Minutes of the Graduate Faculty Council Meeting

Tuesday, December 7, 2010

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

Members (14): Bill Yarroch (ASE), Andrew Storer (SFRES), Amy Marcarelli (Bio Sci), Steve Seidel (Comp Sci), Blair Orr (Peace Corps), Seth Donahue (Bio Med), Eugene Levin (Sch Tech), Greg Waite (Geo), Paul Ward (Cog & Sci), Michael Bowler (Rhet & Tech), Chris Middlebrook (Elec & Comp Eng), Carl Anderson (Eng), Craig Friedrich (MEEM), Barry Solomon (Env Policy)

Guests (7): Heather Suokas (Grad Sch), Debra Charlesworth (Grad Sch), Jacqueline Huntoon, Jacque Smith (Grad Sch), Nancy Byers-Sprague (Grad Sch), Sean Gohman (GSG), James Frendewey (Sch Tech)

2) Review and approval of 11/02/10 meeting minutes.

3) Committee Reports:
   a. Dismissal/Appeal/Grievance Policy (Dean Huntoon): Debra Charlesworth is working to align the policy to fit the University’s Policy on Policies and the University’s Policy on Procedures. Once the policy is in the correct format it will be forwarded to the Senate.
   b. Advisory Guidelines (N. Byers-Sprague): Are there any comments before this goes to a vote? Donohue suggested that on page 2 (Advisory Committee section) of the handouts: The sentence reading “…it is recommended but not required that an additional external member must be chosen.” It is suggested that the word “must” be removed. Nancy will make that change. It is suggested that the bold print in the Advisor section be broken out into two bullet points. Nancy will make that change. Computer Science will agree to this advisory position (last month they requested this proposal be tabled in order for their department to discuss it further). Motion to approve passed.
   b1. Application Overload (W. Yarroch): Dave Watkins proposes that a committee is formed to examine the application process by either instituting an application fee or figure out some other way of dealing with the large number of applications. Jacque volunteered to be on the committee along with Dave Watkins. Does any other department feel overloaded with applications? No, only CEE.

4) Old Business
   a. Tracking Students Who are Both Certificate and Degree Seeking (N. Byers-Sprague): Some of the advantages in tracking these students are being able to conduct longitudinal studies, track time to degree and also to determine the popularity of the certificate programs. In order to track both certificate and degree seeking students, students will have to apply to a certificate program (students who are not enrolled in a degree program already need to apply to a certificate program). There are not many students who are only certificate seeking. Are there any concerns with this? Would there be admission requirements? Certificate requirements typically mirror department’s degree requirements but each department/program can make adjustments as they see fit. The Graduate School is planning to circulate a form to existing students who are both degree seeking and certificate seeking in order to get their information. Would there be a check box added to the existing application? The Graduate School will need to work out the details. It is agreed that it is a good idea to do the tracking. It was suggested that when a procedure is put into place, it then be brought to GFC for review.
   b. Fellowship Update (D. Charlesworth): Finishing Fellowship: A few years ago the GFC requested that there be a competition in the spring to award fall fellowships and the fellowship committee has done that twice now. There have been two issues that have come about. The first being that the panel is having difficulty evaluating in the spring (March) whether or not the student will actually be finishing in the fall (December or January). The other issue is that the spring competition for fall is creating an increase in repeat applications. These students are not always putting their best foot forward. The panel has requested that we limit applications to two attempts per student. The panel is hoping that this will encourage students to really think about when they are going to apply and apply with good intentions to graduate with a superior application. The other request is that we eliminate competition in the spring for fall fellowships. There still would be a competition in the summer for fall fellowships. They would like
this implemented next semester. Any comments/concerns? Is graduating a condition of accepting the fellowship? The panel tells the students that the expectation is that they graduate the following semester but if they do not graduate the money is not taken away. Should this then be limited to one application if they are supposed to graduate in the next semester? The justification for allowing a student to apply twice is if a student does not get a finishing fellowship the first time they apply and then has to work to support themselves, it extends the time to degree. They then have another opportunity to apply.

Dean’s Fellowship: The dean has found little interest in this fellowship mainly because departments need to commit to a total of four years of funding. When the fellowship was first introduced the GFC had concerns about the difficulty of committing to four years of funding. Would it be better to make this a nine month fellowship at the minimum full time level that a student could use any time in their graduate career? We would still commit to four years of funding but this way it would only require the department or researcher to come up with three years of funding. Will there be fewer fellowships granted? As of now there have not been more than five applications so the hope is that this will lead to an increase in applications. It seems as though you would lose the incentive as far as the add-on to the regular stipend. If you had a research grant you could add on if you wanted because of the minimum stipend. If it turns out you do not have a grant for one year, you can use the Graduate School funds. Then if you have another dry year you can use the TA funds. Basically the Graduate School would like to change the following text (page 6 of the handout section) “The support will include a stipend of $2,000 per academic-year semester… to “The support will be a full-time fellowship which would include minimum stipend plus tuition and fees that the student could use at any time during the next four years.” Is this any more attractive to people? It seems like it would be less attractive for recruiting outstanding students because they are getting the minimum. It should be kept at a higher stipend. Is there a way to reduce the years of the funding commitment? In the nation’s top schools it is common to commit five years of funding. Michigan Tech commonly does not do that and that is cited as an applicant’s deterrent. Ward, who has recently worked at Florida State, believes that five year funding is not the norm. Funding for one year is the norm with text that also says that they have been successful in funding students for the full four years but the commitment is for one year. Two departments declared that they sometimes commit to four or five years of funding (RTC and Biological Sciences). The extra $2,000 is a way to recruit students. If you take out the $2,000, the student is not getting anything extra and therefore the best students are not applying. The dean will leave this as it is for now and think through this a little further. If anybody has any ideas please email them to her.

c. Addressing Dissents (N. Byers-Sprague): When a faculty member dissents on a presentation there is no formal way to sign off saying that the dissenting concerns were addressed. The Graduate School would like to sign a signature to be required to verify that the concern was addressed. When a student receives a dissent does that require that the student make changes? Yes, but there is not anything in writing saying that the change was made. A check box could be added with the following choices: my concerns were addressed, my concerns were partially addressed or my concerns were not addressed. Check one of those boxes and sign the form. When will this be implemented? This can be in place for summer or at the latest fall 2011.

d. MS in Geospatial Technology (J. Frendewey): At the last meeting there was a request for admission requirements. The requirements have been added to the last page of the handouts. Before the proposal goes to the Senate the requirement updates will be made within the proposal. Questions/Comments: SS5300 has changed its name to Environmental and Energy Policy (page fifteen of the handouts). In regards to the two 5000 level CS courses, there should be an understanding that almost no student would be able to complete those courses without appropriate prerequisites. Yes, that is understood. Suggestion for the table on page twelve under curriculum design; the fifth column should read “Report or Practicum” rather than “Engineering Report of Practicum.” Motion to approve passed.

e. Certificate in Geospatial Technology (J. Frendewey): The degree requirements would be the same as the MS requirements. Is this intended primarily for certificate seeking students as opposed to degree seeking students taking this concurrently? Yes, the primary intention is to attract certificate seeking students. How many credits are required to complete this certificate program? Fifteen. Motion to approve passed.

