Minutes of the Graduate Faculty Council Meeting

Tuesday, September 2, 2014

Members (19): Andrew Storer (SFRES), Louisa Kramer (Geo), Kari Henquinet (PCorps), Erika Hersch-Green (BioSci), Scott Kuhl (CompSci), Caryn Heldt (ChemEng), Patty Sotirin (Rhet), Shane Mueller (CogSci), Warren Perger (ElecCompEng), Noel Urban (NonDeptEnvir), Jiguang Sun (Math), Keat Ghee Ong (BioMedEng), Dean Johnson (MBA), Veronica Griffis (Civ&EnvEng), Qinghui Chen (Kines), Leonard Bohmann (Eng), Craig Friedrich (MEEM), Judith Perlinger (Atmos), Mari Buche (DataSci), Audrey Mayer (SocSci)

Guests (8): Debra Charlesworth (Grad Sch), Sasha Teymorian (GSG), Nancy Byers Sprague (Grad Sch), Heather Suokas (Grad Sch), Nathan Hood (ConImprov), Kristi Isaacson (Grad Sch), John Jaszczak (Physics), Ravindra Pandey (Physics)

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

2) Online & Interdisciplinary Graduate Coordinator Introduction (Dean Huntoon): Dean Huntoon introduced Dr. Alex Guth. Her task has been to figure out the different laws in the fifty states regarding online education and their definitions of different aspects of education presence. In addition she will be working with non-departmental and interdisciplinary programs to help them manage their graduate programs.

3) Review and approval of 04/15/14 meeting minutes.
   • The following post meeting note from the 4/15/14 meeting was included in the minutes: The dean was informed after the meeting that Senate Proposal 16-08 (adopted by the Senate on 16 April 2008; item 5 under Proposed Resolution) states: “The University Senate will channel all material related to graduate education through the Graduate Faculty Council before taking action.”
   • There are some questions regarding the verbiage, for example the word “channel”, does that mean approve or FYI?
   • A. Storer says the verbiage will need to be discussed with the Senate.

4) Elect a Chair:
   a. Dean Huntoon verbally called for nominations. There were no responses. An email call for nominations went out prior to the meeting with no response. Dr. Andrew Storer volunteered to chair. With a unanimous vote A. Storer is the 2014-2015 GFC chair.

5) Old Business:
   a. Research Tuition Rate Update (Dean Huntoon): Over the summer Dean Huntoon worked with people in the budget planning group and with accounting staff to determine what can be done to modify research-only mode. There are three proposed choices a student entering research-only mode can chose from:
      • Full-Time (9 credits) research-only mode rate is to be used by students who have satisfied all other requirements for the degree except completing the research project.
      • Part-Time (6 credits) research-mode rate is to be used by students who have satisfied all other requirements for the degree except completing the research project who also wish to take a course in addition to their research credits and/or do not need to be enrolled full-time. Students could take at least 3 credits of coursework at the regular tuition rate in order to be full-time (as is required for supported and international students).
      • Minimum (3 credits) research-mode rate is for students who wish to be enrolled at a minimal level when completing their degree and/or during summer semesters. Students could also combine 3 credits of research with 6 credits of coursework (at the regular tuition rate) if they needed to be enrolled full time.
• There will be an associated change in eligibility for PhD students who will now need to complete a minimum of two full-time semesters at regular tuition (18 credits minimum) for post-master’s students and a minimum of 30 credits for pre-master’s students before entering into research-only mode. This is in addition to having to pass the test of disciplinary knowledge (qualifying exam) and having to pass the research proposal exam.

• (C): The proposal presented to the GFC made no distinction for students who earned a master’s degree at Michigan Tech. Discussion followed and as a result of discussion, the proposal was modified so that students who completed an MS degree at Michigan Tech would not need to complete an additional 18 credits prior to entering research mode so as to not de-incentivize the potential for completing both the MS and PhD at Michigan Tech.

• **TO DO:** Please take this back to your departments and bring feedback to the next GFC meeting.

b. Graduate Program Review (Dean Huntoon): This was originally proposed and approved in November of 2010. It has not been acted on as of yet. This process will be operationalized during the next academic year. In the handouts section of the GFC website you can reference what type of data the Graduate School will be collecting and what type of data the programs participating will be asked to collect. Dean Huntoon is looking for volunteers to participate.

• **TO DO:** Please take this back to your departments to see if your program is willing to participate.

c. Graduate Faculty Review (Dean Huntoon): It is stated in the Tenured/Tenure-Track Faculty Handbook that “It is expected that department chairs/school deans will continually review the performance of all individuals holding graduate faculty status in their respective units using criteria outlined in Section B above.” Dean Huntoon found that units did not know they were supposed to do this. In the future the Graduate School will try to facilitate this by having the graduate faculty appointment be for a limited time with option to renew. Dean Huntoon calls for volunteers to form a working group to draft review guidelines that can be used by deans and chairs to review faculty. Judith Perlinger, Audrey Mayer, and Louisa Kramer volunteered.

6) **New Business:**

a. MS in Applied Physics Proposal (J. Jaszczak): The new MS degree program in Applied Physics will distinguish itself from the existing MS degree in Physics by offering flexibility by tailoring the required coursework to prepare students for interdisciplinary research, including nanotechnology, photonics, atmospheric science and biophysics. The proposed program will offer the following advantages: 1) The required core courses will be tailored to meet the needs of a student depending on their individual area of research, and can be selected from within the physics department as well as in cognate departments. 2) The proposed MS Appl. Phys. degree program will attract students from diverse undergraduate backgrounds, including physics, atmospheric science, materials science, electrical engineering, etc.

• (Q): Does the Physics department feel students are applying and not coming because this is not offered or students are not applying because this is not offered?

• (A): The department feels students are not applying because this is not offered.

• (C): In the proposal the terms “plan A, B, and C” are used, they will need to be changed to thesis, report, and coursework as A, B, and C are no longer used.

• **TO DO:** Please take the proposal (handouts section of the GFC website) back to your departments and bring feedback to the next GFC meeting. Please be prepared to vote.

b. Accelerated MS Deferrals (C. Friedrich): Will be discussed at next meeting.

c. Procedures for Applying to a Graduate Certificate Program (K. Isaacson): Four years ago the proposal was approved in which students had to apply for the certificate programs. At that time the Graduate School was very flexible with the rules in order to accommodate students who were about to graduate and had met the certificate requirements. It is four years later and the Graduate School is still being flexible because we have not notified departments of set guidelines. Students who are about to graduate or have already graduated are wanting the Graduate School to award
the certificate without having applied to the certificate program. This results in lost data, for example, programs tracking the certificate students taking the classes are not being tracked as they are not in the system as pursing the certificate degree. The current policy is on the handouts section of the GFC website.

- **TO DO:** Departments/programs need to decide whether or not they want their students to apply and be admitted into these certificate programs or do they want to modify the proposal to say that applying is only a requirement for students only pursing a certificate degree. Is it important to track this data? Also, look at what the definite timeline is for someone who is degree seeking and who wishes to also earn a certificate.

d. Prerequisite Checking (Dean Huntoon): Will be discussed at next meeting.

e. “Changing” History (Dean Huntoon): Will be discussed at next meeting.

f. Degree Completion Timeline Launched (D. Charleworth): This summer the Graduate School held a kaizan event. Students have been confused as to what needed to be done and when in order to complete their degree. There is a new area on the Graduate School website called the Degree Completion Timeline: http://www.mtu.edu/gradschool/administration/academics/timeline/

Those departments who borrowed our degree types table and form links from the Graduate School website to use on their websites should now use this timeline as it contains links to the forms as well as instruction.

g. Peace Corps International Programs Update (K. Henquinet): Will be discussed at next meeting.

