

Georgia Institute of Technology
Graduate Curriculum Committee
Minutes
October 2, 2014

Present: Breedveld (ChBE), Cozzens (Vice Provost), Jagoda (AE), Jayarman (MSE), Pikowsky (Registrar), Ceccagnoli (CoB), Schmidt-Krey (BIOL), Koh (Student Representative), Flowers (ARCH), Ashuri (BC), Ayhan (ISyE), Smith (AE), Balch (Executive Board-Liasion)

Visitors: Laros (Registrar), Merkousko (Registrar), Hodges (Registrar), Bamburowski (Grad. Studies), Gallego (ECON), Barker (BMED), Ghosal (ECON), Bruckman (IC), Williams (ECE), Sekayi (CETL), Tucker (CETL), Samford (CETL), Mark (PE), Venkateswaran (CoC)

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.

Academic Matters

1. A presentation was made about an upcoming proposal for a Doctor of Philosophy with a major in Quantitative Biosciences. The actual proposal will be submitted at a later date for official approval.

Goal: To train the next generation of PhD level, quantitatively-trained bioscientists.

Mission statement: Georgia Tech's interdisciplinary QBioS program is designed to train and prepare PhD level scientists to identify and solve foundational and applied problems in the biological sciences. These PhD scientists will represent the next generation of bioscientists able to combine physical and quantitative modeling in the service of environmentally and biomedically relevant problems. Training such students involves ensuring that students are well versed in a diverse set of quantitative toolkits in addition to having developed expert-level knowledge and experience in applying quantitative methods. The QBioS PhD will leverage best-practices for training programs at the interface of the biosciences and other disciplines, particularly physics, mathematics, earth systems, engineering, and computer science.

Target audience for recruitment: (i) Undergraduates majoring in the physical sciences (e.g., physics, earth systems and chemistry), mathematics,

computer science, and engineering, who would like to transition to a career focusing on interface research in the biosciences. (ii) Undergraduates trained in the biosciences (e.g., integrative biology, physiology, ecology, evolution, neuroscience, biochem, molecular & cellular biology) with particular strengths and interests in quantitative analysis and modeling.

Participating units (i.e. “home schools”) – All 7 Schools within CoS, including Applied Physiology, Biology, Chem/Biochem, EAS, Mathematics, Physics, and Psychology.

Note: A question was raised about whether doctoral students would be able to transfer into this program from another program on campus. Committee members felt that there can be a restriction on inter-campus transfers and suggested that be made clear in the proposal.

2. A motion was made to *approve* a request from the School of Economics for a degree modification. The motion was seconded and approved.

Degree Modification – Approved

Master of Science in Economics

Change name from undesignated Master of Science with a major in Economics to designated and update curriculum. New curriculum will not have a thesis option.

Proposed Restructured program

- a) The degree requires 30 hours of coursework.
- b) Within those 30 hours, at least 21 hours must be at the 6000 level.
- c) Within those 30 hours, the student must complete 18 hours in courses taught by the School of Economics which must include the four mandatory courses:
ECON 6105 Macroeconomics (3 credit hours)
ECON 6106 Microeconomic Analysis (3 credit hours)
ECON 6140 Probability and Statistics (3 credit hours)
ECON 6160 Econometric Analysis (3 credit hours)
and
ECON Electives of 6 credit hours of courses taught in the School of Economics
(Students may count 3 hours of ECON internship credit as a School of Economics elective)
- d) Within those 30 hours, the student can choose 12 hours of elective courses in complementary areas such as Mathematics, Statistics, Industrial Engineering, Civil Engineering, International Affairs, various areas in Management, or Public Policy, among other areas, or in Economics. The selection of these electives will be based on the student’s chosen areas of

concentration. The SOE Director of Graduate Studies along with the Academic Advisor will grant approvals for these courses.

The student must obtain approval of the Director of Graduate Programs, School of Economics, to apply for any courses outside of the 18 hours of courses required to be taught by the School of Economics, as well as approval for internship related credits.

3. A motion was made to *approve* a request from the Center for the Enhancement of Teaching and Learning for new courses. The motion was seconded and approved.

New Courses - Approved

CETL 8723: Academic Writing for International Graduate Students	2-0-2
CETL 8796: Presentation Skills for International Graduate Students	2-0-2
CETL 8797: Oral Communication for International Graduate Students	2-0-2

4. A motion was made to *acknowledge* a request from the College of Computing for a prerequisite modification. The motion was acknowledged without concern.