5) New Business

a. RCR Training (Dean Huntoon): NSF requires responsible conduct of research training for any students funded from the grant. Michigan Tech Sponsored Programs Office certifies that the training is happening on our campus. If your department is not offering this training then your students can enroll in the
Effective Scholarship (UN0500) course, taught by Debra Charlesworth. It is a zero credit course with a $25 fee. The grade is either pass or fail and those who actively participate, pass. In addition, if you have funding from NIH for some specific types of research proposals or student fellowship programs the sort of training that Debra is giving is required. It cannot be online training. There is also a required post doc training for all NSF projects (not sure if NIH post docs are required to take this training). Can the fee be covered by a department account? The Graduate School does not have a problem with that. If the student is supported the fee shows up on the student bill and is covered with the other tuition costs.

b. Outstanding Scholarship Award: Text Change (N. Byers-Sprague): Based on feedback from departments the Graduate School will change the text to say that the number each program can nominate will be based on ten percent of total enrollment in your program rather than ten percent of the expected grads (because expected grads is hard to determine).

c. Discussion of Research Only Mode Adjustments (S. Gohman): The Graduate Student Government has had discussions regarding students who are currently in research only mode that then discover that there is a class that is either going to help their research or is only offered at certain times of the year. Currently the way research only mode works they are not able to take those classes for credit. Can a proposal be put together to modify research only mode to accommodate students who would like to take a class for credit? An option would be to have the student pay for the course as an add-on to their research. There may be some accounting issues. Tuition is based on a code for the semester so you have a specific code while in research only mode. There would need to be some way in which the advisor approves taking a course while in research only mode. The Graduate School will report back when they have some sort of procedure in place.

6) New Meeting Location (H. Suokas): GFC will be meeting in Admin 404 from now on.

7) Motion to adjourn at 5:05 pm.
FY11-02: Graduate Committees: Co-Advisor as External Member

Issue of concern:
Some students have chosen a co-advisor from outside their administrative home department and that person has been the only external member on the committee. Question: Are all the roles of an external member well met by the co-advisor serving in that capacity? A subcommittee of GFC recommends that departments be given the flexibility to allow this but in recognition of the issue recommends the following additional statements (in bold) be added to the current policy language:

Changes are shown below for the Degree Requirements area of the web pages for the Doctor of Philosophy and Master of Science areas. Text equivalent to the text for the Master of Science area will appear in the MBA, Master of Forestry, and Master of Engineering areas.

Proposed Wording – for Degree Requirements - Doctor of Philosophy:

ADVISOR
…The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school. While one co-advisor may be from outside the student’s administrative home department, it is recommended but not required that this co-advisor not fill the role of sole external member on the student’s committee. Before recommending a sole advisor who holds an adjunct appointment in the student’s administrative home department, the appropriate graduate program director should ensure that this person is sufficiently familiar with the department/school standards for research and with applicable university policies/procedures and that this person can maintain adequate contact with the student.

…

ADVISORY COMMITTEE:
…This committee, with the addition of a fourth, external member, will often become the Examining Committee. If co-advisors are chosen and one co-advisor is from outside the student’s home department, it is recommended but not required that an additional external member must be chosen.

…”

ORAL EXAMINATION
…The examining committee will be appointed by the Graduate School in consultation with the department chair. The committee will consist of at least four members of the graduate faculty. At least one of these will be from outside the student's administrative home department or school. The primary advisor, or a co-advisor who serves as chair of the committee, must be from the student's home department or school. While one co-advisor may be from outside the student’s administrative home department, it is recommended but not required that this co-advisor not fill the role of sole external member on the student’s committee.

…”
Current Wording found in Degree Requirements - Doctor of Philosophy:

ADVISOR:
Initially the advisor may be the **graduate program director**, but as soon as possible, and no later than the end of the second semester in residence, a permanent advisor should be chosen. This Michigan Tech graduate faculty member advises the student on course selection and, if applicable, supervises the research experience. The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school. The advisor is an important factor in the graduate student’s timely and successful completion of the program of study. All graduate students must have an advisor.

ADVISORY COMMITTEE:
The advisor and committee, consisting of at least two members of the graduate faculty in addition to the advisor, will be recommended by the advisor and the chair/graduate program director of the major department, school, or program and approved by the Graduate School and filed on the Advisor and Committee Recommendation form. This committee, with the addition of a fourth, external member, will often become the Examining Committee (see “Oral Examination” below).

ORAL EXAMINATION
...The examining committee will be appointed by the Graduate School in consultation with the department chair. The committee will consist of at least four members of the graduate faculty. At least one of these will be from outside the student's administrative home department or school. The primary advisor, or a co-advisor who serves as chair of the committee, must be from the student's home department or school. For interdisciplinary and non-departmental programs, the outside examiner may not be affiliated with the interdisciplinary or non-departmental program. A person external to Michigan Tech may be appointed as an ad hoc member of the Graduate Faculty to serve as the outside examiner. Persons who are not members of the Graduate Faculty may not serve as voting members of doctoral examination committees.

...
Proposed Wording – for Degree Requirements – Master of Science:

ADVISOR
…The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school. While one co-advisor may be from outside the student’s administrative home department, it is recommended but not required that this co-advisor not fill the role of sole external member on the student’s committee. Before recommending a sole advisor who holds an adjunct appointment in the student’s administrative home department, the appropriate graduate program director should ensure that this person is sufficiently familiar with the department/school standards for research and with applicable university policies/procedures and that this person can maintain adequate contact with the student.