7) Motion to adjourn at 5:05 pm.
September 2, 2014
(Last update: 09/22/14)

Handouts of the Graduate Faculty Council

Michigan Tech
Graduate Program Review

I. Purpose

Michigan Technological University conducts formal review of its graduate programs on a regular schedule in order to promote continual improvement. The University Procedure for Periodic Review of Academic Departments and Schools is available on the Provost’s website at: http://www.admin.mtu.edu/admin/prov/PRE%20PROGRAM%20REVIEW%20PROCEDURES.htm

II. Review Cycle

Each program, or set of programs in a related field that choose to be reviewed as a group, will be formally reviewed according to the schedule in the Procedure for Periodic Review of Academic Departments and Schools.

III. Responsibility and Locus of the Review

Reviews are initiated by the Provost as described in the Procedure for Periodic Review of Academic Departments and Schools.

IV. Schedule

The schedule for the review is the same as that described in the Procedure for Periodic Review of Academic Departments and Schools.

V. The Self-Study

The self study will be conducted and include the components described in the Procedure for Periodic Review of Academic Departments and Schools. The data related to graduate education to be collected as part of the self-study are listed in Appendix A of this report, Self-Study Guidelines. During the fall semester of the review year the Graduate School will provide the programs being reviewed with most of the quantitative data required for the Self-Study of graduate programs.

VI. External Reviewers

See Procedure for Periodic Review of Academic Departments and Schools.

VII. Internal Reviewer

See Procedure for Periodic Review of Academic Departments and Schools.

VIII. Review Summary Report

See Procedure for Periodic Review of Academic Departments and Schools.

IX. Dean’s Evaluation

See Procedure for Periodic Review of Academic Departments and Schools.
X. Provost’s Report

See Procedure for Periodic Review of Academic Departments and Schools.

XI. History of Revisions or Changes

- 09/03/10 Draft document prepared by dean of the Graduate School reviewed by a subcommittee of the Graduate Faculty Council.
- 10/15/10 Revised according to Graduate Faculty Council subcommittee comments.
- 10/21/10 Revised to follow format of Procedure for Periodic Review of Academic Departments and Schools.
Appendix A: Self-Study Guidelines for Graduate Program Periodic Review

These guidelines should be reviewed annually by the Graduate Dean and programs which have been recently reviewed so that they can be continually revised and improved.

I. Quantitative Data Collected by the Graduate School

Data collected by the Graduate School and provided to programs at the start of the self-study period. The “goal” column will be filled in by the unit preparing the self-study if the unit chooses to use that column to set goals for itself as a way to internally prioritize resource and effort allocation in the future.

Program Name(s): ____________________________________________________________

Table 1: Number of Graduate Faculty Employed by Michigan Tech by Rank and Year: Headcount and (FTE). (Use parentheses to indicate FTE data.)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>Full Professor</td>
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<td>Associate Professor</td>
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<td>Assistant Professor</td>
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<td>Instructor</td>
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<td>Lecturer</td>
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<td>Research Professor</td>
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<td>Research Engineer</td>
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<td>Other Rank</td>
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Table 2: Faculty Demographics.

<table>
<thead>
<tr>
<th>Demographic Percentages</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>% Female Faculty</td>
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<td>% White Non-Hispanic Faculty</td>
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<td>% Asian-American Faculty</td>
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Table 3: Faculty Scholarly Activity by Year.

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<th>Measure</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<tr>
<td>Peer-Reviewed Publications/FTEF</td>
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<td>Citations/FTEF</td>
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<tr>
<td>% Faculty (Headcount) with Grants</td>
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Table 4: Faculty Involvement in Graduate Education.

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<tr>
<th>Number of Faculty</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<tr>
<td>Serving as PhD Advisor</td>
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<td>Serving as Master’s Advisor</td>
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<td>Serving on PhD Committees</td>
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<td>Serving on Master’s Committees</td>
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Table 5: Applications and Admissions.

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<th>Number</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>Applications</td>
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<td>Admits without Funding Offers</td>
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<td>Admits with Funding Offers</td>
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<td>Number</td>
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<td>Enrolled without Funding Offers</td>
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<td>Enrolled with Funding Offers</td>
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<td>Number of New PhD Students Entering without a Master’s</td>
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<td>Number of New PhD Students Entering with a Master’s</td>
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<td>Number of PhD Students that Converted from a Master’s Program</td>
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<td>Number of PhD Students Leaving the Program*</td>
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<td>Number of Master’s Students Converted from a PhD Program</td>
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<td>Number of Master’s Students Leaving the Program*</td>
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*Students leaving the program are defined as those who have failed to comply with the continuous enrollment policy for at least two of the most recent academic-year semesters. Date of attrition should be first semester following last enrollment.

Table 6: Entering Class.

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<tr>
<th>Characteristic</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>Average Verbal GRE Score</td>
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<td>Average Quantitative GRE Score</td>
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<td>Average Analytical GRE Score</td>
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<td>Average Undergraduate GPA</td>
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<td>Undergraduate or Previous Graduate Institution(s) (List)</td>
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Table 7: Student Demographics.

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<th>Demographic Percentages</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>% Female PhD Students</td>
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<td>% White Non-Hispanic PhD Students</td>
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<td>% Female Master’s Students</td>
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### Demographic Percentages

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<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<td>% White Non-Hispanic Master’s Students</td>
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<td>% Asian-American Master’s Students</td>
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Table 8: Graduate Student Degree Completion Progress. *In each cell indicate total number and percent female, domestic, and non-White/non-Hispanic.*
Table 9: Graduate Student Funding. *In each cell indicate total number and % supported by internal and external funds (Internal = GTA, GA, GTI, FELI; External = GRA, FELE).*

<table>
<thead>
<tr>
<th>Number</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<tbody>
<tr>
<td>1st Year PhD Students Receiving Funding</td>
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<td>2nd-4th Year PhD Students Receiving Funding</td>
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<td>5th Year PhD Students Receiving Funding</td>
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<td>&gt;5 Years PhD Students Receiving Funding</td>
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<td>1st Year Research Master’s Students Receiving Funding</td>
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<td>2nd Year Research Master’s Students Receiving Funding</td>
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<td>&gt;2 Years Research Master’s Students Receiving Funding</td>
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<td>Professional Focus Master’s Students Receiving Funding</td>
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II. **Quantitative Data Collected by the Program(s).**

Additional data must be provided by the program(s). Goals will be identified by the units preparing the self-study report. The “goal” column will be filled in by the unit preparing the self-study if the unit chooses to use that column to set goals for itself as a way to internally prioritize resource and effort allocation in the future.

Program Name(s): ____________________________________________________________

Table 10: Research Involving Graduate Students.

<table>
<thead>
<tr>
<th>Number</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<tbody>
<tr>
<td>Peer-Reviewed Publications with PhD Student as First Author</td>
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<td>Peer-Reviewed Publications with PhD Student as Coauthor</td>
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### Table 11: Teaching Experiences for Graduate Students.

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<th>Number</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
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<tr>
<td>Peer-Reviewed Publications with Research Master’s Student as First Author</td>
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<tr>
<td>Peer-Reviewed Publications with Research Master’s Student as Coauthor</td>
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<tr>
<td>Oral / Poster Presentations at Professional Meetings by PhD Students</td>
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<tr>
<td>Oral / Poster Presentations at Professional Meetings by Master’s Students</td>
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</tr>
</tbody>
</table>

