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# The University of Georgia

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University Council  
Athens, Georgia 30602

November 21, 2008

UNIVERSITY CURRICULUM COMMITTEE – 2008-2009

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Dear Colleagues:

The attached proposal to offer a non-thesis option in Physics under the Master of Science degree (M.S.) will be an agenda item for the December 5, 2008, Full University Curriculum Committee meeting.

Sincerely,

David E. Shipley, Chair  
University Curriculum Committee

cc: Dr. Arnett C. Mace, Jr.  
Professor Jere W. Morehead



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# The University of Georgia

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*Department of Physics and Astronomy*

April 8, 2008

Dr. Garnett Stokes  
Dean, Franklin College of Arts and Sciences  
Old College  
The University of Georgia  
Athens, GA 30602

Dear Dean Stokes:

I am hereby transmitting to you a proposal to add a non-thesis option to the M.S. degree in Physics. On March 5, 2008, the Graduate Faculty of the Department of Physics and Astronomy voted unanimously in favor of the proposed non-thesis M.S. option; the faculty vote was: 20 Yes (*i.e.*, in favor), 0 No, 0 Abstentions.

The Department believes that a non-thesis option will provide a valuable and attractive alternative for students pursuing a non-research, professionally-oriented track, *e.g.* scientific computer programmers, financial analysts, and perhaps most importantly, students whose primary goals are in secondary school science education.

In closing I note that a non-thesis option to the M.S. degree in Physics is not without precedent as nearly all of UGA's aspirational institutions already have a non-thesis M.S. option.

On behalf of the Department, I respectfully request your support of this exciting new educational opportunity for students seeking an M.S. in Physics at UGA..

Sincerely,

William M. Dennis  
Professor and Head

## **Proposal to Add a Non-Thesis Option to the M.S. in Physics**

### **Department of Physics and Astronomy**

Submitted to: Dr. Maureen Grasso  
Dean, Graduate School  
320 E. Clayton St., Suite 400  
University of Georgia

Submitted by: Dr. Bill Dennis, Head  
Prepared by: Graduate Curriculum Committee  
Department Head, Physics and Astronomy  
Physics Building  
University of Georgia

#### **Basic Information**

Proposed Change: Non-thesis option for students pursuing a non-research, professionally-oriented track.

Start Date: Fall 2009

#### **Program Description**

The Department of Physics and Astronomy is requesting that a non-thesis option for the M.S. in Physics be implemented for students pursuing a non-research professionally-oriented program of study. This initiative is consistent with the department's goal to enhance and broaden its graduate program and is fully consistent with the department's long-range plan. The non-thesis M.S. degree is designed for students who intend to pursue careers and professions, such as scientific computer programmer, that require substantial physics or astronomy knowledge to write computer simulations of physical phenomena for industry or governmental labs. Another key example is students whose primary goals are in secondary school science education. This area is critical to the nation's ability to produce technologically competent citizens, and science education, particularly in the secondary schools, could greatly benefit from improved discipline-specific training of these teachers. A course-based M.S. program would provide – in conjunction with Science Education training – a superb background for physical science teachers.

The program of study for students selecting the non-thesis option would contain all the courses already required of thesis-track M.S. students. The courses for the current thesis option include 12 credits of physics and/or astronomy at the 8000 level where 9 of these credits must come from PHYS 8011, PHYS 8101, PHYS 8102, or PHYS 8201. An

additional 12 credits must come from courses at either the 6000 or 8000 level, 9 of which must be physics or astronomy courses. Finally, the remaining 6 credits are for thesis research. In addition to the normal sequence of coursework for thesis-track students that has just been described, the non-thesis M.S. would require an additional 3 credits in the core (PHYS 8301) for a total of 15 credits. The previous 12 credits of electives would be replaced by a concentration of 9 credits taken within the Department at the 6000 or 8000 level in an area depending on the student's professional orientation or objectives (e.g., astrophysics, condensed matter, nuclear physics, etc.). Finally, 6 credits of electives taken in a related area outside the department (e.g., Computer Science, Mathematics, Statistics, Biology) would be required in lieu of the 6 credit hours of thesis research. The total credit hours for the non-thesis M.S. would thus be 30 – the same as for the thesis M.S. option.

At the time of application, the student must choose via admissions either the non-thesis or thesis M.S. option. If the student is currently enrolled, a degree objective change is required.

The current M.S. thesis option will not change. The following table outlines the program of study that requires a thesis and the proposed non-thesis option.