Examination Committee—The examination committee will be appointed by the Graduate School in consultation with the department chair. The committee will consist of at least three members of the graduate faculty. At least one of these will be from outside the student's administrative home department or school. The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school. While one co-advisor may be from outside the student’s administrative home department, it is recommended but not required that this co-advisor not fill the role of sole external member on the student’s committee.

Current Wording found in Degree Requirements - Master of Science:

ADVISOR:
Initially the advisor may be the graduate program director, but as soon as possible, and no later than the end of the second semester in residence, a permanent advisor should be chosen. This Michigan Tech graduate faculty member advises the student on course selection and, if applicable, supervises the research experience. The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school. The advisor is an important factor in the graduate student’s timely and successful completion of the program of study. All graduate students must have an advisor.

Examination Committee—The examination committee will be appointed by the dean of the Graduate School in consultation with the department chair. The committee will consist of at least three members of the graduate faculty. At least one of these will be from outside the student's administrative home department or school. The primary advisor, or a co-advisor must hold a regular or adjunct appointment in the student's administrative home department or school.
Figure 1. Number of finishing fellowship applications per semester since spring 2009. The fall 2009 and 2010 applications have been accepted in the spring and summer of those years.

Changes to future finishing fellowship competitions:
- Limit applications to two attempts per student.
- Eliminate competition in the spring for fall fellowships.
Dean's Fellowship Guidelines

Overview
Beginning in January 2009, the Graduate School will offer up to ten Dean’s Fellowships to assist with the recruitment of highly talented applicants to Michigan Tech’s PhD programs. Dean’s Fellowships will provide partial support for the recipient’s first year in a PhD program. The support will include a stipend of $2,000 per academic-year semester (fall and spring) as well as full summer support (stipend plus minimum full-time tuition and fees). The primary goal of the Dean’s Fellowship program is to support Michigan Tech’s strategic plan goal of being an inclusive and welcoming campus for faculty, students, and staff who bring rich, diverse perspectives to our teaching, learning, and research. The Dean’s Fellowship is intended to contribute to the development of a diverse academic community, which includes future faculty and others who will be leaders throughout their professional careers.

Eligibility Criteria
Students are eligible to be nominated for the fellowship if the following conditions have been met at the time of nomination:

1. Student has applied to and been accepted into a PhD program at Michigan Tech.
2. Student is a US citizen or permanent resident.
3. Student has been offered at least four years of support by the accepting department or graduate degree program. Support can be from a combination of internal and external sources. Funding provided through the Dean’s Fellowship program will supplement funding from another source (including internal funds) for the fall and spring semesters of the student’s first year but will provide full support (at the minimum level) during the summer semester following the student’s first academic year of study. Support may be terminated at any time if the student fails to make satisfactory progress toward their degree.
4. Student has been assigned a faculty mentor who will provide guidance as soon as the student enters Michigan Tech. The faculty mentor need not necessarily be the student’s research advisor, but the mentor must be able to provide guidance that will assist the student in making good progress toward their degree from the time that the student matriculates at Michigan Tech.
5. The department or program has a formal peer-mentoring program in place. Peer mentors should provide new students with information about the graduate experience at Michigan Tech. Peer mentors should make new students feel “at home” in graduate school at Michigan Tech and in the local community.

Nomination Process
Students must be nominated for the Dean’s Fellowship by the chair of the department or the graduate program director of the unit that has accepted the student. Nominations are due by March 1 each year. The Dean of the Graduate School will announce the recipients of the Dean’s Fellowship by March 22 each year. Nomination files will consist of the following:

1. A copy of the student’s application file.
2. A copy of the student’s acceptance and offer of support letter.
3. A statement by the department chair or graduate program advisor identifying the name of the faculty mentor and peer mentor that will be assigned to the student once s/he matriculates at Michigan Tech.
4. A statement of how the student will contribute to the goals enumerated in Michigan Tech’s Strategic Plan (http://www.mtu.edu/stratplan/).
Review Process
The credentials of nominees will be reviewed by a faculty panel convened by the dean of the Graduate School using the criteria listed below. Each nomination will be reviewed on an individual basis using a holistic approach.

The goals of Michigan Tech’s strategic plan will guide the evaluation process. These goals are:
1. Attract and support a world-class and diverse faculty, staff, and student population.
   1.1. Provide an outstanding work environment and support opportunities for all members of the Michigan Tech community.
   1.2. Increase the diversity of our faculty, staff, and students.
   1.3. Provide exceptional facilities and an aesthetically pleasing environment.
2. Deliver a distinctive and rigorous discovery-based learning experience grounded in science, engineering, technology, sustainability, and the business of innovation.
   2.1. Provide dynamic experiential learning that integrates instruction, research, and innovation in undergraduate and graduate programs.
   2.2. Develop undergraduate and graduate programs in new and emerging areas.
   2.3. Provide exemplary student life activities.
3. Establish world-class research, scholarship, and innovation in science, engineering, and technology that promotes sustainable economic development in Michigan and the nation.
   3.1. Increase interdisciplinary initiatives to expand knowledge and address societal needs.
   3.2. Promote economic development and innovation in Michigan and the nation.
   3.3. Address societal needs through global partnerships.

Additional criteria will also be considered during the evaluation of nominees. These include:
1. Is the nominating department taking steps to encourage applications from and participation by members of groups that are currently underrepresented on the Michigan Tech campus?
2. Are PhD students in the nominee’s graduate program publishing in peer-reviewed journals and making presentations at national and international professional conferences?
3. Is it likely that the nominating department or graduate program will continue to supplement the student’s stipend and provide summer support using funds obtained from external sponsors, research incentive accounts, the Michigan Tech fund, or departmental funds?
4. Does the nominee have an outstanding academic record?
5. Does the nominee have an ethnic/cultural background that is underrepresented in their discipline and/or is the applicant a first-generation college student?
6. Has the nominee demonstrated a commitment to diversity in their professional, personal, or educational endeavors (for example, by participating in activities that address racial and gender disparities and/or race relations in the US).
7. Does the nominee have family or individual financial status that would make it difficult to continue in graduate school without financial support from the University?
8. Will the nominee’s background, life challenges, or life experiences bring a unique prospective to the academic program to which s/he is applying?

