

**Georgia Institute of Technology**  
**Graduate Curriculum Committee**  
**Minutes**  
**April 14, 2011**

**Present:** Butera (ECE), Pikowsky (Registrar), Storici (BIO), Ferri (ECE), Rosen (ME), Potts (Grad Studies), Chordia (CoA), Flowers (ARCH), Sanders (MSE), Silva (ECON), Neitzel (ME)

**Visitors:** Laros (Registrar), Howson (Registrar), Paraska (VPFAD), Scott (MGT), Hicks (PUBP), Castro (BC), Allen (CoA), Sullivan (BMED), White (CoC), Dieci (Math), Stanley (BMED)

**Note:** All action items in these minutes require approval by the Academic Senate. In some instances, items may require further approval by the Board of Regents or the University System of Georgia. If the Regents' approval is required, the change is not official until notification is received from the Board to that effect. Academic units should take no action on these items until USG and/or BOR approval is secured. In addition, units should take no action on any of the items below until these minutes have been approved by the Academic Senate or the Executive Board.

1. A motion was made to approve a request by the School of Public Policy for a new course and for deactivation of a course. The motion was seconded and approved. Unanimous.

Note: All USG institutions offering courses in philosophy are now required to list them under the PHIL prefix. To preserve consistency among all the philosophy courses offered at Georgia Tech, the School of Public Policy requested the following:

**New course:**

PHIL 6000: Responsible Conduct of Research (RCR) 1-0-1

Note: This course will replace PST 8000 Responsible Conduct of Research (RCR). The course number and level were changed to accommodate both Master's and Ph.D. students.

**Deactivate Course:**

PST 8000

2. A motion was made to approve a request by the School of Building Construction for a new degree. This proposal was previously presented on March 20, 2011 and tabled for additional information. After further review and deliberation, the motion was seconded and approved. There were five votes to approve and 2 abstentions.

**New Degree:**

Doctor of Philosophy with a Major in Building Construction

A total of 49 credit hours will be required for this Ph.D. degree beyond the master's degree. Courses will be taken in consultation with and with the approval of the student's Ph.D. Guidance Committee.

The required minimum core courses for all students in this program will be:

- a) BC 7100 Quantitative Methods in Construction Research (3 credit hours),
- b) BC 7200 Advanced Readings in Building Construction (6 credit hours),  
BC 8000 PhD Seminar (1 credit hour), and
- c) BC 8100 Research Methodology (3 credit hours).

A Minimum of twelve credit hours of concentration electives, chosen from a list of approved electives (revised every semester by the faculty in the School of Building Construction), will be required.

A minimum of nine credit hours of course work will be required for the minor.

A minimum of fifteen credit hours of thesis, including a minimum of six credit hours of BC 8999 Doctoral Thesis Preparation and a minimum of nine credit hours of BC 9000 Doctoral Thesis, will be required.

Additional requirements will be established by the Ph.D. Guidance Committee on a case by case basis. The Guidance Committee will consist of three Building Construction faculty members who will work directly with each student to ensure they are taking courses which can directly assist them toward gaining advanced proficiency in their chosen area of research. A program of study must be approved by the student's Guidance Committee.

A student must choose a minor field of study that is most relevant to her or his research, with the major field being in Building Construction. The minor field must be outside of the School of Building Construction, must include at least nine hours of coursework, taken on a letter grade basis of "B" or better, and must be approved by the Ph.D. Guidance Committee and the Office of Graduate Studies and Admissions. Although the student's plan of study will be approved, the student must additionally submit a letter and receive approval for the completion of the coursework on the chosen minor.

An overview of program requirements includes:

- A Program of Study must be approved by the student's Guidance Committee. Additional requirements may be set by the Ph.D. Guidance Committee. The student must have a minor field of study in the area of the student's research. The minor field must be outside of the School of Building Construction and must include at least nine hours of course work. The minor must be approved by the Ph.D. Guidance Committee and the Office of Graduate Studies.
- Pass a Ph.D. comprehensive (qualifying) examination consisting of written and oral portions.
- Complete a Ph.D. dissertation and orally defend the dissertation.

3. A motion was made to approve a request by the School of Materials Science and Engineering for a modification to the current MSE Doctoral Degree Program. The modified curriculum involves a merge between the Schools of Materials Science and Engineering and Polymer, Textile and Fiber Engineering to form an integrated curriculum focused on the innovation, development and understanding of materials to meet the challenges of the 21<sup>st</sup> century. The motion was seconded and approved. Unanimous.

