



BOARD OF REGENTS OF
THE UNIVERSITY SYSTEM OF GEORGIA

**FORMAL PROPOSAL TO OFFER
DOCTOR OF PHILOSOPHY WITH A MAJOR IN
MUSIC TECHNOLOGY
DEGREE PROGRAM**

Institution: Georgia Institute of Technology

Institutional Contact: Dr. Anderson D. Smith, Senior Vice Provost for Academic Affairs

Date of Proposal: October 14, 2009

College: College of Architecture

Department: Music

Degree: Doctor of Philosophy with a major in Music Technology

Major: Music Technology

Degree Inscription: Doctor of Philosophy with a major in Music Technology

CIP Code: 50.0999

Anticipated Starting Date: January 2010

Program Point of Contact:

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1. Curriculum: Requirements of the Ph.D. with a major in Music Technology will include completion of core courses, a minor, elective coursework, a qualifying paper, comprehensive exams and a dissertation. Appendix A provides course descriptions for all Ph.D. Core Courses. Please refer to the Table 1 below for the Required Coursework.

Table 1: Required Coursework for the Ph.D. in Music Technology

	Course	Course Number	Prerequisites and Notes	Credit Hours
Music Tech Core (36 credits)	Music Perception and Cognition	MUSI 6001 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Interactive Music	MUSI 6002 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Music Technology History and Repertoire	MUSI 6003 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Technology Ensemble	MUSI 6004 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Computational Music Analysis	MUSI 6201 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Digital Signal Processing for Music	MUSI 6202 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Project Studio in Music Technology	MUSI 6203 Existing	MS or Ph.D. standing or permission of instructor	3 hours
	Music Technology Research Lab	MUSI 7100 Existing	MS or Ph.D. standing or permission of instructor	12 hours
	Research Methods in Music Technology	MUSI 8001 (NEW)	Ph.D. standing or permission of instructor	3 hours
	Apprentice Teaching	MUSI 8002 (NEW)	Ph.D. standing or permission of instructor	6 hours
Minor Field of Study To include the study of: a) relevant history and precedent in the field; b) relevant theory; c) current debate; and d) methods of analysis and inquiry.				9 credit hours (minimum)
Elective Courses To include any MUSI course number 6000 or higher. Courses from other units may be substituted with approval of the student's advisor.				15 credit hours (or as needed)
Total Course Requirements				66 credit hours (minimum)

Minor Field of Study

Minors, which are selected by students in consultation with their advisor, are designed to enable the student to apply knowledge from other fields toward work in Music Technology. The student is responsible for the full range of knowledge, at the level of professional competence, for the Minor field selected. Minors often focus on traditional fields of study associated with other professions, such as human-computer interaction, digital signal processing, and digital media. Minors typically constitute 9 hours of coursework.

As an example, a minor in social computing might include:

- CS 6750 Introduction to Human Computer Interaction
- CS 6460 Foundations of Educational Technology
- CS 6470 Online Communities

Qualifying Paper

The qualifying paper is designed to demonstrate the student's capacity to effectively conduct, analyze and communicate research and to encourage the student toward continued scholarship and publication of research. The paper must present original scholarship.

The paper is to be written in the format of a journal article, aimed at a specific peer-reviewed scholarly journal or conference in music or a related field. The paper must be reviewed and approved by the Music Technology Graduate Program Committee.

Comprehensive Exam

Music Technology students will take a common exam and an individualized exam. Both exams will include written and oral components.

The common exam will cover the core areas of music technology as outlined by the courses in the music technology core, including research methods, theory, and analysis. The exam will focus on a list of topics and corresponding bibliography provided to students by the Music Technology Graduate Program Committee.

The individualized exam will focus on the student's minor field of study and its relationship to music technology. The student will develop, under the direction of her or his advisor, a description of the field of study and a bibliography to serve as the basis for the exam. The test will cover history and precedent in the field, theory (its evolution and current debate), and methods of analysis and inquiry. The proposal should delineate the parameters of the field of study and the literature pertinent to that field.