<b>Current M.S. with Thesis</b>	<b>Proposed M.S. Non-Thesis</b>
Core: (12 credits)	Core: (15 credits)
3 of the following 4 courses:	All of the following 5 courses:
PHYS 8011 – Classical Mechanics I	PHYS 8011 – Classical Mechanics I
PHYS 8101 – Quantum Mechanics I	PHYS 8101 – Quantum Mechanics I
PHYS 8102 – Quantum Mechanics II	PHYS 8102 – Quantum Mechanics II
PHYS 8201 – Advanced Electromagnetic Theory I	PHYS 8201 – Advanced Electromagnetic Theory I
3 credits of PHYS or ASTR coursework	PHYS 8301 – Statistical Mechanics I
Electives: (12 credits)	Concentration: (9 credits)
At least 9 credits of PHYS or ASTR coursework	PHYS or ASTR courses at 6000 or 8000 level
Thesis: (6 credits)	Electives: (6 credits)
PHYS 7000, PHYS 7300	related 6000 or 8000 level courses outside of department
Oral Defense of MS Thesis	Oral Exam based on Concentration
Minimum Total Credit Hours: 30	Minimum Total Credit Hours: 30

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In lieu of a thesis the student must pass an oral exam based on material covered in the area of Concentration. An oral exam was chosen over a written exam because those students who are switching from the Ph.D. track to the M.S. Non-Thesis Option track will have already taken a written exam (2-3 times depending on the student). Even though it is likely that most of the students enrolled in the Non-Thesis M.S. Option will not be switching from the Ph.D. track, we would like all Non-Thesis M.S. students to have the same requirements for the degree. The oral exam will be administered by the student's committee during the final semester of the student's program and the chair will assign a pass/fail grade with input from the committee. Should the student fail the oral exam, he or she will have one more opportunity to pass this exam, but he or she will have to enroll and take the exam the following semester. Any student failing the oral exam twice will not be permitted to obtain a Non-Thesis M.S.

### **Faculty Vote**

The Graduate Faculty of the Department of Physics and Astronomy voted unanimously in favor of the proposed non-thesis M.S. option. The faculty vote, taken on March 5<sup>th</sup>, 2008, was 20 Yes (i.e., in favor), 0 No, 0 Abstentions.

### **Justification for the Proposed Non-Thesis M.S. Option**

A non-thesis option in our Department is needed for several reasons.

- Post-baccalaureate coursework in physics and astronomy can be beneficial to a student's goals without the inclusion of a research-specific component. Best examples are students whose long-term goals are broader than the traditional physics student, e.g., students whose goals are to work in fields such as computer programming which would require substantial amounts of physics and/or astronomy backgrounds in order to write simulations of the physical phenomena relevant for industrial applications or governmental laboratories. Other examples would be students interested in working in areas such as health physics or nuclear engineering. The background coursework in physics provided by a non-thesis M.S. would be invaluable in successfully assimilating the various training regimens of each discipline. In the cases described above, a thesis requirement delays the completion of the student's degree for at least a year and does not significantly contribute to the work the student will eventually do.
- Post-baccalaureate coursework without a thesis component can be very beneficial to students whose primary goals are in secondary school education. It is widely accepted that science education in secondary schools could greatly benefit from improved discipline-specific training of our teachers. The course-based M.S. program described above would provide, in conjunction with Science Education

training, a superb background for teaching any of the physical sciences. A thesis requirement does not necessarily prepare the future secondary school teacher as well as additional graduate-level coursework in the subject.

- Some students are not sure whether they want to invest the 5-7 years that are typically necessary for obtaining a Ph.D. in physics. These students often come in as M.S. students to “try out” the discipline. This decision often requires two or even three years to become final in the student’s mind. These students are not served at all by the thesis requirement for the M.S. The non-thesis M.S. would mean they have not spent their 2 or 3 years in our department in vain.
- Virtually every single peer institution in UGA’s aspirational category already has a non-thesis M.S. option. This documentation is included in Appendix A. By our not having a non-thesis option, we are automatically at a competitive disadvantage when recruiting students to our graduate program.

### **Admission Procedure for Domestic Applicants**

The admissions standards are the same for both the thesis or non-thesis options. Admissions are open to all qualified graduates of accredited institutions. Admission materials are available through the Graduate Admissions Office. All prospective students should send to the Graduate School: 1) a completed application; 2) two official transcripts from each institution of higher education attended; 3) Graduate Record Examination (GRE) general scores; 4) A brief essay describing the applicant's background, interests, goals, aspirations, *etc.*

### **Admission Procedure for International Applicants**

The admissions standards are the same for both the thesis or non-thesis options. Admissions are open to all qualified graduates of accredited institutions. Admission materials are available through the Graduate Admissions Office. All prospective students should send to the Graduate School: 1) a completed application; 2) two official transcripts from each institution of higher education attended; 3) Graduate Record Examination (GRE) general scores; 4) A brief essay describing the applicant's background, interests, goals, aspirations, *etc.*; 5) official TOEFL or IELTS scores not more than two years old.

### **Impact on Current Students**

There would be no adverse impact on current M.S. degree students in the department. Students currently enrolled in the M.S. degree (with thesis) would have the option of changing to the M.S. non-thesis option or completing their M.S. with thesis. The programs of study of current students selecting the non-thesis M.S. option would have to reflect the new course requirements described above. We anticipate that perhaps 3-4 students currently enrolled as M.S. students will switch to the non-thesis option (the

majority of our students are in the Ph.D. program). Future students will have the choice of electing either a thesis or non-thesis M.S. degree option.

**Financial Impact**

No new course, faculty, facilities, or services will be required to implement a non-thesis option for the M.S. degree. Thus, no new funds are required.