### Table 12: Post-Graduation Activities.

<table>
<thead>
<tr>
<th>Number</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTA/GTI Duty Required for PhD Students? (Yes, No)</td>
<td></td>
<td></td>
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<tr>
<td>Average Number of Laboratory or Recitation Sections Taught per Semester by PhD Students</td>
<td></td>
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<tr>
<td>Average Number of Lecture Sections Taught per Semester by PhD Students</td>
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<tr>
<td>GTA/GTI Duty Required for Master’s Students? (Yes, No)</td>
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<tr>
<td>Average Number of Laboratory or Recitation Sections Taught per Semester by Master’s Students</td>
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<tr>
<td>Average Number of Lecture Sections Taught per Semester by Master’s Students</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Indicated Type of Student (PhD or MS) Graduating in Indicated Year</th>
<th>Year 1 20XX</th>
<th>Year 2 20XX</th>
<th>Year 3 20XX</th>
<th>Year 4 20XX</th>
<th>Year 5 20XX (Final)</th>
<th>Year 5 + 5 20XX (Goal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD Students Going Directly to Tenure-Track Positions</td>
<td></td>
<td></td>
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<tr>
<td>PhD Students Going Directly to Post-Doc Positions</td>
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<tr>
<td>Number of Indicated Type of Student (PhD or MS) Graduating in Indicated Year</td>
<td>Year 1 20XX</td>
<td>Year 2 20XX</td>
<td>Year 3 20XX</td>
<td>Year 4 20XX</td>
<td>Year 5 20XX (Final)</td>
<td>Year 5 + 5 20XX (Goal)</td>
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<tr>
<td>PhD Students Going Directly to Position in Industry</td>
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<tr>
<td>PhD Students Going Directly to Position in Government</td>
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<tr>
<td>PhD Students with no Positions</td>
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<tr>
<td>Master’s Students Going Directly to a PhD Program</td>
<td></td>
<td></td>
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<tr>
<td>Master’s Students Going Directly to Post-Secondary Education Positions</td>
<td></td>
<td></td>
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<tr>
<td>Master’s Students Going Directly to Position in Industry</td>
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<td></td>
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<tr>
<td>Master’s Students Going Directly to Position in Government</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Master’s Students with no Position</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### III. Qualitative Data Collected by the Program(s)

Surveys will be administered to volunteer students (current and former) online. Responses will be returned to the Graduate School where they will be aggregated into two groups (current students/former students) and provided to the program. The identity of the respondents will be kept confidential.

#### A. Questions for Current Students:

1. Was Michigan Tech your first choice for graduate school? If not, what was your first choice?
2. Are you PhD or master’s student? If master’s, do you plan to write a thesis?
3. Are you planning to earn a certificate as well as your degree?
4. Are you planning to earn more than one degree (e.g., master’s and PhD or master’s in more than one field)?
5. What were you doing before graduate school? If at University, which one?
6. While a graduate student have you traveled to a conference? If so, did you give an oral or poster presentation? If so, how was the trip paid for?
7. Have you had a paper published in a peer-reviewed journal or equivalent? If so, were you the first author?
8. Have you written a proposal for external or internal funding (e.g., for fellowship, research grant, or other)?
9. Have you had financial support? If so, of what type? If so, how many hours on average did you work per week? If a TA, were you given training or support for teaching?
10. What are your primary and secondary career goals?
11. Have you had an internship or co-op position?
12. Were your graduate program’s goals for its students clear to you before you came to Michigan Tech?
13. Are you a peer mentor?
14. Are your colleagues (other graduate students) supportive of one another?
15. Are there opportunities for social interactions with the other graduate students in your program?
16. Are there opportunities for social interactions with faculty and staff?
17. Do you have an advisor?
18. Do you have a faculty or staff member mentor who is not also your advisor?
19. Is your progress in graduate school formally reviewed with you at least one time per year? If so, who communicates with you about the review (e.g., department chair, graduate program director, or advisor)?
20. Are you encouraged to interact with faculty and/or students outside of your home department?
21. Are you encouraged to take courses outside of your home department?
22. Have you identified your external committee member? If so, in what year of your graduate program did you add this person to your committee?

Please rate the following for the overall program (Likert Scale of 1-5: outstanding, good, average, poor, very poor)

1. Teaching by faculty
2. Scholarly activity of faculty
3. Curriculum (courses) offered
4. Research conducted by graduate students
5. Advising of graduate researchers
6. Program quality
7. Computer resources
8. Laboratories or studios
9. Graduate student offices/workspaces
10. Scholarly interactions with peers
11. Social interactions

Please rate the following for the University overall (Likert Scale of 1-5: outstanding, good, average, poor, very poor, N/A)

1. Library
2. On-campus housing
3. Off-campus housing
4. Healthcare
5. Health insurance
6. Childcare
7. Social interaction spaces
8. Recreational/athletic activities

B. Questions for Former Students:
   1. Were you PhD or master’s student? If master’s, did you write a thesis?
   2. Did you earn a certificate as well as a degree?
   3. Did you earn more than one graduate degree at Michigan Tech (e.g., master’s and PhD or master’s in more than one field)?
   4. What are you doing professionally at this time?
   5. Do you feel your graduate education at Michigan Tech prepared you well for your career?
   6. Would you recommend Michigan Tech to prospective graduate students in your field?

Please rate how well you feel your program prepared you to: (Likert Scale of 1-5: very well, well, average, poorly, very poorly)

1. Make oral presentations.
2. Prepare written reports.
3. Write proposals for resources.
4. Think critically about technical issues in your field.
5. Learn material on your own.
6. Manage your time.
7. Supervise others.
8. Think “outside the box.”

Do you have any suggestions on how the graduate program in which you completed your degree might be improved?

IV. Other Narrative Information

Suggested types of other information that program may wish to address in the self-study of its graduate programs are listed below.

1. Program Goals: What are the goals for the program(s)? (For example, at the PhD level is the intent to produce researchers in a particular area of the discipline? Is the goal to produce future faculty? Is the goal to produce researchers for industry? At the master’s level is the goal to emphasize research or professional preparation?)
2. Alignment: How do the programmatic goals align with the University Strategic Plan?
3. Resources: How are resources (money, space, faculty and staff time) allocated in support of the goals?
4. Innovative Practices: Are some practices being employed that are particularly effective or promising? (For example, REU-based recruiting, peer-mentoring, TA-training/support, proposal preparation training, career preparation training, awards for outstanding achievements, travel support for meetings, departmental-level grievance process, formal annual review of graduate students, etc.).
5. Points of Pride: Notable achievements, recognitions, etc.
6. Collaboration: Describe new or existing collaborations. These may be international, interdisciplinary, multi-university, etc.
7. Challenges: What challenges exist that may make it difficult to reach the goals?
8. New Initiatives: Are any new initiatives currently planned?
REVIEW OF GRADUATE FACULTY

From New England Association of Schools and Colleges (NEASC) accreditation standard 4.23 (emphasis added):

Institutions offering graduate degrees have an adequate staff of full-time faculty in areas appropriate to the degree offered. Faculty responsible for graduate programs are sufficient by credentials, experience, number, and time commitment for the successful accomplishment of program objectives and program improvement. **The scholarly expectations of faculty exceed those expected for faculty working at the undergraduate level.** Research-oriented graduate programs have a preponderance of active research scholars on their faculties. Professionally-oriented programs include faculty who are experienced professionals making scholarly contributions to the development of the field.
1.5.3 Graduate Faculty Status

A. Membership

The Graduate Faculty consists of tenured and tenure-track members of the academic faculty holding the rank of ASSISTANT PROFESSOR, ASSOCIATE PROFESSOR, or PROFESSOR who have been appointed by the Dean of the Graduate School. Tenured and tenure-track faculty who are awarded EMERITUS status upon retirement remain members of the Graduate Faculty.

The Dean of the Graduate School may also grant graduate faculty status to others with an on-going professional relationship with Michigan Tech, including RESEARCH, PART-TIME, VISITING, or ADJUNCT faculty members, LECTURERS and INSTRUCTORS, RESEARCH ENGINEERS, and RESEARCH SCIENTISTS.

Under special circumstances, the graduate dean may appoint individuals with special technical expertise to the Graduate Faculty for a specific term and purpose, such as serving as a member of a student's advisory committee.

Graduate faculty members are eligible to teach graduate courses (5000 level and above), serve as examining members on Masters and PhD committees, and supervise Masters and PhD students.

Persons who are not members of the Graduate Faculty may teach 5000 and 6000 level courses only after obtaining written approval from the Dean of the Graduate School.

B. Qualifications of Graduate Faculty

1. Qualifications expected for graduate faculty appointment:
   a. Experience and continued interest in the conduct of research.
   b. The necessary background for, and a continued interest in, teaching graduate courses.
   c. Continued interest in serving as a graduate student advisor.