Prerequisite Modification – Approved (Acknowledged without Concern)

CS 7460: Collaborative Computing

Remove Prerequisite course CS 6750/PSYC 6750 from course CS 7460

The school of Interactive Computing proposes to remove the prerequisite CS 6750/PSYC 6750 Human-Computer Interaction from the course CS 7460 Collaborative Computing. Over time it has become apparent that the content of 6750 is not actually necessary for students before taking 7460. As a result, we would like to remove this unnecessary obstacle.

5. A motion was made to *approve* a request from the College of Computing for degree modifications. The motion was seconded and approved.

Degree Modification – Approved

Master of Science in Computer Science
- concentration in Machine Learning
- concentration in Computer Graphics

We are proposing to add two additional courses to the approved Machine Learning concentration elective list. These two courses are both in the appropriate area of study and their addition to the list of approved electives gives the student more choices in fulfilling their concentration.

We are also proposing to remove CS 8803 Simulation of Biological Systems (Special Topics) and add CS 7492, these two are the same course. It simply has a new permanent course number.

Master of Science in Computer Science – Concentration in Machine Learning

Course option:

This option requires the student to complete 36 hours of coursework

Total Course Credit Hours 36

Minimum Credit Hours in CS 24

Minimum Credit Hours (6000/8000 Level) in CS 18

Minimum Credit Hours (6000/8000 Level) 24

Project option:

This option requires the student to complete 27 hours of coursework and a 9 hour project. The project requires approval by a faculty advisor and the MS program coordinator in the semester prior to its inception.

Total Credit Hours 36

MS Project Hours 9

Total Course Credit Hours 27

Minimum Credit Hours in CS 24*

Minimum Credit Hours (6000/8000 Level) in CS 18*

*May not include MS project or thesis hours.

Thesis option:

This option requires the student to complete twenty-four hours of coursework and a 12 hour thesis. The thesis process is defined elsewhere in this catalog.

Total Credit Hours 36

MS Thesis Hours 12 hour

Total Course Credit Hours 24

Minimum Credit Hours in CS 24*

Minimum Credit Hours (6000/8000 Level) in CS 18*

*May not include MS project or thesis hours.

Machine Learning Concentration Requirements:

Core (6 Hours):

Algorithms: Pick one (1) of:

- CS 6505 Computability, Algorithms, and Complexity
- CS 6520 Computational Complexity Theory
- CS 6550 Design and Analysis of Algorithms
- CS 7510 Graph Algorithms
- CS 7520 Approximation Algorithms
- CS 7530 Randomized Algorithms
- CSE 6140 Computational Science and Engineering Algorithms

And, pick one (1) of:

- CS 7641 Machine Learning
- CSE 6740 Computational Data Analysis: Learning, Mining, and Computation

Electives (6 Hours):

Pick two (2) of:

- CS 7616 Pattern Recognition
- CS 7646 Machine Learning for Trading
- CS 7650 Natural Language
- CS 8803 Special Topics: Machine Learning Theory
- CS 8803 Special Topics: Machine Learning for Finance
- CSE 6240 Web Search and Text Mining
- CSE 6242, Data and Visual Analytics
- CSE 6243 Adv Top Machine Learning

Master's in Computer Science – Concentration in Computer Graphics

Course option:

This option requires the student to complete 36 hours of coursework

Total Course Credit Hours 36

Minimum Credit Hours in CS 24

Minimum Credit Hours (6000/8000 Level) in CS 18

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Project option:

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Minimum Credit Hours in CS 24*

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Thesis option:

This option requires the student to complete twenty-four hours of coursework and a 12 hour thesis. The thesis process is defined elsewhere in this catalog.

Total Credit Hours 36
MS Thesis Hours 12 hour
Total Course Credit Hours 24
Minimum Credit Hours in CS 24*
Minimum Credit Hours (6000/8000 Level) in CS 18*
*May not include MS project or thesis hours.