**Degree Modification:**

Doctor of Philosophy with a major in Materials Science and Engineering

To prepare the students for their research, two core course options are available. One track of core courses focuses on metals and ceramics, often referred to as “hard materials” and the second, macromolecules, is sometimes referred to as “soft materials.” The material responses to a variety of environments are significantly different that the two-track option fits well. The courses that appear in each track have been previously taught in the separate Schools and will now be combining the two tracks into a single Ph.D. program where a student follows one of the two tracks without redundancy. Note: All PTFE prefixes have/will disappear and are relabeled MSE.

The combined school unanimously adopted the following procedure for the qualifying examination.

- (1) The oral portion would be included as part of two new core courses a one hour seminar and a three hour critical review of the current materials literature.
- (2) The procedures in the closed book qualifying examination currently used by PTFE.

**Proposed Graduate Qualifying System:**

The proposed graduate qualifying system is in essentially three parts, as explained below:

(1) *Core Courses* - All core courses must be completed with a grade of 'B' or better or an overall 3.2 GPA before proceeding to the qualifying examination. Students are dropped from the Ph.D. program if they have a combination of 2 'C's or a 'W' and a 'C' in the 6 core courses.

(2) *Written exam* – Students will be provided with research papers supplied by faculty involved in graduate courses (or by selection from graduate committee). A written exam will be taken by the students 3-4 weeks after receiving papers and will have to answer 6 out of 12 questions, each based on the research papers. The written exam will last 3 hours and will test the ability to read, understand and critically analyze the pre-supplied research papers, but will require knowledge of the core courses and related science discussed in the papers. Students are not allowed to discuss the

research papers with their supervisors, but are encouraged to discuss them with their colleagues. This exam mimics closely that already in operation in 'PTFE'.

(3) *Critical Analysis Course* – As part of the two courses (MSE 8801 and 8803) taken in the first year the students will be instructed on delivering a research lecture as well as writing a critical analysis in their research field. At the end of the second course, they will be examined by 3 faculty through a written document, oral presentation and a question and answer period. The same 3 faculty will examine all students in any one year. The written document will be based on a standard format for all candidates. This course replaces both 'oral' examination methods previously used by the 'old' departments, but captures the strengths, while removing both the weaknesses inherent in the previous styles.

### **Proposed MSE Program Curriculum (Hard Track)**

<u>Core Courses</u>	<u>Hours</u>	<u>Description</u>
MSE 6500 (Fall)	2-0-2	Thermodynamics of Materials
MSE 6501 (Fall)	1-0-1	Phase Equilibria
MSE 6402 (Fall)	3-0-3	Crystallography, Structure and Defects
MSE 8801 (Fall)	1-0-1	Seminar
MSE 6403 (Spring)	3-0-3	Kinetics of Diffusional/Non-Diffusional Phase
MSE 8803 (Spring)	3-0-3	Critical Analysis in Materials Science
Course of Choice*	3-0-3	Characterization
Course of Choice*	3-0-3	Computations

\* See suggested list & submit Program of Study to MSE Academic Office for Approval

### **Ph.D. Requirements**

- Students must complete all core courses with a minimum grade of B in each course or an overall 3.2 GPA before proceeding to the qualifying examination. Students are dropped from Ph.D. program if a combination of 2 'C's or a 'W' and a 'C' in the 6 core courses
- Six hours from general MSE curriculum
- Nine hours in an approved minor
- Pass the written qualifying exam
- Complete all course work with a minimum GPA of 3.0
- Write, present and defend a Ph.D. dissertation

Additional Ph.D. Requirements for students entering directly from B.S. program

- Six additional hours of course work in the major (6 hours)

Note: A total of 37 credit hours are required for Ph.D. direct from B.S.

Courses in Characterization could include (not limited to):

MSE 6105	Diffraction Studies
MSE 6110	Transmission Electron Microscopy

MSE 6120	Quantitative Characterization of Microstructures
MSE 6130	Surface Characterization
MSE 6404	Scattering Theory
CHEM 6172	Physical Methods in Inorganic Chemistry
CHEM 6181	Chemical Crystallography
CHEM 6283	Electroanalytical Chemistry
CHEM 6572	Macromolecular Structure
CHEM 6752	Polymer Characterization
MSE 8803	Advanced X-ray Diffraction

Courses in Computations could include (not limited to):

MSE 6795	Mathematical, Statistical, and Computational Techniques in Materials Science
CHEM 6382	Computational Methods in Organic Chemistry and Biochemistry
ISyE 6739	Basic Statistical Methods
ME 6104	Computer-aided Design
ME 6124	Finite-Element Method: Theory & Practice
MATH 4255	Monte Carlo Methods
MATH 4347	Partial Differential Equations I
MATH 4348	Partial Differential Equations II