Dissertation

The student will propose, conduct, and defend a work of original scholarship. The dissertation topic must give promise of being either a genuine addition to the fundamental knowledge of the field or a new and better interpretation of facts already known.

Sample Program of Study-Ph.D. with a major in Music Technology

First Year

- MUSI 6003 – Music Technology History and Repertoire (*Required Core*)
- MUSI 6002 – Interactive Music (*Required Core*)
- MUSI 6202 – Digital Signal Processing for Music (*Required Core*)
- MUSI 6001 – Music Perception and Cognition (*Required Core*)
- MUSI 6101 – Computational Music Analysis (*Required Core*)
- MUSI 7100 – Music Technology Research Lab (*Required Core*)
- CS 6750 – Introduction to Human Computer Interaction (*Minor*)
- CS 6010 – Principles of Design (*Elective External*)

Second Year

- MUSI 6004 – Technology Ensemble (*Required Core*)
- MUSI 6104 – Project Studio in Music Technology (*Required Core*)
- MUSI 7100 – Music Technology Research Lab (*Required Core*)
- CS 6460 – Foundations of Educational Technology (*Minor*)
- CS 6470 - Online Communities (*Minor*)
- MUSI 6103 – Music Recording and Mixing (*Elective*)
- LCC 6313 – Principles of Interactive Design (*Elective External*)
- LCC 6318 – Experimental Media (*Elective External*)
- Comprehensive common exam

Third Year

- MUSI 8001 – Research Methods in Music Technology
- MUSI 8002 — Apprentice Teaching (*Required Core*)
- MUSI 7100 – Music Technology Research Lab (*Required Core*)
- CS 7641 – Machine Learning (*Elective External*)
- Qualifying paper
- Comprehensive Subject exam
- Dissertation proposal
- Dissertation research

Fourth Year

- Dissertation research
- Committee review of dissertation
- Defense of dissertation
- Award of Ph.D. degree

b. Course descriptions : Please refer to Appendix A.

c. When describing required or elective courses, list all course prerequisites.

No course in the core, electives, or sample minor field (social computing) requires a specific prerequisite.

d. Provide documentation that all courses in the proposed curriculum have met all institutional requirements for approval.

The five new courses were approved by the College of Architecture, the Institute Graduate Curriculum Committee and Academic Senate. The five new courses are:

- MUSI 8001 – Research Methods in Music Technology – 3 Credit Hours
- MUSI 8002 – Apprentice Teaching – 3 Credit Hours
- MUSI 7998 – Preparation for Qualifying Paper – 1 to 21 Credit Hours
- MUSI 7999 – Preparation for Qualifying Examination – 1 to 21 Credit Hours
- MUSI 9000 – Doctoral Thesis – 1 to 21 Credit Hours

e. Append materials available from national accrediting agencies or professional organizations as they relate to curriculum standards for the proposed program.

Please refer to Section 1.f. below.

f. Indicate ways in which the proposed program is consistent with national standards.

Currently, there are no codified national standards for Ph.D. degrees in music technology. The College Music Society's *Directory of Music Faculties in Colleges and Universities, U.S. and Canada* does not list any accredited Ph.D. programs in music technology.

Items included in this proposal, though, establish the program's consistency with de facto national standards: the reports from external consultants (senior faculty at peer institutions with comparable graduate programs); and the comparisons of our program to peer Ph.D. programs. Three specific programs are included below for reference and comparison. These programs reside in well-established music departments that employ dozens of professors and instructors and offer a variety of undergraduate and graduate degrees in areas such as performance, composition, musicology, and jazz. The information provided in this document addresses only the Ph.D. related to music technology in each department.