Following review of the nominees’ qualifications, the panel will recommend to the dean of the Graduate School that each student 1) receive a Fellowship, 2) receive a Fellowship if sufficient funds are available, or 3) not receive a Fellowship. The dean of the Graduate School will review the panel’s recommendations and make the final decision about each nominee. The number of Fellowships ultimately awarded will depend on the size and quality of the pool of nominees and on the funds available to support the Dean’s Fellowship program each academic year.
FY11-09: Addressing Dissents (N. Byers-Sprague)

Current Situation:
Currently only the advisor and department chair/graduate program director need to sign page 2 of the “Report on Oral Examination” indicating that “The candidate addressed comments of the dissenting committee member and the final thesis/report/dissertation copy is accepted without further revision or correction:”

Issue of Concern:
Recently a dissenting examiner expressed concern when faced with the pressure of a short time line to review a revised document and noted that there is opportunity for an advisor to sign page 2 without the student fully addressing issues raised by the dissenting examiner. Would adding the requirement of the signature of the dissenting examiner better ensure that all concerns were addressed?

Proposed Change:
Page 2 of the “Report on Oral Examination” would include a signature line for the dissenting examiner.
1. GENERAL DESCRIPTION AND CHARACTERISTICS OF PROGRAM

Sustainable development of a society depends greatly on the availability and reliability of geospatial data. Terabytes of multi-dimensional geospatial data and metadata are acquired using various sophisticated instruments such as global navigation satellite systems, aerial and satellite panchromatic hyper-spectral remote sensors, high-precision optical-electronic surveying instruments, laser scanning systems, radar, sonar, etc. Data are used by scientists from many different disciplines such as engineering, geology, forestry, agriculture, social sciences, history, and political science to study diverse aspects of the Earth and human activity. All these disciplines use geospatial data and technology as a supplementary tool in their research, but geospatial data acquisition and processing is a science in itself.

The roots of geospatial technology are geodetic science, photogrammetry, cartography, surveying, topographic mapping, and thematic mapping. Combined with new technological developments in optics, electronics, and computing, these roots have produced a new blend of applied science – Integrated Geospatial Technology. Examples of recent applications of these technologies include: terrestrial and airborne laser scanning systems that are widely used to obtain 3D models of objects; high-resolution satellite imaging sensors that provide multi- and hyper-spectral video data which allow users to investigate spatial-temporal and physical properties of objects; and Global Navigation Satellite Systems that provide real-time and accurate geo-positioning and navigation data to define precise locations of objects on land and water, including man-made structures or natural features.

There is a large and growing need for scientists and engineers with advanced training in the geospatial technologies. In particular, there is a recognized need among different disciplines for more effective systems to gather, analyze, and interpret geographically referenced spatial data. Powerful new research and technological tools for addressing these problems require graduate-level training in the geospatial sciences.
In many cases, the same geospatial product, such as a Digital Terrain Model, can be created by different techniques. To achieve a goal, professionals need to reason and predict the spatial and semantic accuracy of the final product, compare different techniques and approaches, and estimate technological, financial, and manpower requirements. Planning the data acquisition process, balancing errors and accuracies, and combining and optimizing different technologies for data acquisition and adjustment requires professional knowledge integrated with skills spanning different aspects of quantitative geospatial techniques and technologies.

The proposed Master’s Degree is designed for students from a variety of backgrounds for careers in surveying, photogrammetry, remote sensing, Light Detection and Ranging (LiDAR), terrestrial laser scanning industries, and for allied areas that require knowledge and understanding of the acquisition, processing, and analysis of spatially referenced data.

2. **RATIONALE**

Current trends in industry and government agencies indicate that a stable demand exists for geospatial technology within multiple disciplines. In academia, a growing number of faculty and graduate students are using geospatial data within a variety of fields. Active research programs, courses, and a growing number of graduate degrees incorporate the use of such data and information. The Master’s Degree proposed here will support ongoing activities by facilitating interdisciplinary collaboration in graduate education, and will add value to Michigan Tech’s current graduate offerings by providing a suite of courses in the area of Integrated Geospatial Technology.

The design of this proposed graduate program specifically addresses the following goals:

- Provide a flexible interdisciplinary structure to ensure the best positioning of its graduates in job markets.
- Allow for rapid response to the current demands of industry and foreseeable future trends.
- Incorporate state-of-the-art geospatial research and technology.
- Attract current students of Michigan Tech as well as students at other universities nationally and internationally.
- Promote flexibility in terms of staffing, research interests, practical expertise and modes of course delivery.
- Promote sustainable research infrastructure and staffing in the area of geospatial science and technology at Michigan Tech.

The proposed Master’s Degree is viewed as the initial stage in the strengthening of geospatial science and technology at Michigan Tech. As interest in graduate geospatial education grows and the campus becomes more familiar with the needs and interests of students in this program, the Master’s program could be scaled-up to an interdisciplinary PhD program.
3. **DISCUSSION OF RELATED PROGRAMS WITHIN THE INSTITUTION AND AT OTHER INSTITUTIONS**

Very few higher education institutions offer baccalaureate degree programs focused specifically on geospatial technology and GIScience *per se*. Berdusco \(^1\) identified about 425 higher education institutions worldwide (about 260 in the US) that offer formal certificate, diploma, or degree programs in GIS and GIScience.

Of the 28 US universities listed as offering undergraduate degree programs in GIS, **all but four in fact offer B.A. and B.S. degrees in Geography** (nineteen programs.) Others offer baccalaureate degrees in Earth Science, Environmental Science, Natural Resources, or Forestry, with concentrations, specializations, tracks, or undergraduate certificates in GIS, GIScience, cartography, and related topics.

For the same reasons that the geospatial workforce is diffused among many industries in every employment sector, geospatial activities tend to be widely dispersed and poorly coordinated on four-year college campuses. Within academic programs, courses involving geospatial technologies are often positioned as intermediate or advanced technical specialties with prerequisites and class size limits that pose barriers to enrollment.

A small number of US universities offer graduate degrees in separate quantitative geospatial disciplines such as Surveying (Purdue, University of Texas at Corpus Christi, Florida), Photogrammetry (Ohio State) and Cartography (Penn State, Kansas), but **there is no** university in the US offering Integrated Geospatial Technology.

4. **PROJECTED ENROLLMENT**

The Michigan Tech Surveying Engineering program’s Advisory Board has expressed its support for establishing a graduate program in Integrated Geospatial Technology. The Board felt that there would be strong demand from industry for graduate students with the expertise that would be gained through participation in a certificate or Master’s program.

There are currently five students in the Surveying Engineering program who have expressed an interest in completing a Master’s degree. We expect 5-10 students a year will enroll in the proposed Master’s program.

We strongly believe that the unique structure of the proposed graduate program curriculum and the availability of online course delivery will attract additional non-degree seeking post-graduate students nationally and internationally.