### **Proposed Polymer Curriculum: (Soft Track)**

#### *Fall 1<sup>st</sup> year*

MSE6500	2-0-2	Thermodynamics (core)
MSE6502	1-0-1	Polymer Solution Thermodynamics (core)
MSE6768	3-0-3	Polymer Structure, Physical Properties and Characterization
MSE8001	1-0-1	Seminar

#### *Spring 1<sup>st</sup> year*

MSE7771	3-0-3	Mechanics of Polymer Solids and Fluids
MSE8803	3-0-3	Critical Analysis of current literature in Materials Science

#### *Summer 1<sup>st</sup> year*

Written Qualifying exams

#### *Fall 2<sup>nd</sup> year*

Choice of a minimum of 2 of the following:

MSE6750	Preparation and reactions of polymers
MSE6751	Physical Chemistry of Polymers in Solutions
MSE6752	Polymer Characterization
MSE6755 or 6481	Theoretical Chemistry of Polymer/Statistical Mechanics
MSE6600	Advanced Polymer Processing

#### *Differences and changes:*

A new course (MSE6500) has been created. The remaining core courses that were all taught in the 1<sup>st</sup> year remain, but a number of these have remained as core requirements in the 1<sup>st</sup> year, and the remainder as a limited number of choices the

students take (2 out of 5). The first year is now entirely consistent with the MSE concentration in terms of class hours. Minor requirements remain the same.

### **Ph.D. Requirements**

- Students must complete all core courses with a minimum grade of B in each course or an overall 3.2 GPA before proceeding to the qualifying examination. Students are dropped from Ph.D. program if a combination of 2 'C's or a 'W' and a 'C' in the 6 core courses
  - Six hours from general MSE curriculum
  - Nine hours in an approved minor
  - Pass the written qualifying exam
  - Write, present and defend a Ph.D. dissertation
4. A motion was made to approve a request by the College of Computing for degree modification and new courses. The motion was seconded and approved. Unanimous.

### **Degree Modification:**

Master of Science in Computer Science

- Add two new Specializations
  - Information Security
  - Visual Analytics

The Master of Science in Computer Science degree was modified to include specializations per the January 20<sup>th</sup> GCC meeting. The new curriculum reflected the changes in the field by changing the MSCS requirements so that each specialization defines its own core requirements. Each specialization must consist of 12-15 hours, each one optionally split between core and specialization electives. The original modification included thirteen specializations and with the addition of these two new ones will bring the list up to fifteen.

### **Information Security Specialization:**

Core (9 hours)

- CS 6238, Secure Computer Systems
- CS 6260, Applied Cryptography
- CS 6262, Network Security

Electives (9 hours)

Take 2 of:

- CS 6035, Introduction to Information Security
- CS 6210, Advanced Operating Systems
- CS 6250, Computer Networks
- CS 6300, Software Development Process
- CS 6340, Software Testing and Analysis
- CS 6725, Information Security Strategies and Policies
- CS 7560, Theory of Cryptography

**Visual Analytics Specialization:**

Core (6 hours):

CS 7450: Information Visualization

Pick one of two:

CSE 6740: Computational Data Analysis

CSE 6242: Data and Visual Analytics

Electives (9 hours) Pick three from:

CS 6456: Principles UI Software

CS 6465: Computational Journalism

CS 6485: Visualization Methods in Science and Engineering

CS 6490: Computer Graphics

CS 6750: Human-Computer Interaction

CS 6795: Intro Cognitive Science

CSE 6242: Data and Visual Analytics

**New Courses:**

CS 6266: Information Security Practicum

0-15-5

CS 6999: Master's Project

0—3-27—1-9

CS 7646: Machine Learning for Trading

3-0-3

CSE 6242: Data and Visual Analytics

3-0-3

Note: There was some discussion about what kinds of changes in specializations would need to come to the Committee, given that these changes are in the areas of research. The Committee agreed that any curricular change that affects requirements for the degree and those that would create a new notation on the transcript would need to be approved. For purposes of tracking “non-curricular” changes, a notification item to the Committee would suffice if these areas of research are to be officially noted and published.

5. A motion was made to approve a request by the School of Biomedical Engineering for new courses and for deactivation of courses. The motion was seconded and approved. Unanimous.