2. Evidence of Qualifications
Faculty may meet the qualification requirements if they:

a. Are currently involved in research work or graduate instruction or in advising graduate students.

b. Regularly publish articles in recognized journals having national distribution or books related to their field of study.

c. Have earned the terminal degree in their field.

C. Appointment Procedures

Graduate Faculty appointment and retention decisions are made by the Dean of the Graduate School with recommendations and advice from department chairs, deans of colleges and schools, and the Graduate Faculty Council.

Recommendation for Graduate Faculty status is made in writing by the department chair of the appropriate academic unit or by the dean of the appropriate School. These recommendations are forwarded to the college dean, where appropriate, and then to the Graduate Dean.

D. Review of Graduate Faculty

It is expected that department chairs/school deans will continually review the performance of all individuals holding graduate faculty status in their respective units using criteria outlined in Section B above.

When, in a department chair/school dean's professional judgement, a faculty member holding a graduate faculty appointment is no longer satisfactorily functioning in this capacity, s/he must recommend that the individual in question be removed from graduate faculty status. The Dean of the Graduate School may also initiate the removal process in consultation with the appropriate chair/dean. The Dean of the Graduate School will act on recommendations with the advice and consent of the Graduate Faculty Council.
with Michigan Tech, including RESEARCH, PART-TIME, VISITING, or ADJUNCT faculty members, LECTURERS and INSTRUCTORS, RESEARCH ENGINEERS, and RESEARCH SCIENTISTS." the fourth paragraph read "(500 level and above)" and now reads (5000 level and above)." Also added the fifth paragraph: "Persons who are not members of the Graduate Faculty may teach 5000 and 6000 level courses only after obtaining written approval from the Dean of the Graduate School." The first paragraph in item C. read: "... and the Graduate Council" and now reads: "... and the Graduate Faculty Council"

05/02/2011 - 2010 Annual Review: In item C. the sentence "Recommendation for Graduate Faculty status is made in writing by the department chair of the appropriate academic unit or by the deans of the Schools of Business and Forestry" now reads "Recommendation for Graduate Faculty status is made in writing by the department chair of the appropriate academic unit or by the deans of the appropriate School."

http://www.admin.mtu.edu/admin/prov/facbook/ch1/1chap-17.htm
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Address questions to: hwebmaster@mtu.edu.
Summary of the Proposal for a Master of Science Degree Program in Applied Physics

The new Master of Science (MS) degree program in Applied Physics will distinguish itself from the existing MS degree in Physics by offering flexibility to tailoring the required coursework to prepare students for the interdisciplinary research, including nanotechnology, photonics, atmospheric science and biophysics. The proposed program will offer the following advantages:

- The required core courses will be tailored to meet the needs of students depending on their individual area of research, and can be selected from within the physics department as well as in cognate departments.
- The proposed MS Appl. Phys. degree program will attract students from diverse undergraduate backgrounds, including physics, atmospheric science, materials science, electrical engineering, etc..

There are several universities offering similar graduate programs including the University of Michigan (“Applied Physics is an interdisciplinary program that bridges physics with emerging technologies.”); Stanford University (“The purpose of the master’s program is to further develop knowledge and skills in applied physics and to prepare students for a professional career or doctoral studies.”); Caltech (“The Applied Physics option at Caltech offers a multidisciplinary graduate program spanning engineering and physics in which fundamental physical principles are used to address research issues of technological importance at the frontiers of engineering and science.”), etc..

The curriculum structure of the proposed MS Appl. Phys. program is similar to our current MS Physics program, but offers students the flexibility to tailor their respective core courses, as summarized as follows,

<table>
<thead>
<tr>
<th>Degree</th>
<th>Course Requirements Beyond Those of the Graduate School</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S. in Applied Physics</td>
<td>Core Courses: Minimum of 10 PH credits at the 4000-level or higher including a minimum of 6 credits from the following list:</td>
</tr>
<tr>
<td>Plans A, B, D</td>
<td>PH5010 Journal Club (1 credit; required)</td>
</tr>
<tr>
<td></td>
<td>PH5110 Classical Mechanics (2 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5210 Electrodynamics I (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5310 Statistical Mechanics (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5320 Mathematical Physics (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5410 Quantum Mechanics I (3 credits)</td>
</tr>
<tr>
<td>Application Electives</td>
<td>Two courses (minimum 5 credits) at the 4000-level and higher (including at least one course at the 5000-level or higher) from an Application Elective list; with approval of advisor.</td>
</tr>
<tr>
<td></td>
<td>Additional courses may be required by the student’s advisory committee under plans A and B.</td>
</tr>
<tr>
<td>Research</td>
<td>PH5999 Master’s Research</td>
</tr>
<tr>
<td></td>
<td>Minimum 6 credits for thesis degree (Plan A)</td>
</tr>
<tr>
<td></td>
<td>Minimum 3 credits for report degree (Plan B)</td>
</tr>
<tr>
<td></td>
<td>No research for coursework degree (Plan D)</td>
</tr>
</tbody>
</table>
Proposal 20-04 is amended by replacement of the entire text of Proposal 20-04.

Rationale

In the last two years several new graduate certificate programs have been established and others are in the proposal stage. The amended Graduate Certificate Policy builds on existing policy and adds the following provisions:

- Recognize the student category: graduate certificate-seeking. These students will be admitted to the Graduate School, but will not be seeking a specific graduate degree.
- Establish a residency policy for graduate certificate-seeking students and degree-seeking students also pursuing a graduate certificate.
- Establish a differential in maximum minimum credits for the certificate: degree-seeking, 12 credits; certificate-seeking, 15 credits.

Amending Text: The text replacing Proposal 20-04 follows.

Graduate Certificates

Graduate Certificates will be granted to students who have completed the Graduate Certificate requirements established by academic or research units at Michigan Technological University. Graduate Certificates will be noted on official transcripts, and a written certificate will be given to the student upon completion of the requirements. The Graduate School will administer the Certificate Programs and develop procedures regarding faculty oversight, program re-evaluation, scholarship support, and other fiscal and management issues.

Michigan Tech degree-seeking graduate students who wish to earn a graduate certificate must complete an application for the certificate program available through the graduate school.

Individuals who wish to earn a graduate certificate from Michigan Tech and who are not currently enrolled at Michigan Tech as degree-seeking students must complete the University’s online graduate admission application. Applicants seeking a graduate certificate must meet the same admission standards as degree-seeking applicants. Upon formal admission to the Graduate School, these students will be assigned an academic advisor by the certificate’s program director. These students will be charged the same tuition and fees as degree-seeking graduate students in the advisor’s administrative home department or school.
Individuals seeking to earn a graduate certificate from Michigan Tech should note the following:

1) **Applicants to a Graduate Certificate program must have a Bachelors degree or equivalent.** Individual Graduate Certificate programs may have additional admission requirements. The time limit during which a student is expected to complete all of the requirements of a Graduate Certificate may vary, but is not to exceed four years.

2) **No more than 3 credit hours may normally be 3000 or 4000 level courses, however interdisciplinary and multidisciplinary certificates may have a maximum of 6 credit hours at the 3000 or 4000 level. All other credits must be at the 5000 or higher level, and may include no more than 3 credit hours of research.**

3) A minimum grade of B is required in all course work. Graduate Faculty must teach all courses required for a Graduate Certificate, except for the allowed 3000 or 4000 level courses.

4) A maximum of 1/3 of the coursework credits required for a certificate can be transferred in from another university. Research credits (if required for the certificate) must be earned through Michigan Tech.