UC San Diego (UCSD) – Ph.D. in Computer Music

The Ph.D. in Computer Music at UCSD emphasizes research in new techniques for electronic music composition and performance. 13 students are currently enrolled or are completing their dissertations. The department has five full-time faculty in computer music. The program is allied with two research centers, the Center for Research in Computing in the Arts (CRCA) and California Institute for Telecommunications and Information Technology (Calit2). In addition to these research centers, a new music department building opened in 2009 featuring three high-tech performance spaces, recording facilities, and research space for computing and sound technology.

Ph.D. students must complete at least 72 credit hours in topics including performance, analysis, conducting, and computer music. They must also submit a publishable qualifying paper, take written and oral qualifying examinations, and write a dissertation. Normal time to completion is four years.

Contact at the Music Department at UCSD:

Peter Otto, Music Technology Director

Computer Music

Phone: 858-534-4602

Program website: http://music.ucsd.edu/grad/comp_music.php

Stanford University – Ph.D. in Computer-Based Music Theory and Acoustics

The Music Department in Stanford offers a Ph.D. in computer-based music theory and acoustics. Approximately 15 candidates are currently enrolled in the program, with 4 full-time faculty and three consulting professors involved. The degree program is affiliated with Stanford's Center for Computer Research in Music and Acoustics (CCRMA). Areas of ongoing interest at CCRMA include: Composition, Applications Hardware, Applications Software, Synthesis Techniques and Algorithms, Physical Modeling, Signal Processing, HCI, and real-time electronics.

Ph.D. students must complete 135 credit hours, or 90 credit hours if they already have a master's degree; these credit hours are higher than other peers due to Stanford's quarter system. Courses are focused almost exclusively on computer music, with only 16 units for more general music analysis and proseminar topics. Students must also complete a foreign language exam, written and oral qualifying exams, and a dissertation.

Contact at the Music Department at Stanford:

Chris Chafe, Director of CCRMA

Phone: (650) 723-4971

Program website: <http://music.stanford.edu/Academics/gradStudies.html>

New York University – Ph.D. in Music Technology

The Department of Music and Performing Arts Professions in NYU's Steinhardt School of Culture, Education, and Human Development offers a Ph.D. in Music Technology. This program, just launched in fall 2008, extends existing bachelors and masters-level offerings to make NYU one of the few schools to offer an integrated music technology curriculum at all levels of study. The Ph.D. focuses on research in music information retrieval, digital signal processing, interactive music systems, and 3D audio.

Ph.D. candidates must complete 48 credit hours. Only 12 of these credits must be in music technology; the remaining courses can be drawn from music technology or from other areas of music, from computer science, or from mathematics. Candidates must also take written and oral qualifying exams, complete a semester each as a teaching assistant and an independent classroom teacher, and write a dissertation.

Contact at the Music Department at New York University:

Kenneth Peacock, Director of Music Technology

Phone: (212) 998-5424

Program website: <https://www.nyu.edu/projects/mtr/musictech/Programs/doctoral.html>

- g. If internships, clinical placements, and/or field experiences are required/appropriate as part of the program, provide information documenting availability of these experiences as well as how students will be assigned and supervised.

Internships, clinical placements, or other specific field experience is not required for this degree program.

For Ph.D. proposal. Socialization into the profession will take a variety of forms:

- Teaching – 2 courses per year mentored by the student’s faculty advisor and subject to attendance and review by all members of the Music Technology faculty each semester.
- Performances, presentations, and research papers at conferences, symposia, and other professional meetings appropriate to the discipline and the student’s particular area of emphasis.
- Annual performance review of research initiatives by the Music Technology faculty. This will include a portfolio presentation by the student.
- Some course content in research-oriented classes will include information, strategies, and expectations for publishing in peer-reviewed journals and other professional venues appropriate to the student’s particular area of emphasis
- Participation in the Georgia Tech Center for Music Technology Margaret Guthman Musical Instrument Competition which attracts contestants and experts from a very select international pool annually
- Attendance and presentations at the Georgia Tech Center for Music Technology Seminar Series
- Attendance and presentations at the GVV Center Brown Bag Lunch Series
- Participation, performance, and support for the Georgia Tech Center for Music Technology annual Listening Machines Concert/Event
- Participation, and support for the GVV/Georgia Tech Center for Music Technology Sonic Generator Concert Series
- Informal picnics, get-togethers, and dinners hosted by the Music Technology Group

h. Indicate the adequacy of core offerings to support the new program.

