponsored Operations. Upon successful completion of the internal review process, copies of the formal agreement will be forwarded to the collaborating university for review and modification. Once the terms of the formal agreement are agreed upon by the collaborating universities, it will be reviewed and, if appropriate, signed by the president and provost at Michigan Tech and by the leadership at the collaborating university(s).
The University Senate of Michigan Technological University

Proposal XX-10
(Voting Units: Academic)

AMENDMENT OF PROPOSAL 11-01
"REQUIREMENTS FOR GRADUATION"
(BOARD OF CONTROL POLICY 8.5)"

1. Introduction

Senate Proposal 11-01 established residency requirements for graduation with a baccalaureate degree from Michigan Tech. Proposal 11-01 was approved by the Board of Control as their Policy 8.5 Requirements for Graduation. There is no Board policy establishing residency requirements for graduate degrees.

Residency requirements for graduate students have been part of the Graduate Catalog for decades, but are not formal university policy. This proposal amends the Requirements for Graduation, to establish current graduate requirements as formal policy approved by the Faculty and by the Board of Control.

2. Amendment of Proposal 11-01

Proposal 11-01 is amended by insertion of the underlined italicized wording:

8.5. Residency Requirements for Graduation
The residency requirements for a student to receive a baccalaureate degree from Michigan Technological University are the following:

a. Thirty of the last 36 semester credit hours of academic work to be applied to the degree must be completed at Michigan Technological University. Study abroad and co-op credits earned through Michigan Tech may be included in this 30 hours of Michigan Tech courses if the student has completed 30 credit hours of courses at Michigan Tech among the last 60 credit hours to be applied to the degree.

b. Thirty semester credit hours of advanced level courses (3000 or higher) must be completed at Michigan Tech.

The residency requirements for a student to receive a graduate degree from Michigan Technological University are the following:

a. A minimum of two-thirds of the required non-research course-work credits required for the degree must be taken through Michigan Tech.

b. Research credits used to satisfy degree requirements must be taken through Michigan Tech and must be supervised by a member of Michigan Tech graduate faculty.
c. Some graduate degree programs may have other specific requirements.

Courses which meet the "at Michigan Tech" requirement are defined as courses listed in the course catalog and taught by Michigan Tech faculty either on campus, at field locations, or through distance learning.

The President or the President's designee, the Provost, is authorized to grant exceptions to these requirements in extraordinary individual cases.

Degree programs with other special requirements may apply for exemptions. The President or the President's designee, the Provost, may grant such programmatic exemptions upon recommendation of the Senate.

3. Proposal 11-01 as Amended

The amended text of Proposal 11-01 will read as follows:

8.5. Residency Requirements for Graduation
The residency requirements for a student to receive a baccalaureate degree from Michigan Technological University are the following:

a. Thirty of the last 36 semester credit hours of academic work to be applied to the degree must be completed at Michigan Technological University. Study abroad and co-op credits earned through Michigan Tech may be included in this 30 hours of Michigan Tech courses if the student has completed 30 credit hours of courses at Michigan Tech among the last 60 credit hours to be applied to the degree.

b. Thirty semester credit hours of advanced level courses (3000 or higher) must be completed at Michigan Tech.

The residency requirements for a student to receive a graduate degree from Michigan Technological University are the following:

a. A minimum of two-thirds of the required non-research course-work credits required for the degree must be taken through Michigan Tech.

b. Research credits used to satisfy degree requirements must be taken through Michigan Tech and must be supervised by a member of Michigan Tech graduate faculty.

c. Some graduate degree programs may have other specific requirements.

Courses which meet the "at Michigan Tech" requirement are defined as courses listed in the course catalog and taught by Michigan Tech faculty either on campus, at field locations, or through distance learning.

The President or the President's designee, the Provost, is authorized to grant exceptions to these requirements in extraordinary individual cases.
Degree programs with other special requirements may apply for exemptions. The President or the President's designee, the Provost, may grant such programmatic exemptions upon recommendation of the Senate.
GRADUATE SCHOOL | Graduate Faculty Council—Draft Agenda

April 6, 2010

NOTE: All links connect to a single pdf file

1. Review minutes of 03/02/2010

2. Old Business
   a. Graduate Certificate for International Profile Proposal (B. Orr, W. Rose)
   b. Grad Certificate in HEDV Engineering
   c. International Dual Graduate Degrees Proposal
   d. Committee Reports:
      i. Graduate Program Review (Dean Huntoon)
      ii. Dismissal/Appeal/Grievance Policy (Dean Huntoon)

3. New Business
   a. Residency Requirements for Graduate Students (R. Keen)
   b. Academic Good Standing (R. Archer)