Computer Graphics Concentration Requirements:

Core (6 Hours):

- CS 6491 Foundations of Computer Graphics
- CS 6505 Computability, Algorithms, and Complexity

Electives (6 Hours):

Pick two (2) from

- CS 6457 Video Game Design and Programming
- CS 6485 Visualization Methods for Science and Engineering
- CS 6764 Geometric Modeling
- CS 7490 Advanced Image Synthesis
- CS 7491 3D Complexity Techniques for Graphics, Modeling, and Animation
- CS 7495 Computer Vision
- CS 7496 Computer Animation
- CS 7497 Virtual Environments
- ~~CS 8803 Special Topics: Simulation of Biological Systems~~
- CS 7492 Simulation of Biology

Degree Modification – Approved

Master of Science in Computer Science
- concentration in Databases & Software Engineering

We are proposing to add a new course, Advanced Software Engineering, to the Electives pick for this concentration. This will enable those concentrating on the Software Engineering side to take a more advanced, in depth course in their chosen area, and will give students more choices for their nine elective hours.

Master of Science in Computer Science – Concentration in Databases & Software Engineering

Course option:

This option requires the student to complete 36 hours of coursework

Total Course Credit Hours 36

Minimum Credit Hours in CS 24

Minimum Credit Hours (6000/8000 Level) in CS 18

Minimum Credit Hours (6000/8000 Level) 24

Project option:

This option requires the student to complete 27 hours of coursework and a 9 hour project. The project requires approval by a faculty advisor and the MS program coordinator in the semester prior to its inception.

Total Credit Hours 36

MS Project Hours 9

Total Course Credit Hours 27

Minimum Credit Hours in CS 24*

Minimum Credit Hours (6000/8000 Level) in CS 18*

*May not include MS project or thesis hours.

Thesis option:

This option requires the student to complete twenty-four hours of coursework and a 12 hour thesis. The thesis process is defined elsewhere in this catalog.

Total Credit Hours 36

MS Thesis Hours 12 hour

Total Course Credit Hours 24

Minimum Credit Hours in CS 24*

Minimum Credit Hours (6000/8000 Level) in CS 18*

*May not include MS project or thesis hours.

Concentration in Databases and Software Engineering

Core Courses (6 hours)

- CS 6505 Computability, Algorithms, and Complexity

Pick one (1) of:

- CS 6210 Advanced Operating Systems
- CS 6241 Design and Implementation of Compilers
- CS 6290 High-Performance Computer Architecture
- CS 8803 Special Topics: Graduate Introduction to Operating Systems

Electives

(9 hours) Pick three (3) of:

- CS 6300 Software Development Process
- CS 6310 Software Architecture and Design
- CS 6340 Software Analysis and Testing
- CS 6365 Introduction to Enterprise Computing
- CS 6400 Database Systems Concepts and Design
- CS 6422 Database System Implementation
- CS 6675 Advanced Internet Computing Systems and Applications
- CS 8803-ASE Special Topics: Advanced Software Engineering
- CS 8803-FPL Special Topics: Foundations of Programming Languages

6. A motion was made to *approve* a request from the Department of Biomedical Engineering for new courses and degree modifications. The motion was seconded and approved.

New Courses - *Approved*

BMED 7004: Teaching & Research Practicum I	1-0-1
BMED 7005: Teaching & Research Practicum II	1-0-1

Degree Modification - *Approved*

Doctor of Philosophy with a major in Biomedical Engineering
(Joint Degree with Emory)

Changes to fulfill the Responsible Conduct of Research (RCR) requirements at both GT and Emory University:

- Remove PHIL6010 from the degree requirements
- Insert RCR training covered in PHIL6010 within already established coursework within the major, including the following courses:
 - o BMED 7004 (Teaching & Research Practicum I): Eight hours of the course will be dedicated to in-person RCR training in required topics, including authorship and publication, collaborative research, conflict of interest, data acquisition/management/ownership/sharing, peer review, policies regarding the use of human subjects and vertebrate animals in research, and the responsibilities of mentors and mentees.
 - o BMED 7011/7012/7013 (Integrative Core Courses): For each course, 1.5 hours will be dedicated to in-person RCR training in the topic of science and engineering in society. Students must take two of these courses for a total of 3 hours of in-person RCR training.

Revisions to the BMED RCR training are proposed to reduce the total number of hours of in-person RCR training from 40 to 19 total hours, while still satisfying the scholarly integrity and responsible conduct of research training requirements for Emory, GT, the National Science Foundation, and the National Institutes of Health. Previously the delivery of RCR training was via a single 2-unit (30 hour) course PHIL6010 Biomedical Ethics (see prior proposal) taught by two BMED faculty members, and via two Emory courses (PSI600 and PSI610, now JPE 600 and JPE 610). The 30 contact hours of PHIL6010 was found to be overly burdensome for both students and faculty, and greatly exceeded required training levels. The new proposal delivers most of the PHIL6010 content via addition to the BMED courses listed above. Not only are RCR topics embedded within courses covering biomedical topics, but the training will be spread over multiple semesters with multiple BMED faculty members. The Emory courses (JPE600 and JPE610) will remain degree requirements.