The core offerings of the degree program are consistent with those of nationally recognized peer programs and similar Ph.D. degrees at Georgia Tech. Candidates are provided a thorough grounding in the precedent, history, and theory of the discipline. Specific courses ensure that research methods, teaching techniques, and scholarly work worthy of critical peer-review are developed. Additionally, the core offerings require candidates to be directly engaged in current intellectual debate and provide them with the methods of analysis, inquiry, and scholarship to generate meaningful and original contributions to the major and emerging issues in the discipline.

2. Admissions criteria:

Students accepted into the Ph.D. program in Music Technology are expected to hold a Masters degree in Music Technology or from an allied field, such as computing, music, engineering, or media arts and sciences. In exceptional cases, students may advance from Georgia Tech’s M.S. in Music Technology to Ph.D. standing after a single year of coursework. All applicants must demonstrate mastery of core masters-level material covered in Music Technology. This includes proficiency in:

- Music theory, performance, composition, and/or analysis
- Music Information Retrieval
- Digital Signal Processing and Synthesis
- Interactive Music Systems Design
- Music Cognition

Proficiency will be assessed through review of a portfolio of the applicant’s work and an interview process.

Students may waive the requirement to enroll in specific courses by appealing to the College’s Music Technology Graduate Program Committee. Such appeals will typically be granted only if the student has already taken the

same course at Georgia Tech or has taken a substantially equivalent course at another institution, and if the student has earned a B or higher in that course.

Applicants are expected to have GRE scores consistent with the range accepted by the home academic unit, and GRE subject tests as required by the academic unit.

3. Availability of assistantships:

Since 2005 the College of Architecture has provided annual tuition waivers for six Music Technology graduate research assistants. These assistantship positions have been offered to master of science students along with monthly stipends and will convert to support Ph.D. students once the program is approved. In addition, music technology faculty members have received close to one million dollars in external funding from sources such as the National Science Foundation and the Georgia Research Alliance. These fiscal resources have provided tuition waivers and monthly stipends to graduate assistants. In 2009, nine graduate students are receiving assistantship sponsored by internal and external sources. We plan to maintain this level of assistantship and enhance it with additional external support such as an NSF IGERT proposal, for example, which is currently being prepared by faculty members affiliated with the Georgia Tech Center for Music Technology.

4. Student Learning Outcomes and other outcomes of the proposed program.

The Ph.D. program will produce truly interdisciplinary researchers with deep and broad artistic and technical skills. Graduates will be positioned to become industry leaders, practitioners, educators, and/or entrepreneurs. Students will learn to apply their musical, technological, and scientific creativity to the development of innovative artistic and technological artifacts. The learning outcomes for Ph.D. students in Music Technology are:

- Communicate difficult technical concepts both orally and in writing.
- Mastery of fundamental and advanced concepts in Music Technology.
- Conduct independent research.
- Disseminate research results through peer-review and publication.
- Teach or mentor other students in classroom or directed research activities.