5) **Non-degree seeking students who earn Michigan Tech credits prior to formal admission to a certificate program can apply those credits to satisfy up to 1/3 of the coursework-credit requirements for the certificate. Non-degree seeking students should update their enrollment to certificate-seeking prior to earning more than 1/3 of the coursework credits required for the certificate. Research credits earned by non-degree seeking students cannot be applied toward a graduate certificate.**

6) **Credits may be double counted between a single certificate and a single master's or PhD program.**

7) Michigan Tech requires that students earning a graduate certificate complete a minimum of 15 credits beyond the bachelor’s degree. **Students concurrently earning a graduate certificate in addition to a graduate degree at Michigan Tech are allowed, with the approval of the certificate program advisor, to complete 12 out of the 15 credits required for the certificate in order to obtain both certificate and graduate degree. A 12-credit certificate will not be awarded until completion of a Michigan Tech graduate degree.**

**Faculty Endorsement & University Approval of a New Graduate Certificate**

Graduate Certificates may be proposed by individual faculty, groups of faculty, departments, or groups of departments in any academic or research unit at Michigan Tech. Graduate Certificates may be proposed in disciplines without a preexisting graduate degree program. A proposed Graduate Certificate curriculum may contain fieldwork, distance learning, and laboratory courses in addition to traditional classroom offerings. Additional admission requirements for a Graduate Certificate program beyond that stated above must be listed in the proposal.

Proposals for Graduate Certificate programs will follow the usual procedures for university
degree programs, and be submitted to the Senate by the Provost.

Introduced to Senate: 01 February 2010
Editorial Change (in blue): 01 February 2010
Adopted by Senate: 24 February 2010
Approved by Admin with addition of one word (in red) for clarification: 04 March 2010
The University Senate of Michigan Technological University

Proposal 4-11
(Voting Units: Academic)

“Amendment of Senate Proposal 11-10, Graduate Certificates”

Submitted By
Graduate School

Rationale
The amending text clarifies the Graduate Certificate language concerning source of transfer credits and concerning double counting of transfer credits.

Proposal
Credits earned at Michigan Tech or another institution may be double counted between a single certificate and a single degree program.

Current Text
4) A maximum of 1/3 of the coursework credits required for a certificate can be transferred in from another university. Research credits (if required for the certificate) must be earned through Michigan Tech.

Recommended Text
4) A maximum of 1/3 of the coursework credits required for a certificate can be transferred in from another university or from a Michigan Tech undergraduate degree schedule. Credits applied toward a certificate can be used to satisfy both requirements for a degree and requirements for a certificate. Credits applied toward a certificate must have been earned no more than 5 years prior to the date on which the certificate will be awarded. Research credits (if required for the certificate) must be earned through Michigan Tech.

Introduced to Senate: 10 November 2010
Adopted by Senate: 08 December 2010
Approved by Administration: 20 December 2010
Summer Updates

- Created Degree Completion Timeline pages on our web site for each degree type
  - Detailed information about what to complete for each degree, along with when, why, and how
  - Accessible for students, faculty, and staff
  - Created following feedback from faculty, staff, and students at a Kaizen event
- MyMichiganTech has been expanded for students
  - Detailed information about what to complete for each graduate degree
  - Date each item is completed
  - Personalized according to start term and degree type

Degree Completion Timeline on our web page
Based on feedback received from faculty, staff, and students, we have created new web page that detail for each degree type every item a student needs to complete to earn their degree and maintain their student status.

Access from this link

http://www.mtu.edu/gradschool/administration/academics/timeline/

OR – click on “Degree completion timeline” from our quick links area to navigate to this section of our web site.

![Quick Links Menu](image)

Figure 1. Our Quick Links menu – note the Degree Completion Timeline link.

The figures below show a portion of the listing for a thesis option student, and an example of the details available when a student clicks the details button.
Figure 2. A section of the degree completion timeline for a thesis option student. Note it lists when to complete something (left column), the list of items to complete (2nd column) and buttons to click on for detailed help and why to complete the items.

<table>
<thead>
<tr>
<th>When</th>
<th>What</th>
<th>Click button for more details</th>
<th>Click button for an explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four weeks before your defense</td>
<td>Plan for your defense</td>
<td>Details</td>
<td>Why?</td>
</tr>
<tr>
<td></td>
<td>Schedule your defense by submitting the Pre-defense form</td>
<td>Details</td>
<td>Why?</td>
</tr>
<tr>
<td>Two weeks before your defense</td>
<td>Submit complete, defendable, version of your thesis to the Graduate School</td>
<td>Details</td>
<td>Why?</td>
</tr>
<tr>
<td></td>
<td>Submit complete, defendable, version of your thesis to your advisor and committee</td>
<td>Details</td>
<td>Why?</td>
</tr>
<tr>
<td>Day of defense</td>
<td>Publicly defend your thesis</td>
<td>Details</td>
<td>Why?</td>
</tr>
<tr>
<td></td>
<td>Bring copy of Report on final oral examination form to defense</td>
<td>Details</td>
<td>Why?</td>
</tr>
</tbody>
</table>

Figure 3. An example of the instructions given for the “Details” of the item “Plan your defense.”
MyMichiganTech Overview

- A personalized website for students to access University information
- Students can access this within a week of submitting their online application
- Students log in at www.MyMichiganTech.mtu.edu with their Michigan Tech ID and password
- Each student will have “tabs” in their menu bar that take them to the individual pages of interest – for example, Current Students, Housing, Financial Aid, etc.

Current Students Area

![Image of MyMichiganTech interface]

**Figure 4.** Overview of the Current Students area of MyMichiganTech. The student checklist is in the left column. The My Status area contains the current status for a number of important items (account balance, academic standing, etc.).

Student Checklist (left column)

- Open checkbox – things to complete now that are not late
- Red exclamation point – items that are overdue and need immediate attention
- Green check – items that are complete (these will disappear after a period of time)
Figure 5. The student checklist lists items that need to be completed at this time (open checkbox), items that have been completed (green check; will hide after a specified period of time or when another action is completed), and items that are overdue (red exclamation point).

Dissertation, Thesis, or Report Status (center column)

- A summary of the current status of each document a student is completing.
- When applicable, deadlines to submit items or when items will be ready, will appear.
- Links to helpful areas are provided as needed. The Question mark icon also summarizes helpful links at all time.

Figure 6. The Dissertation, Thesis, or Report Status area found in the My Status column. Contains a short description of the current status of the document. For this student, it lets them know when to expect a review, and confirms the date we have on file for the defense.
Figure 7. Another example of the Dissertation, Thesis, or Report status area. This student has already submitted a report that has been accepted, and a draft dissertation that has been reviewed. Blue text are hyperlinks that point to a helpful web page.

Degree Completion Timeline on MyMichiganTech
- For each degree sought, lists the items required for the degree along with the date completed (as applicable).

Figure 8. Students will access the Degree Completion Timeline from the center column by clicking on the “your degree completion timeline” hyperlink.

Figure 9. At the top of the timeline for all students will be requirements for all students. This list will adapt based on the start date of the student to display the appropriate required RCR training. Items that are complete have a green check, the hyperlink to instructions is hidden, and a date (not shown) the item was complete is on the far right.
### MS in Mechanical Engineering, thesis option, expected Spring 2015

- Appoint advisor
- Appoint advisory committee
- Submit Degree schedule
- Submit Petition to enter full-time research-only mode (optional) [more info]
- Complete Thesis and Defense
- Submit Commencement application form (optional) [more info]
- Degree will be awarded pending processing of final grades for this semester.