5. **SCHEDULING PLANS**

The classes will be taught on the Michigan Tech campus and most of them will have the option for online delivery.

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\(^1\) Berdusco, B., Results of a Survey of Known Higher Education Offerings in GIS and GISci (2003), [http://www.ucgis.org/priorities/education/GIS_Cert+Masters_Prog/Berdusco.htm](http://www.ucgis.org/priorities/education/GIS_Cert+Masters_Prog/Berdusco.htm)
6. CURRICULUM DESIGN

MASTER OF SCIENCE PROGRAM:

Table 1 outlines options and requirements for the proposed Master of Science degree in Integrated Geospatial Technology.

Table 1: MS Degree Requirements

<table>
<thead>
<tr>
<th>Program</th>
<th>Option</th>
<th>Coursework</th>
<th>Thesis Research</th>
<th>Engineering Report or Practicum</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>Plan A</td>
<td>≥20</td>
<td>6-10</td>
<td></td>
<td>≥30</td>
</tr>
<tr>
<td>MS</td>
<td>Plan B</td>
<td>≥24</td>
<td></td>
<td>2-6</td>
<td>≥30</td>
</tr>
<tr>
<td>MS</td>
<td>Plan C</td>
<td>≥30</td>
<td></td>
<td></td>
<td>≥30</td>
</tr>
</tbody>
</table>

The Master’s program is designed to represent the diversity within the body of knowledge that comprises Integrated Geospatial Technology. The specific set of courses a student takes to meet the requirements of the degree is meant to be flexible to allow a customized program that will satisfy specific research or project interests. It is assumed that each student will take at least 2 courses from at least 2 different areas and specialize in one area in order to understand the essence of integrated approaches to solving real life problems.

7. COURSE DESCRIPTIONS

There are three groups of courses: A) required, B) professional electives, and C) supporting electives. The required group consists of three courses (6 credits), an introduction to the geospatial field, research methods and a research seminar.

The professional electives group provides the set of core courses for the degree. These courses are grouped into Geomatics, GIScience, Remote Sensing, and Geospatial Metadata and Cartography. The variety of courses provides flexibility for specific coursework selection depending on a student’s area of specialization. For example, a student interested in pursuing an emphasis in Geodetics would be advised to take the Fundamentals of Remote Sensing (GE4250) course and the introductory one credit course (SU5003) combined with Computational Geosciences to fulfill a GIS component. As another example, students interested in pursuing environmental geospatial applications might be advised to select FW5510, FW5540 and FW5560.

Supporting courses can be useful for tailored preparation of graduate students for specific career paths. This group includes courses in robotics and computer science, which could serve the needs of a student interested in the aerospace industry; and courses in environmental policy and decision making for students seeking employment with governmental agencies.

The actual program of study for each student will be developed in consultation with an advisor and will be based on individual educational goals.

A. REQUIRED COURSES

SU5010 Geospatial Concepts, Technologies and Data (3 credits), (course exists, delivery: Dr. Eugene Levin)

High-level review of geospatial data acquisition systems, sensors and associated processing technologies. Course considers geospatial metadata generation principles, interoperability, and major tools for manipulation with geospatial data. Course may help in transition of non-geospatial majors to geospatial field.
FW 5810 Research Methods in Natural Resources (2 credits) (course exists, delivery: SFRES faculty)
Overview of science and scientific research. The process of graduate education including choosing an advisor, selecting a research problem, writing a thesis proposal, scientific hypothesis testing, analyzing data, and communicating results through various media.

SU5800 Graduate Seminar (1 credit), (new course, delivery: participating faculty)
Student presentation of current geospatial research in a traditional seminar setting.

B. PROFESSIONAL ELECTIVE COURSES

I. GEOMATICS
Geomatics courses are designed to provide students with the knowledge required to collect geographic information, prepare it for use, and take into account the inherent measurement errors typically encountered.

SU5020 Data Analysis and Adjustments (3 credits), prerequisite SU3250(C) or equivalent (course exists, delivery: Dr. Alfred Leick)
Course explores fundamentals of mathematical error propagation theory including various observation equations, least squares adjustments, and Kalman filter methods. Blunder detection, decorrelation, and inversion of patterned and large matrices processes are considered. Involves analysis of position estimation deploying geospatial measurements.

SU5021 Geodetic Models (3 credits), prerequisite SU5020(C) (course exists, delivery: Dr. Alfred Leick)
Course provides solid geospatial background in geodetic reference frames: datums; geoids; and reference ellipsoids. 2D and 3D geodetic network adjustments are considered based on 3D spherical models.

SU5022 Positioning with GNSS (3 credits), prerequisite SU5020 or equivalent (course exists, delivery: Dr. Alfred Leick)
In depth study of GPS, GLONASS, Galileo, COMPASS satellite systems, theory, and processing of global positioning measurements. Strongly recommended for geospatial practitioners.

II. GEOGRAPHIC INFORMATION SCIENCE (GISc)
The courses in Geographic Information Science provide students with an introduction to the information science issues associated with processing and displaying geographical data.

SU5023 Geospatial Positioning (3 credits), (course exists, delivery: Colin Brooks)
High-level summary of GPS-GAP courses. This course is intended for interdisciplinary graduate students who seek just ONE combination course in adjustments, geodesy and GPS (with emphasis on GPS/GNSS). Not available to students who have taken SU5020, SU5021, SU5022.

SU5041 Geospatial Data Processing (3 credits), (course exists, delivery: Dr. Yerach Doytsher)
Advanced data collection techniques; raster to vector; data conversion and map projections; topology; principles and application via advanced spatial analysis; advanced database structure; geo-database; georelational data model versus object-component data model; advanced 3D applications – vector and raster data model application; network analysis; linear referencing and confliation; geo-coding, GIS-CAD integration; web-based GIS innovations.

SU5043 Topographic Analysis (3 credits), (course exists, delivery: Dr. Yerach Doytsher)
LiDAR measurements; DSM - data sources, accuracy analysis, quality control, vector data analysis; terrain representation and TIN; grid analysis - interpolation, visibility, filers (smoothing, edges, median); shading;

2 Professor, Department of Spatial Information Science and Engineering, University of Maine; Adjunct Professor, Michigan Tech
3 Senior Research Scientist, Michigan Tech Research Institute (MTRI)
4 Professor, Civil and Environmental Engineering, Technion-Israel Institute of Technology
merging overlapping DSMs; spatial analysis - spectral analysis shape analysis; automatic feature extraction from DSM.