Degree Modification - *Approved*

Master of Science in Biomedical Engineering
(Joint Degree with Emory)

Changes to fulfill the Responsible Conduct of Research (RCR) requirements at both GT and Emory University:

- Remove PHIL6010 from the degree requirements

- Insert RCR training covered in PHIL6010 within already established coursework within the major, including the following courses:
 - o BMED 7004 (Teaching & Research Practicum I): Eight hours of the course will be dedicated to in-person RCR training in required topics, including authorship and publication, collaborative research, conflict of interest, data acquisition/management/ownership/sharing, peer review, policies regarding the use of human subjects and vertebrate animals in research, and the responsibilities of mentors and mentees.
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7. A motion was made to *approve* a request from the School of Electrical and Computer Engineering for new courses. The motion was seconded and approved.

New Courses - Approved

ECE 6274: Statistical Natural Language Processing	3-0-3
ECE 6283: Harmonic Analysis for Signal Processing	3-0-3
ECE 7103: Advanced Memory Systems	3-0-3

8. Dr. Leo Mark, Associate Dean, Professional Education, led the discussion of a possible new academic credential called a “Modulum.” Although Dr. Mark originally brought this item to the Committee with the intent to seek a vote on procedures for this proposal to advance, the Committee decided to limit the agenda item to a presentation with Q&A. The Committee felt that the issue was too new and the proposal too unspecific to warrant a vote. Furthermore, it was noted that clear procedures already exist: any action taken on this “Modulum” concept, or any other “academic program” or “official academic credential,” could only go forward with the approval of the Graduate Curriculum Committee, then would have to go to the Academic Faculty Senate as an action item, and would

have to be then sent to the Board of Regents in prospectus format before a formal proposal can be considered.

The term “Modulum” was developed at Tech and would be a new academic credential. Such a concept or credential does not exist at other institutions. Dr. Mark noted that Tech has a tradition of innovation, and suggested that this would be another venture along those lines. The *Threads* curriculum and the online Master of Science in Computer Science in the College of Computing were cited by Dr. Mark as examples of innovative curriculum development.

There was substantial discussion on this proposed new academic credential. On the one hand, the proposal states that a “Modulum” would be “degree-like”, with internal and external recognition similar to a degree; on the other hand, the proposal does not explicitly propose the “Modulum” as a *new type* of degree. This ambiguity was not resolved during the discussion and several Committee members expressed significant concerns about the ill-defined concept and academic status of a “Modulum”. Clarity on this concept will be critical to assess the impact of the proposed program on Tech’s curricular offerings and its standing as a degree-granting institution that is universally recognized, respected and valued. Since such clarity was absent, support among the attending Committee members for the proposed “Modulum” concept was weak.

Committee members asked a number of questions in an effort to understand what this new credential/degree would look like and how it would operate. Questions and observations included the following:

- Since this is a new kind of academic credential, would some kind of preliminary discussion be needed with the Board of Regents, prior to a prospectus being created? Would the Board of Regents know what to do with such a proposal without some detailed explanation?
- No quantitative evidence was presented of demand for the “Modulum”; for new degrees, a market analysis is usually a key component of the prospectus.
- The proposal expressed the intent that coursework from a “Modulum” (or multiple “Modula”) can be applied towards completion of a Master’s degree. This raised serious concerns among Committee members. First of all, it was stated that the academic rules and regulations that currently apply to degree programs must be honored by the new credential. In other words, successful completion of “Modula” within a degree program should not result in the award of an MS degree unless all other requirements for that degree were met. Secondly, all current policies regarding credit transfers between degrees (e.g., undergraduate to Master’s) include restrictions to limit “double-counting”; the proposed full transfer of all credit from “Modulum” to Master’s would therefore be inconsistent with existing credit transfer policies.
- Admission requirements were discussed. Past history of petitions to admit students without proper academic credentials was brought up. It was clear from the Committee input that the required admission standards would

have to be met and compromises would not be approved. The Committee does not wish to see history repeat itself in this regard.