**Figure 10.** The list of items to complete for a student pursuing an MS with a thesis option.

<table>
<thead>
<tr>
<th>Thesis and Defense</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Two weeks before defense, please submit:</strong></td>
</tr>
<tr>
<td>- Pre-defense form</td>
</tr>
<tr>
<td>- Thesis to Graduate School and committee</td>
</tr>
<tr>
<td><strong>Immediately after defense, please submit:</strong></td>
</tr>
<tr>
<td>- Report on Final Oral Examination form</td>
</tr>
<tr>
<td><strong>Work on final thesis corrections. When you have completed the technical corrections required by your committee, please submit:</strong></td>
</tr>
<tr>
<td>- Approval of a dissertation, thesis, or report form</td>
</tr>
<tr>
<td>- Thesis to Canvas</td>
</tr>
<tr>
<td>- Degree completion form to Canvas with the thesis</td>
</tr>
<tr>
<td>- Thesis to ProQuest/UMI</td>
</tr>
<tr>
<td>- Final submission complete and in review. [more info]</td>
</tr>
<tr>
<td>- Thesis accepted for formatting.</td>
</tr>
<tr>
<td><strong>After your final document is approved for formatting</strong></td>
</tr>
<tr>
<td>- Submit signed Degree completion form to Graduate School [off campus?]</td>
</tr>
<tr>
<td>- Pay publishing fees.</td>
</tr>
<tr>
<td>- Final thesis accepted.</td>
</tr>
</tbody>
</table>

**Figure 11.** The list of items to complete related to the thesis and defense. Note that heading text separates items by the time they need to be completed.
The University Senate of Michigan Technological University

Proposal XX-15
(Voting Units: Full Senate)

Master of Science Degree Program in Applied Physics

Department of Physics
Michigan Technological University
Houghton, MI 49931

(September 16, 2014)

Contacts:  Yoke Khin Yap, Director of Graduate Studies – Engineering Physics
John Jaszcak, Associate Dean, College of Sciences and Arts
Ravi Pandey, Chair, Department of Physics

I. Introduction

The Department of Physics is proposing a new Master of Science (M.S.) degree program in Applied Physics. The proposed program will meet the needs of scientists and engineers seeking training in contemporary areas that make connections between the traditional branches of physics and engineering. The new degree will distinguish itself from the existing M.S. degree in Physics by offering significant additional flexibility to faculty and students in tailoring the required coursework to prepare students for the interdisciplinary research. The proposed program will use the resources already available in the Department of Physics and at the University. The M.S. in Applied Physics is expected to attract domestic and international students to pursue graduate study in interdisciplinary areas of science, including nanotechnology, photonics, atmospheric science and biophysics.
II. Proposal

1. General description and characteristics of program

The study of physics has generally been focused on the foundational disciplinary areas including, high-energy physics, atomic and molecular physics, astrophysics, and nuclear physics. During the past two decades, new branches of physics have gained increasing attention, particularly in those interface areas where traditional physics intersects with other applied disciplines. These include biophysics, physics at the nanoscale condensed matters, materials physics, atmospheric physics, optics/photonics, optoelectronics, etc. In order to fill such a void in the interdisciplinary program in physics at the Master's level, we have proposed the Master of Science degree in Applied Physics (M.S. Appl. Phys.). It is to be noted here that our department offers the Ph. D. degree in Engineering Physics in collaboration with departments in the College of Engineering and is an active participant in the interdisciplinary program, Ph. D. in Atmospheric Science. The M.S. Appl. Phys. program can be considered as extension of those two successful programs to the M.S. level.

2. Rationale

Much exciting research is now being done in new interdisciplinary branches of physics, including physics at nanoscale, photonics, and optoelectronics etc. Most of the faculty members of the department have established research programs in these “frontier” areas of applied physics. The current M.S. in Physics program at Michigan Tech does not allow M.S.-seeking graduate students adequate flexibility to meet the demands of such frontier areas. The proposed M.S. Appl. Phys. program will provide the necessary framework to allow faculty to tailor core courses for their students that are more closely aligned to their specialized research areas. The new program will also attract physics undergraduate students from more diverse backgrounds to pursue graduate-level study in applied physics at Michigan Tech, and will provide better job opportunities for our graduates in areas of contemporary technological interest.

The proposed M.S. Appl. Phys. degree will offer the following advantages:

- The required core courses will be tailored to meet the needs of student depending on their individual area of research. These core courses will be decided by the research advisor or the director of the Physics graduate program (prior to the identification of the research advisor), and can be selected from within the physics department as well as in cognate departments.

- The proposed M.S. Appl. Phys. degree program will attract students from diverse undergraduate backgrounds, including but not limited to physics. For example, students with undergraduate backgrounds/degrees in atmospheric science, materials science, electrical engineering, etc. may be interested in M.S. level study and research with a significant physics foundation.
3. Discussion of related programs within the institution and at other institutions

3.1. Related programs within the institution

Michigan Tech offers a M.S. degree in Physics, Ph.D. degree in Physics, and a Ph.D. degree in Engineering Physics. Course requirements for these programs are summarized in the following table:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Course Requirements Beyond Those of the Graduate School</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S. in Physics</td>
<td>Core Courses (15 credits):</td>
</tr>
<tr>
<td>Thesis option</td>
<td>PH5010 Journal Club (1 credit)</td>
</tr>
<tr>
<td>Report option</td>
<td>PH5110 Classical Mechanics (2 credits)</td>
</tr>
<tr>
<td>Coursework option</td>
<td>PH5210 Electrodynamics I (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5310 Statistical Mechanics (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5320 Mathematical Physics (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5410 Quantum Mechanics I (3 credits)</td>
</tr>
<tr>
<td>Disciplinary Electives</td>
<td>Two PH courses at the 4000-level and higher from a restricted list.</td>
</tr>
<tr>
<td></td>
<td>PH5999 Master’s Research (6 credits required for Plans A and D)</td>
</tr>
<tr>
<td>Ph.D. in Physics</td>
<td>Core Courses (15 credits):</td>
</tr>
<tr>
<td></td>
<td>[Same as for M.S. in Physics above]</td>
</tr>
<tr>
<td>Disciplinary Electives</td>
<td>Two PH courses at the 4000-level and higher from a restricted list.</td>
</tr>
<tr>
<td>Specific additional courses</td>
<td>may be required by the student’s advisory committee.</td>
</tr>
<tr>
<td>Research</td>
<td>PH6975 Full-Time Doctoral Research and PH6999 Doctoral Research as required to complete doctoral research and credit requirements</td>
</tr>
<tr>
<td>Ph.D. in Engineering Physics</td>
<td>Core Courses (15 credits):</td>
</tr>
<tr>
<td></td>
<td>[Same as for M.S. in Physics above]</td>
</tr>
<tr>
<td>Disciplinary Electives</td>
<td>Three courses at the 4000-level and higher, including a minimum of one course at the 5000-level or higher; selected from a restricted list, and as approved by the student’s advisory committee.</td>
</tr>
<tr>
<td>Specific additional courses</td>
<td>may be required by the student’s advisory committee.</td>
</tr>
<tr>
<td>Research</td>
<td>PH6975 Full-Time Doctoral Research and PH6999 Doctoral Research as required to complete doctoral research and credit requirements</td>
</tr>
</tbody>
</table>

Michigan Tech does not have an existing M.S. degree program that specifically meets the areas of atmospheric physics, biophysics, photonics, optoelectronics, and physics at nanoscale etc. (http://www.mtu.edu/gradschool/programs/degrees/). Students graduating from the M.S. in Appl. Phys. program may opt to enroll in our Engineering Physics Ph.D. program.
3.2. Related programs at other institutions

There are several universities offering M.S. and Ph.D. level graduate programs in applied physics including:

- University of Michigan (http://www-applied.physics.lsa.umich.edu/)
- Columbia University (http://apam.columbia.edu/applied-physics#Programs),
- Caltech (http://www.aph.caltech.edu/),
- Stanford University (http://www.stanford.edu/dept/app-physics/cgi-bin/), and
- Cornell University (http://www.aep.cornell.edu/).

All these universities emphasize new emerging areas of study, including:
- nanoscience/condensed matter/solid-state physics,
- laser/photonics/plasma physics,
- biophysics/medical physics,

with the intent to better prepare their students in these fields. As quoted from the website of the program at the University of Michigan, “Applied Physics is an interdisciplinary Ph.D. program that bridges physics with emerging technologies.” According to the program at Stanford University, “The purpose of the master’s program is to further develop knowledge and skills in applied physics and to prepare students for a professional career or doctoral studies.” From the program description on the Caltech website, “The Applied Physics option at Caltech offers a multidisciplinary graduate program spanning engineering and physics in which fundamental physical principles are used to address research issues of technological importance at the frontiers of engineering and science.” Based on these websites on February 27, 2014, the number of graduate students enrolled in these programs pursuing both M.S. and Ph.D. degrees are about 69 at the University of Michigan, 95 at Columbia, 118 at Caltech, and 75 at Cornell (data from Stanford is not available on their website).