III. REMOTE SENSING

The courses in Remote Sensing provide a background in wireless or non-contact methods of obtaining information related to geospatial objects.

**SU5002 Infrared Technology, Sensors, and Applications (1 credit), (course exists, delivery: Dr. Robert Schuchman)**
Infrared remote sensing fundamentals, current and future technologies, and applications are considered. Remote sensing for both civilian applications such as environmental resource mapping and military applications will be included.

**SU5930 Synthetic Aperture Radar (SAR) Fundamentals and Applications (3 credits), (course exists, delivery: Dr. Robert Schuchman)**
Review of radar concepts, applications of SAR (InSAR) data, types of available satellite/airborne systems, and data processing methods. Applications for creating topographic data, recognizing targets, classifying ice and vegetation, and oceans/large lakes will be presented based on real-world examples.

**FW5560 Digital Image Processing: Remote Sensing Perspective (3 credits), (course exists)**
Presents the theory and quantitative procedures of digital image processing using remotely sensed data. Emphasizes image acquisition, preprocessing, enhancement, transformation classification techniques, accuracy assessment, and out-products. Discusses linkages to GIS. Also covers evaluating applications of the technology to current resource management problems via peer-reviewed literature.

IV. GEOSPATIAL METADATA AND CARTOGRAPHY

This group of courses provides the knowledge and background to understand the science of describing data and visualization in different types of maps.

**SU5042 Digital Cartography (3 credits), (course exists, delivery: Dr. Yerach Doytsher)**
Spatial relations - topology, relations and relationships, directions and distances; hierarchy; generalization - vector (linear, polygonal, fractals) and raster; labeling - automatic name placement, text arrangement and deletion text; computational geometric algorithms - line intersection, polygonal relationships, grid model, route analysis.

**SU3540 Geospatial Information Technology with Elements of Field Cartography (4 credits), prerequisite MA3710 (course exists, delivery: Dr. Eugene Levin)**
Application of GIS technology methods for processing surveying data obtained in the field. Concepts of interoperability and metadata organization are considered. Includes map projection review and 2D and 3D cartographic data visualization.

B. SUPPORTING ELECTIVE COURSES

**EE 5725 - Mobile Robotics & Multi-Robot Systems (3 credits)**
Introduction to mobile robotics and multi-robot systems. Introduce spatial description, mobile robot locomotion, kinematics, localization and mapping, motion planning and navigation. Topics in multi-robot systems include biological inspirations, control structure, inter-robot communication, learning in multi-robot systems, and modeling and analysis.

**EE 5522 - Digital Image Processing (3 credits) (course exists)**
Image formation, enhancement, and reconstruction. Applications in medical imaging, computer vision, and pattern recognition.

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5 Co-Director, Michigan Tech Research Institute (MTRI)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 5611</td>
<td><strong>Computer Graphics: Advanced Rendering and Animation</strong> (3 credits) (course exists)</td>
<td>3</td>
<td>Topics include polygonal objects, parametric curves and surfaces, lighting models, shadows and textures, ray-tracing techniques, radiosity methods, volume rendering, and animation.</td>
</tr>
<tr>
<td>CS 5811</td>
<td><strong>Advanced Artificial Intelligence</strong> (3 credits) (course exists)</td>
<td>3</td>
<td>Course topics include current topics in artificial intelligence including agent-based systems, learning, planning, use of uncertainty in problem solving, reasoning, and belief systems.</td>
</tr>
<tr>
<td>FW 5540</td>
<td><strong>Advanced Terrestrial Remote Sensing</strong> (4 credits) (course exists)</td>
<td>4</td>
<td>Remote sensing principles and concepts at the graduate level. Topics include camera and digital sensor arrays, types of imagery, digital data structures, spectral reflectance curves, applications and introductory digital image processing.</td>
</tr>
<tr>
<td>FW 5550</td>
<td><strong>Geographic Information Systems</strong> (4 credits) (course exists)</td>
<td>4</td>
<td>Use of geographic information systems (GIS) in resource management. Studies various components of GIS in detail, as well as costs and benefits. Laboratory exercises use ArcGIS software package to solve resource management problems.</td>
</tr>
<tr>
<td>FW 5560</td>
<td><strong>Digital Image Processing: Remote Sensing Perspective</strong></td>
<td></td>
<td>Presents the theory and quantitative procedures of digital image processing using remotely sensed data. Emphasizes image acquisition, preprocessing, enhancement, transformation classification techniques, accuracy assessment, and out-products. Discusses linkages to GIS. Also covers evaluating applications of the technology to current resource management problems via peer-reviewed literature.</td>
</tr>
<tr>
<td>GE 4100</td>
<td><strong>Geomorphology and Glacial Geology</strong> (4 credits) (course exists)</td>
<td>4</td>
<td>The study of the processes, including fluvial, glacial, wind, mass movement, and wave action, shaping the earth's surface by erosion and deposition of geologic materials. Emphasizes the role of past and present climate. Field trips are a major component.</td>
</tr>
<tr>
<td>GE 4250</td>
<td><strong>Fundamentals of Remote Sensing</strong> (3 credits), (course exists)</td>
<td>3</td>
<td>This course focuses on the basic physics behind above-surface remote sensing and remote sensing systems. Topics covered include: properties of the atmosphere, absorption and scattering of electromagnetic radiation, instrument design, data acquisition and processing, validation, and basic applications.</td>
</tr>
<tr>
<td>SS 5300</td>
<td><strong>Environmental Policy and Politics</strong> (3 credits), (course exists)</td>
<td>3</td>
<td>An overview of environmental policymaking and politics in the U.S. Emphasizes policies regarding air and water pollution, toxics and hazardous waste. Discussion of rulemaking, enforcement, and administration of laws by EPA. Investigation of environmental politics on national and community levels, with focus on social movements and citizen participation.</td>
</tr>
<tr>
<td>SS 5350</td>
<td><strong>Environmental Policy Analysis</strong> (3 credits), (course exists)</td>
<td>3</td>
<td>The role of economic analysis in environmental policy, including a detailed review of the major tools that are used at the federal, state, regional, and local levels. Special emphasis on benefit-cost analysis and comparative risk analysis.</td>
</tr>
<tr>
<td>SU 4140</td>
<td><strong>Photogrammetry</strong> (3 credits) (course exists)</td>
<td>3</td>
<td>Basic principles of photogrammetry and its role as a technology for spatial data collection. Use of photogrammetry in the fields of surveying, engineering, and geographic information management will be discussed.</td>
</tr>
<tr>
<td>SU 4100</td>
<td><strong>Geodetic Positioning</strong> (3 credits) (course exists)</td>
<td>3</td>
<td>Introduces the instruments and procedures used in surveying projects that require a high order of accuracy. Discusses some conventional instruments and techniques but the greater emphasis is on GPS techniques.</td>
</tr>
</tbody>
</table>
8. LIBRARY AND OTHER LEARNING RESOURCES

The library has basic literature in the area of geospatial technologies but the following additional books and journals would be required.