- Admission of “Modulum”-seeking students as non-degree seeking students *versus* the development of a new degree-type was discussed at some length. If the “Modulum” is not a new *degree*, this seems a feasible option to implement the concept. The Committee speculated that within the current system, students with non-degree-seeking status can take a coherent set of courses, rely on a certified transcript for documentation, be awarded a “Modulum” credential by the academic unit that defined the course sequence, and transfer up to 16 credit hours of this coursework towards a Master’s degree if subsequent admission as degree-seeking student were to be sought.
- In response to questions, the Committee was told that there is no current plan, given the likely complexities, to pursue the option to have financial aid to cover students pursuing a “Modulum” if it moves forward. The same holds true for VA benefits, which would also require a thorough approval through all the normal channels.
- There was discussion on how a “Modulum” would be coded in the Registrar’s database and what kinds of information, if any, would appear on the transcript. Dr. Mark stated that in his vision the document verifying completion of the “Modulum” would be issued by the Registrar.
- It was noted that the “Modulum” would have to be proposed by one of the existing academic units in the normal fashion through the Graduate Curriculum Committee and beyond. Dr. Mark noted that some of the Engineering programs have already expressed interest in this idea.
- Another concern raised by Committee members was that this appears to be an “associate level” graduate degree and that this effort would “cheapen” Georgia Tech’s graduate-level programs.
- During the discussion on academic status of the “Modulum”, the Committee wondered if the term “Modulum” is really another word for “certificate” and could be handled the same way as the current certificates. The Registrar explained that all certificates at Tech are embedded within a degree and therefore can only be awarded to degree-seeking students.
- It was noted that only those MS degrees with concentrations or specializations would operate under this concept. There would have to be some defined subset of MS level courses for a “Modulum” or “Modula” to exist within that program.
- A question was raised as to whether degree-seeking students who are working on MS degrees could pick up a “Modulum” along the way. There would seem to be no reason why this would not be possible.
- There was a general sense that, should a prospectus come forward, there might not be enough votes within the current Graduate Curriculum Committee to pass it in its current incarnation.
- The communication of what a “Modulum” is and how it operates would be critical to the campus community and the public. It would be very important to not misrepresent what it means as a credential and to ensure

that it, as a “graduate program” at Tech, would have the proper faculty oversight.

9. David Bamburowski, Director of Graduate Studies, asked the Committee to consider a draft of a proposed cooperative agreement with the Universite Internationale De Rabat (Morocco) and GT Lorraine.

Mr. Bamburowski described the general process for how these agreements are approved. A new part of the process will be to have the signed agreements submitted to the Graduate Committee as informational items, once completed and signed, so that the Committee’s archives will have a more complete picture of all activities that involve graduate education at Tech. Committee members agreed that this is a good and logical change.

Questions were raised in regard to this proposal in terms of whether the affected Schools have reviewed and/or signed off. It was noted that signatures are gathered in parallel efforts, unlike the way other proposals proceed in a linear fashion through the various levels of approval.

One question on this draft was related to the wording as to the numbers of semesters required in the program. Once completed and signed, this agreement will be resubmitted to the Committee as an informational item.

Student Petitions

1. A motion was made to approve Petition Subcommittee actions on petitions in the following areas. The motion was seconded and approved.

The following petitions were reviewed by the Graduate Curriculum Committee Petition Subcommittee. (All approved except where noted) Petitions reviewed from 06/05/14 to 10/02/14.

2- Selective withdrawal (**1 Denied**)

1- Term withdrawal

The following petitions were reviewed administratively by the Registrar’s office. (All approved except where noted) Petitions reviewed from 06/05/14 to 10/02/14.

12- Late registration for current term

5- Seven-year rule waiver

2- 1-hour rule waiver

1- Use excess pass-fail hours toward degree

2- Change grade mode

6- Cancel registration

3- Count PHD Thesis hours towards MS Degree

4- Full Graduate Standing

- 2- Readmission after 1st drop
- 1- Use courses taken on Special Status towards degree
- 1- Six-year rule waiver
- 1- Graduate with MSMA Degree with 2.85 GPA
- 2- Exceed transfer credit limit
- 1- Graduate without GPA (did coursework at another school, thesis hours here)
- 2- One hour overload for FA14 term

Adjourned,

**Reta Pikowsky
Registrar**