In addition to these institutions, there are many other universities that offer the Master degree in Applied Physics or Engineering Physics, for example,
- Oregon State University (http://www.physics.orst.edu/MSApplied)
- John Hopkins University (http://ep.jhu.edu/graduate-programs/applied-physics)
- University of Massachusetts Boston (http://www.umb.edu/academics/csm/physics/grad/applied_physics_ms)
- George Mason University (http://spacs.gmu.edu/category/academics/graduate-programs/ms-applied-engineering-physics/)
- New Jersey Institute of technology (http://spacs.gmu.edu/category/academics/graduate-programs/ms-applied-engineering-physics/)
- University of North Carolina Charlotte (https://physics.uncc.edu/graduate-programs/ms-applied-physics)

3.3 Projected enrollment and economic impact

The projected enrollment in the proposed M.S. Appl. Phys. program would be about 5 students. We anticipate the majority of the students being 5th year M.S. students, thus completing within one year with the course work option. As the program gains some visibility and prominence, we anticipate eventually reaching 10-12 students enrolled per year.
The demands for the new M.S. Appl. Phys. program is well justified as highlighted as follows. According to a recent report from the American Institute of Physics:\(^1\):

a) The total number of exiting Master’s degree has increased from 672-716 (between 2002 to 2004) to 735-801 (between 2009 and 2012).

b) The most frequently cited research specialty of these exiting Masters (classes of 2009, 2010, and 2011) are condensed matter (13%), applied physics (11%), materials science (8%), optics (6%), and medical science (6%), with a total of 44%. These are among the research areas of the new M.S. Appl. Phys. Program. [It is noted that in this report, a large number of citations (35%) are categorized as “other”, and astronomy is cited at 9%].

Furthermore, the employment rate of physics and astronomy Masters recipients is quite strong, at 95% for U.S. citizens, and 93% for non-U.S. citizens, according to a latest available report\(^2\) from the American Institute of Physics. This report also pointed out that some of the applied physics areas are among the most frequently cited research specialties of these Masters recipients (classes of 2006, 2007, 2008). For example, condensed matter (17%), optics (10%), applied physics (9%), and materials science (9%), make up a total of 45%. [It is noted that in this report, a large number of citations (40%) are categorized as “other”, and astronomy is cited for 15%].

4. Scheduling plans (Extension, Evening, Regular)

Regular only.

5. Curriculum design

The curriculum structure of the proposed M.S. Appl. Phys. program is similar to our current M.S. Physics program, but as noted above, offers students additional flexibility through tailoring their respective core courses as a foundation for work in a more specialized applied physics program. For example, students in biophysics could be better prepared with a core course on molecular biology, and students in physics at nanoscale may need core courses in advanced solid state theory (e.g. quantum tunneling, quantum confinement phenomena) and device engineering. The proposed program will therefore provide a framework for realistic curricula to prepare future members of the workforce who will be successful in the frontier areas of science and engineering that have built upon the latest advancements in physics.

The next table lists the course requirements for the proposed program. These requirements are in addition to those of the Graduate School. A minimum of 30 credits are required for the program.

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<table>
<thead>
<tr>
<th>Degree</th>
<th>Course Requirements Beyond Those of the Graduate School</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S. in Applied Physics</td>
<td></td>
</tr>
<tr>
<td>Thesis option</td>
<td>Core Courses:</td>
</tr>
<tr>
<td>Report option</td>
<td>Minimum of 10 PH credits at the 4000-level or higher including a minimum of 6 credits from the following list:</td>
</tr>
<tr>
<td>Coursework option</td>
<td>PH5010 Journal Club (1 credit; required)</td>
</tr>
<tr>
<td></td>
<td>PH5110 Classical Mechanics (2 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5210 Electrodynamics I (3 credits)</td>
</tr>
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</tr>
<tr>
<td></td>
<td>PH5320 Mathematical Physics (3 credits)</td>
</tr>
<tr>
<td></td>
<td>PH5410 Quantum Mechanics I (3 credits)</td>
</tr>
<tr>
<td></td>
<td>Application Electives</td>
</tr>
<tr>
<td></td>
<td>Minimum 10 credits at the 4000-level and higher (including at least one course at the 5000-level or higher) from an Application Elective list; with approval of advisor.</td>
</tr>
<tr>
<td></td>
<td>Additional courses may be required by the student’s advisory committee under plans A and B.</td>
</tr>
<tr>
<td></td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td>PH5999 Master’s Research</td>
</tr>
<tr>
<td></td>
<td>Minimum 6 credits for thesis degree (Thesis option)</td>
</tr>
<tr>
<td></td>
<td>Minimum 3 credits for report degree (Report option)</td>
</tr>
<tr>
<td></td>
<td>No research for coursework degree (Coursework option)</td>
</tr>
</tbody>
</table>

Application Elective course lists, shown below, will be updated annually. New lists may be created by the Physics Graduate Studies Committee, depending on faculty interests and available course offerings.

**Application Elective Lists**

(I) Atmospheric Physics:
- PH 5640 - Atmospheric Physics
- PH 5680 - Atmospheric Fluid Dynamics
- PH 5320 - Mathematical Physics
- ATM 5010 - Research Methods in Atmospheric Science
- ATM 5519 - Atmospheric Biogeochemistry
- ATM 5515/CE5515/CH5515 - Atmospheric Chemistry
- ATM 5512 - Applied Boundary Layer Meteorology
- CE 5800/GE 5800 - Mathematical Modeling of Earth Systems
- ENVE 4501 - Environmental Engineering Chemical Processes
- ENVE 4504 - Air Quality Engineering and Science
- EE 5540 - Statistical Optics
- FW 5340 - Advanced Topics in Climate Change
- GE 4250 - Fundamentals of Remote Sensing
- GE 5030 - Earth Systems Science II

(II) Physics at Nanoscale
- PH 5410 - Quantum Mechanics I,
- PH 5520 - Materials Physics,
- PH 5530 - Selected Topics in Nanotech,
PH 4510 - Introduction to Solid State Physics,
EE 5471 - Microfabrication Laboratory,
EE 5460 - Solid State Devices,
MEEM 5130 - Nanoscale Science and Technology,
MY 6200 - Advanced Topics in Materials Characterization,
PH 4510 - Introduction to Solid State Physics
PH 5530 - Selected Topics in Nanotech (theory and experiment both)
PH 4390 - Computational Methods in Physics
PH 5510 - Theory of Solids

(III) Photonic
BE 5250 - Biomedical Optics,
EET 5261 - Optical System Design and Testing
EE 5410 - Engineering Electromagnetics,
EE 5526 - Microwave Engineering
EE 5528 - Antenna Engineering,
EE 5490 - Solar Photovoltaic Science and Engineering,
PH 5410 - Quantum Mechanics I,
PH 5320 - Mathematical Physics,
PH 5510 - Theory of Solids,

(IV) Biophysics
PH 4999 - Molecular Biology for Physicists and Engineers
BE 5250 - Biomedical Optics
BE 5550 - Biostatistics for Health Science Research
BE 5880 - Principles and Analysis of Cellular Processes
BL 5010 - Cellular Imaging and Confocal Microscope
BL 5035 - Bioimaging
BL 5370 - Special Topics in Microbiology
BL 5360 - Special Topics in Biochemistry
BMB 6020 - Theoretical Molecular Biology

Degree Options:
Students may earn the degree of M.S. in Appl. Phys. according to the following options, which highlight program-specific requirements that are in addition to any University and Graduate School requirements.

Thesis Option
In addition to the coursework requirements (15 credits) described above, a minimum of 6 credits in PH5999 (research) is required. Remaining credits of the 30 total required by the Graduate School may include additional course or research credits (up to a maximum of 10 research credits) as approved by the Physics graduate program director and the student’s advisory committee. A minimum of 12 credits must be at the 5000-6000 level and a maximum of 12 credits can be at the 3000-4000 level. Requirements of this option also include a written Master’s thesis and a final oral examination based on the student’s thesis.
Report Option.