LIST OF BOOKS (APPROXIMATE COST: $2,000)


LIST OF JOURNALS (APPROXIMATE ANNUAL COST: $12,345)

1. GPS Solutions, Springer, ISSN: 1080-5370 (Available through SpringerLink)
3. Photogrammetric Engineering and Remote Sensing, American Society for Photogrammetry and Remote Sensing (ASPRS), ISSN: 0099-1112 ($270/year)
5. Surveying and Land Information Science, National Society of Professional Surveyors, ISSN: 1538-1242
9. **COMPUTING ACCESS FEE**

A computer access fee of $210 (2010-11) per semester will be required for students enrolled in this program and additional university Distance Learning fees may be required for on-line courses.

10. **FACULTY RESUMES**

Colin Brooks (http://expertise.cos.com/cgi-bin/exp.cgi?id=1265087)

Yerach Doytsher, PhD (http://www.technion.ac.il/~doytsher/13.htm)

Michael Falkowski, Ph.D (http://forest.mtu.edu/faculty/falkowski/)

Alfred Leick, PhD (www.gnss.umaine.edu)

Eugene Levin, PhD, CP (http://www.tech.mtu.edu/Faculty_Pages/Eugene_Levin.html)

Ann MacLean, Ph.D (http://forest.mtu.edu/faculty/maclean/index.html)

Robert Schuchman, PhD (http://expertise.cos.com/cgi-bin/exp.cgi?id=1289668)

Aleksey Smirnov, Ph.D (http://www.geo.mtu.edu/profile/AVSmirnov.htm)

Igor Ternovskiy, PhD (www.intopsys.com)

11. **DESCRIPTION OF AVAILABLE/NEEDED EQUIPMENT**

The School of Technology has been teaching surveying engineering and photogrammetry for over 20 years. In terms of equipment, the School of Technology already has the following capital assets to support the new program.

- Trimble GNSS RTK system $60,000
- Trimble S6 total stations (4 pcs) $96,000
- TSC2 wireless data collectors (4 pcs) $10,000
- Leica DN Digital Levels (10 pcs) $30,000
- Trimble Geomatics Office (90 licenses) $400,000
- Arc GIS licenses (unlimited) (available via Michigan Tech)
- Carlson Civil Suite software (90 licences) $927,000
- SimWright StereoGIS softcopy photogrammetric workstation (5 licenses) $50,000
- Cardinal Systems VrMapping photogrammetric software suite (12 licenses) $120,000
- Chrysler PT Cruiser vehicle $6,700
- Small aerial UAV (in production with ME-EM aerospace student enterprise) $13,000
- RIEGL 3D Imaging Sensor LMS-Z210ii terrestrial LiDAR scanner $50,000

Total current assets are valued at $1,762,700.

The School of Technology and MTRI have all the necessary equipment and software licenses to start the proposed graduate degree program.
12. **PROGRAM COSTS**

The Graduate program may be started without additional costs since a portion of the distance learning tuition revenue will be used to support the external instructors. The plan is to have an agreement that pays the instructors a fixed amount per student with a cap on the maximum compensation per class. This means that classes with very low enrollment might not be offered if the instructor does not feel there is adequate compensation. Tuition revenue from classes with enrollment beyond the break-even point could possibly be used to subsidize low enrollment classes.

13. **SPACE**

Several shared graduate student offices will be required for full-time students (one room for each 5 students). In the event that a geospatial faculty member is hired as part the SFHI, an office in the School of Technology (EERC) might be needed in the future.

14. **ACCREDITATION REQUIREMENTS**

None

15. **PLANNED IMPLEMENTATION DATE - FALL SEMESTER 2010**

16. **INTERNAL STATUS OF THE PROPOSAL**

Approved by:

Date:
1. GENERAL DESCRIPTION AND CHARACTERISTICS OF PROGRAM

Sustainable development of a society depends greatly on the availability and reliability of geospatial data. Terabytes of multi-dimensional geospatial data and metadata are acquired using various sophisticated instruments such as global navigation satellite systems, aerial and satellite panchromatic hyper-spectral remote sensors, high-precision optical-electronic surveying instruments, laser scanning systems, radar, sonar, etc. Data are used by scientists from many different disciplines such as engineering, geology, forestry, agriculture, social sciences, history, and political science to study diverse aspects of the Earth and human activity. All these disciplines use geospatial data and technology as a supplementary tool in their research, but geospatial data acquisition and processing is a science in itself.

The roots of geospatial technology are geodetic science, photogrammetry, cartography, surveying, topographic mapping, and thematic mapping. Combined with new technological developments in optics, electronics, and computing, these roots have produced a new blend of applied science – Integrated Geospatial Technology. Examples of recent applications of these technologies include: terrestrial and airborne laser scanning systems that are widely used to obtain 3D models of objects; high-resolution satellite imaging sensors that provide multi- and hyper-spectral video data which allow users to investigate spatial-temporal and physical properties of objects; and Global Navigation Satellite Systems that provide real-time and accurate geo-positioning and navigation data to define precise locations of objects on land and water, including man-made structures or natural features.

There is a large and growing need for scientists and engineers with advanced training in the geospatial technologies. In particular, there is a recognized need among different disciplines for more effective systems to gather, analyze, and interpret geographically referenced spatial data. Powerful new research and technological tools for addressing these problems require graduate-level training in the geospatial sciences.

In many cases, the same geospatial product, such as a Digital Terrain Model, can be created by different techniques. To achieve a goal, professionals need to reason and predict the spatial and semantic accuracy of the
The proposed graduate certificate is designed for students from a variety of backgrounds for careers in surveying, photogrammetry, remote sensing, Light Detection and Ranging (LiDAR), terrestrial laser scanning industries, and for allied areas that require knowledge and understanding of the acquisition, processing, and analysis of spatially referenced data.