**New Courses:**

BMED 6700: Biostatistics

3-0-3

BMED 6710: Rational Design of Biomaterials

3-0-3

BMED 6711: Rational Design of Biomaterials Lab

0-9-3

BMED 6720: Biotransport

3-0-3

BMED 6740: Living System Modeling &amp; Analysis

3-0-3

BMED 6760: Information Processing Models in Neural Systems

3-0-3

BMED 7001: Biomedical Engineering Seminar

1-0-1

BMED 7011: Integrative Core: Introduction to Modeling &  
Experimentation in Biomedical Engineering

3-0-3

BMED 7012: Integrative Core: Experimental Design-Measurements  
at the Right Spatial and Temporal Scales

3-0-3

BMED 7101: Advanced Seminar: Biomaterials & Regenerative Medicine	3-0-3
BMED 7301: Advanced Seminar: Cellular & Biomolecular Engineering	3-0-3
BMED 7410: Introduction to Multiscale Analysis in Systems Biology	3-0-3
BMED 7411: Mathematical Models in Biology & Medicine	3-0-3
BMED 7413: Biochemical Systems Analysis	3-0-3
BMED 7601: Advanced Seminar: Neuroengineering	3-0-3
BMED 7610: Quantitative Neuroscience	3-0-3

Deactivate Courses:

- BMED 6011 - Engineering Science I
- BMED 6012 - Engineering Science II
- BMED 6021 - BME Problem Solving I
- BMED 6022 - BME Problem Solving II
- BMED 6031 - Biomedical Science I
- BMED 6032 - Biomedical Science II
- BMED 6778 - Intro to Biomaterials
- BMED 8010 - Bioengineering Seminar
- BMED 8015 - Lab Rotation I
- BMED 8016 - Lab Rotation II
- BMED 8017 - Lab Rotation III
- BMED 8125 - Bioengineering Lab
- BMED 8130 - Bioethics-Values
- BMED 8695 - TATTO Stage I
- BMED 8696 - TATTO Stage II
- BMED 8697 - TATTO Stage III

6. A motion was made to approve a request by the College of Management for a degree modification, new courses, and deactivation of courses. The motion was seconded and approved. Unanimous.

**Degree Modification:**

Master of Business Administration

Currently, MBA students take a 1.5 hour core course in microeconomics (MGT 6130 Managerial Economics) and a 1.5 hour core course in macroeconomics (MGT 6131 Macroeconomic Environment of Business) as part of their core requirements for the MBA degree. Nationally, MBA programs have increasingly moved toward offering macroeconomics as an elective, because macroeconomics is of special importance to MBA students with a concentration in finance, banking and international business. Expanding macroeconomics and changing it to a three-hour elective course (MGT 6135 Macroeconomic Environment of Business) allows for much greater depth and breadth necessary for these students.

An expanded microeconomics class, MGT 6134 (Managerial Economics II) will benefit all Georgia Tech MBA students. At present, in the 1.5 hour course, we are unable to cover such crucial topics as information economics, market failure, auction and bargaining models, and antitrust. Expanding microeconomics into two 1.5 hour required courses will allow coverage of these very important topics.

The requested change does not impact the total core MBA hours.

The College of Management requests that the 1.5 hour course, MGT 6131 Macroeconomic Environment of Business be removed from the MBA core curriculum and MGT 6134 Managerial Economics II substituted as a core requirement.

At the same time the College is also requesting approval of the three-hour MGT 6135 Macroeconomics of Business, which will be taught as an MBA elective.

The committee discussed concerns related to the use of fractional hour courses and asked the College of Management to consider other options. The Committee also asked that an ad hoc committee be formed to talk about the unit of credit definition and whether other changes would need to be made if fractional hour courses need to exist in the future. The ad hoc committee would be asked to look at all of the related issues in making a recommendation to the Committee.

**New Courses:**

MGT 6134: Managerial Economics II	1.5--0--1.5
MGT 6135: Macroeconomics for Managers	3-0-3
MGT 7308 - Theory Construction	3-0-3

**Deactivate Courses:**

MGT 6133 - Business Law and Ethics  
MGT 6131 - Macroeconomic Environment of Business  
MGT 7307 - Marketing Theory

7. A motion was made to approve a request by the School of Mathematics for a new course. The motion was seconded and approved. Unanimous.

MATH 7014: Advanced Graph Theory 3-0-3

This course had been previously approved, but was built as a Special Topics course at the time and taught as such for several years. The Special Topics version of this course will no longer be active, having been replaced by this permanent course.

8. A motion was made to approve Petitions Subcommittee recommendations in the following areas. The motion was seconded and approved. Unanimous.

All were approved except as noted.

- 1- Change registration from CS8902 to 8903 for the Spring 2011 term
- 2- Selective withdrawals
- 2- Change grade modes (**Denied**)

The following petitions were handled administratively since the February 10 meeting. All were approved.

10- Update status to degree seeking (full graduate standing)

1- Waiver of the six-year rule

1- Use CHEM9000 as CHEM7000 to meet Master's thesis requirements

1- Readmit after first drop

Adjourned,

Reta Pikowsky

Registrar