In addition to the coursework requirements (15 credits) described above, a minimum of 3 credits in PH5999 (research) is required. Remaining credits of the 30 total required by the Graduate School may include additional course or research credits (up to a maximum of 6 research credits) as approved by the Physics graduate program director and the student’s advisory committee. A minimum of 12 credits must be at the 5000-6000 level and a maximum of 12 credits can be at the 3000-4000 level. A student following the project option is expected to: present written and oral project reports at the conclusion of the project.

Coursework Option

Students will be required to take 30 course credits including the core course and disciplinary elective requirements listed above, and as approved by the Physics graduate program director. A minimum of 18 credits must be at the 5000-6000 level and a maximum of 12 credits can be at the 3000-4000 level.

Students may initially be advised by the Physics graduate program director for their degree program. Students pursuing the Thesis option or Report option should choose a research advisor prior to the end of the second academic-year semester in residence. The Physics graduate program director will remain the advisor for students pursing the Coursework option.

6. New course descriptions

Since the department already offers graduate degrees in physics, no new courses are necessary and none are proposed.

7. Library and other learning resources

No additional library or learning resources are required.

8. Computing Access Fee

Not applicable.

9. Faculty resumes

The curriculum vitae of the faculty members are given at:
http://www.mtu.edu/physics/department/faculty/

Graduate Faculty serving this program will be the same as the existing M.S. and Ph.D. degrees in the department of Physics. The Faculty members are:
10. Description of available/needed equipment

The Physics Department at Michigan Technological University is well equipped with modern research laboratories: http://www.mtu.edu/physics/facilities/research/

Since the department already offers M.S. degrees in physics, and enrollment increases are expected to be modest, no additional equipment is required.

11. Additional Resources Required

No additional costs are anticipated for this new graduate degree program.

12. Space

No additional space is required to accommodate the new graduate degree program.

13. Policies, regulations and rules

None besides curricular requirements outlined above.

14. Accreditation requirements

Not applicable.
15. **Internal status of the proposal**

Feb 20, 2014: The physics graduate studies committee approved the proposal and recommended it to the physics department faculty for its consideration.

March 25, 2014: The proposal was approved by the physics department faculty.

May 28, 2014: The proposal was discussed in the council meeting of the College of Science and Arts. Supportive suggestions were received.

July 7, 2014: The revised proposal was approved by the Dean of the College of Science and Arts.

September 2, 2014: Introduced and approved to the Graduate Faculty Council.


16. **Planned implementation date**

Fall semester 2015.
Appendix: Financial documentation for Master of Science in Applied Physics

I. Relation to university strategic plan
   a. Relation of program to the university’s educational and research goals: This new Master program supports Goal 2.1 of the university strategic plan (Integration of research, instruction, and innovation that achieves the University Student Learning Goals). Specifically, “strengthen existing programs and develop new offerings in emerging interdisciplinary areas.”
   b. Consistency with the university’s resource allocation criteria: The proposed program intended to attract new graduate students to the university based on existing instruction and research resources.

II. Impact on university enrollment
   a. Projected number of students in the program: Projected enrollment is about 5 graduates at the initial phase.
   b. Source of new students; in particular, will the students be drawn from existing programs, or will they be students who would otherwise not have come to MTU? Based on the recent reports from the American Institute of Physics (see details in the proposal), it is expected that the program will attract some new graduate students to the university.
   c. What is the likely correlation between demand for the new program and existing enrollment patterns at MTU? This program emphasize on preparing students to meet the demands of interdisciplinary expertise in the job market. This will likely attract students from non-physic background into the department of physics and thus diversify the existing enrollment patterns at the departmental level.
   d. What is the current enrollment in the unit? Fall 2013: 40 graduate students.

III. Impact on resources required by department in which the program is housed
   a. Faculty lines: This program will be supported by existing faculty line.
   b. Faculty and student labs, including ongoing maintenance: Existing research labs are adequate to support this program.
   c. Advising: This will be supported by existing faculty line.
   d. Assessment: The graduate study committee will monitor and evaluate the enrollment and student performance of the new program in an annual basis.

IV. Impact on resources required by other units within the university
   a. Other academic (e.g., Gen Ed) units with regard to faculty, labs and assessment. We do not expect any significant impact to other units although some of the existing classes may occasionally see an increase of enrollment by one or two students.
   b. Information Technology, the Library, central administration and career planning with respect to the impact on the need for computing services, library resources, advising, record keeping, development of employer relations etc. There should be no significant impact on other units.
V. Assessment of the ability to obtain the necessary resources assuming requested funds are obtained. For high demand fields (e.g., business fields, etc.), will it be possible to fill allocated lines? Not applicable as we do not need additional resources.

VI. Past proposals
The Department of Physics has not initiated any new Master degree programs for more than five decades.

VII. Departmental budget contribution
All figures are for 2013-14.

a. What is the department’s total general fund budget? The general fund base budget was $2.1 million.

b. How much tuition does the department generate? This information should be provided for both the credit hours taught by the department and the number of credit hours taken by the department’s majors.

For courses taught by the department: Undergraduate tuition was $4,992,000 (~9600 SCH times $520 per credit hour) and graduate tuition was $431,520 (~580 SCH times $744 per credit hour). Total tuition was $5,423,520.

For courses taken by our majors and taught by other departments (estimated): 70 majors (primary majors only) times 32 credits per year times 0.6 (60% of credits taken outside the department) times $520 per credit equals $698,880.

VIII. How do the benefits from this program compare to other alternatives that are currently under consideration or development?

The proposed M.S. Appl. Phys. degree will offer the following benefits:

1. The required core courses will be tailored to meet the needs of students depending on their individual area of research. These core courses will be decided by the research advisor or the director of the Physics graduate program (prior to the identification of the research advisor), and can be selected from within the physics department as well as in cognate departments.

2. The proposed M.S. Appl. Phys. degree program will attract students from diverse undergraduate backgrounds, including but not limited to physics. For example, students with undergraduate backgrounds/degrees in atmospheric science, materials science, electrical engineering, etc. may be interested in M.S. level study and research with a significant physics foundation.
Full-Time (9 credits); Part-Time (6 credits); 3 Credit (minimum enrollment)

Full-Time Research-Mode rate is to be used by students who have satisfied all other requirements for the degree except completing the research project.

Part-Time Research-Mode rate is to be used by students who have satisfied all other requirements for the degree except completing the research project but wish to take a course in addition to their research credits and/or do not need to be enrolled full-time. Students in this category could take at least 3 credits of coursework at the regular Research-Based Program Tuition Rate in order to be full-time (as is required for supported students).

Students would use the 3 credit option when completing the degree and during summers.

There will be an associated change in eligibility for PhD students who will now need to complete a minimum of 2 full-time semesters at regular tuition (18 credits minimum) for post-master’s students and a minimum of 30 credits for pre-master’s students before entering into research-only mode. This is in addition to having to pass the test of disciplinary knowledge (qualifying exam) and having to pass the research proposal exam.
Graduate Faculty Council—Draft Agenda

September 2, 2014
NOTE: (all handouts connected to a single pdf file)

1. Review minutes of 04/15/14

2. Chair Nominations

3. Old Business:
   a. "Research - Intensive Mode" Update (Dean Huntoon)
   b. Graduate Program Review (Dean Huntoon)
   c. Graduate Faculty Review (Dean Huntoon)

4. New Business
   a. MS in Applied Physics Proposal (J. Jaszczak)
   b. Accelerated MS Deferrals (C. Friedrich)
   c. Procedure for Applying to a Graduate Certificate Program (K. Isaacson)
   d. Pre-requisite Checking (Dean Huntoon)
   e. "Changing" History (Dean Huntoon)
   f. Degree Completion Timeline Launched (D. Charlesworth)
   g. GFC/Senate Approval Updates (H. Suokas)