2. **RATIONALE**

Current trends in industry and government agencies indicate that a stable demand exists for geospatial technology within multiple disciplines. In academia, a growing number of faculty and graduate students are using geospatial data within a variety of fields. Active research programs, courses, and a growing number of graduate degrees incorporate the use of such data and information. The graduate certificate proposed here will support ongoing activities by facilitating interdisciplinary collaboration in graduate education, and will add value to Michigan Tech’s current graduate offerings by providing a suite of courses in the area of Integrated Geospatial Technology.

The design of this proposed graduate certificate specifically addresses the following goals:

- Provide a flexible interdisciplinary structure to ensure the best positioning of its graduates in job markets.
- Allow for rapid response to the current demands of industry and foreseeable future trends.
- Incorporate state-of-the-art geospatial research and technology.
- Attract current students of Michigan Tech as well as students at other universities nationally and internationally.
- Promote flexibility in terms of staffing, research interests, practical expertise and modes of course delivery.
- Promote sustainable research infrastructure and staffing in the area of geospatial science and technology at Michigan Tech.

The proposed graduate certificate is part of an effort to strengthen geospatial science and technology at Michigan Tech.

3. **DISCUSSION OF RELATED PROGRAMS WITHIN THE INSTITUTION AND AT OTHER UNIVERSITIES**

Refer to the proposal for the Master’s Degree Program in Integrated Geospatial Technology.

4. **PROJECTED ENROLLMENT**

The Michigan Tech Surveying Engineering program’s Advisory Board has expressed its support for establishing a graduate program in Integrated Geospatial Technology. The Board felt that there would be strong demand from industry for graduate students with the expertise that would be gained through participation in a certificate or Master’s program.
Currently, there are five industry professionals who have expressed interest in a graduate certificate and we anticipate approximately ten students participating in the program at any point in time.

We strongly believe that the unique structure of the proposed graduate certificate and the availability of online course delivery will attract additional non-degree seeking post-graduate students nationally and internationally.

5. SCHEDULING PLANS
The classes will be taught on the Michigan Tech campus and most of them will have the option for online delivery.

6. CURRICULUM DESIGN
Certificate:
All of the courses in the proposed Master’s program, except Graduate Research, will be available to students seeking the graduate certificate. Any combination of fifteen credits may be selected depending on the technical emphasis area of the student. Example groups of courses oriented towards particular areas of emphasis are provided below. This allows each student to create a personalized program of study.

   Surveying Engineering and GPS: SU5010, SU5020, SU5021, SU5022, SU5042
   GIS and 3D Visualizations: FW5560, SU5010, SU5041, SU5042, SU5043
   Remote Sensing and GIS: FW5550, SU5001, SU5002, FW5560, SU5010, SU5023, SU5930
   Automated Cartography and GIS: FW5550, SU5001, SU5002, FW5560, SU5041, SU5043
   Manned & Unmanned Robotic Platforms (UAV/UGV) Guidance, Navigation and Control (Geospatial Background): FW5560, SU5010, SU5022, SU5041, SU5042
   Interdisciplinary: SU5021, SU5022, SU5041, SU5042, SU5930

7. COURSE DESCRIPTIONS
Refer to the proposal for the Masters Degree Program in Integrated Geospatial Technology.

8. LIBRARY AND OTHER LEARNING RESOURCES
Refer to the proposal for the Master’s Degree Program in Integrated Geospatial Technology.

9. COMPUTING ACCESS FEE
A computer access fee of $210 (2010-11) per semester will be required for students enrolled in this program and additional university Distance Learning fees may be required for on-line courses.

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The graduate certificate program may be started without additional costs since a portion of the distance learning tuition revenue will be used to support the external instructors. The plan is to have an agreement that pays the instructors a fixed amount per student with a cap on the maximum compensation per class. This means that classes with very low enrollment might not be offered if the instructor does not feel there is adequate compensation. Tuition revenue from classes with enrollment beyond the break-even point could possibly be used to subsidize low enrollment classes.

13. **SPACE**

No additional space is required.

14. **ACCREDITATION REQUIREMENTS**

There are no accreditation requirements for the proposed graduate certificate.

15. **PLANNED IMPLEMENTATION DATE**

Spring Semester 2011.

16. **INTERNAL STATUS OF THE PROPOSAL**

Approved by:

Date:
Points to address from November 2, 2010 GFC meeting

1. Will this program be housed in the School of Technology?

   The MS in Integrated Geospatial Technology is interdisciplinary in nature and will have participating faculty members from several academic units within the university. We believe it is important for the success of the program that it be administered from within the School of Technology. The program proposal originated from within the school and there is a commitment from the dean to provide the necessary administrative and financial support so the program can be a success.

   In addition, the surveying program has approximately $1.8 million in equipment and software in place to support the proposed graduate program.

2. Entry requirements.

   Of course, the proposed MS program must adhere to all requirements imposed by the graduate school at the time a student applies for admission, and the applicant must follow the specified admissions procedures.

   It is anticipated that applicants will come from various technical disciplines and will most likely have taken the appropriate foundation courses.

   To be specific all applicants should have:

   • three college-level calculus courses,
   • an object-oriented programming course,
   • and college level physics.

   In addition, a course in linear algebra is recommended.

   Conditional acceptance might be useful in order to give certain students the opportunity to complete any missing requirements.
Graduate Faculty Council—Draft Agenda

December 7, 2010

NOTE: (all handouts connected to a single pdf file)

1. Review minutes of 11/0/2010

2. Committee Reports
   a. FY10-01-Dismissal/Appeal/Grievance Policy (D. Charlesworth)
   b. FY11-02-Advisory Guidelines-Formally know as: Co-Advisory as External Member (N. Byers-Sprague)
      1. Application Overload in CEE (W. Yarroch)

3. Old Business
   a. FY11-05-Tracking Students Who are Both Certificate and Degree Seeking (N. Byers-Sprague)
   b. FY11-08-Fellowships Update (D. Charlesworth)
   c. FY11-09-Addressing Dissents (N. Byers-Sprague)
   d. FY11-14-MS in Geospatial Technology (J. Frendewey)
   e. FY11-15-Certificate in Geospatial Technology (J. Frendewey)

4. New Business
   a. FY11-07-RCR Training
   b. Outstanding Scholarship Award: Text Change (N. Byers-Sprague)
   c. Discussion of Research Only Mode Adjustments (S. Gohman)