Program assessment will be the responsibility of the Music Technology Graduate Program Committee. This assessment will be conducted on an ongoing basis in collaboration with the faculty of the Music Department. The assessment plan consists of the following:

- Faculty will meet with the Program Director on an annual basis to evaluate the program and discuss any changes.
- Preliminary evaluation of student achievements will be conducted based on the results of qualifying paper (year 2/3). The committee will address curricular issues, teaching methods, research outcomes, and other academic criteria in regards to students' paper quality.
- Secondary evaluation of student achievement will be conducted based on the results of comprehensive exam results (year 2/3). The committee will address curricular issues, teaching methods, research outcomes, and other academic criteria in regards to the exam results.
- Exit interviews will be conducted with every graduating student in which they will be asked questions about the effectiveness of the program, the quality and relevance of the courses, and for suggestions for improvement.
- After graduation, data will be kept tracking where graduates are employed, what positions, their salary level, and the level of their satisfaction of the quality of academic preparation they received in the program. Both alumni and employers will be surveyed one year, three years, and five years after graduation to obtain information that will be used to continuously update and improve the program.
- The program will be subjected to institutional assessment procedures and methods such as the Online Assessment Tracking Systems.

Additionally, after approval this program will be included in the Institute's Academic Program Review cycle with a projected review date in 2014.

5. Administration of the program:

- a. Indicate where the program will be housed within the academic units of the institution.

Music Department, College of Architecture, Georgia Institute of Technology

- b. Describe the administration of the program inclusive of coordination and responsibility.

The degree will be offered through the Music Department, a division of the College of Architecture. The College maintains close supervision of all degree programs through administrative oversight (the Dean and Associate Deans), faculty governance (Curriculum Committee and faculty votes for curricular change), and compliance with institution-wide curriculum requirements. The Music Technology Graduate Program Committee, established in 2006 to administer the M.S. in Music Technology, will facilitate admission of students and any other tasks associated with the program. In addition to admission, ongoing curriculum planning and promotion of the program will be the main responsibilities of the Music Technology Graduate Program Committee.

[6. This item in USG-BOR format is Not Applicable to doctoral programs.]

7. Accreditation: Describe regional and/or disciplinary accreditation requirements associated with the program (if applicable).

As mentioned in Section 1.f., there is no accrediting body or established national standards for a Ph.D. in music technology. The program does not require review and approval by the Southern Association of Colleges and Schools (SACS) but will be included during the Institute's next accreditation review.

8. Projected enrollment for the program—include this information in Section 11.

It is anticipated that from 2 to 6 students will be enrolled in the Ph.D. program at any given time.

9. Faculty.

- a. Complete the appended form to provide an inventory of all faculty directly involved with this program. Please refer to Appendix B.
- b. If it will be necessary to add faculty in order to begin the program, give the desired qualifications of the persons to be added, with a timetable for adding new faculty and plan for funding new positions.

No additional faculty are required to offer and administer this proposed degree program.

10. For Ph.D. Proposals Only-External Reviews: Provide a list of five to eight reviewers who have not previously reviewed this proposal and are external to the university system, from aspirational or comparable programs/institutions. This list should include an explanation of why these reviewers are suggested. This list should not include individuals who the department or institution has consulted during the process of program proposal development.

Contact at the Music Department at UCSD:

Rand Steiger
UCSD Department of Music
9500 Gilman Drive MC0326
La Jolla, CA 92093
Phone: 858-534-43230
Program Web site: http://music.ucsd.edu/grad/comp_music.php

Contact at the Music Department at Stanford:

Chris Chafe, Director of CCRMA
Department of Music □
Braun Music Center □
Stanford University □
Stanford, CA 94305-3076
Phone: (650) 723-4971
Program Web site: <http://music.stanford.edu/Academics/gradStudies.html>

Contact at the Music Department at New York University:

Robert Rowe
Department of Music and Performing Arts Professions
35 W. 4th Street, Suite 777
New York, NY 10012
Phone: (212) 998-5435
Program Web site: <https://www.nyu.edu/projects/mtr/musictech/Programs/doctoral.html>

Contact at UC Berkeley Center for New Music & Audio Technologies:

David Wessel, Director of CNMAT
Center for New Music and Audio Technologies □
1750 Arch Street □
Berkeley, CA □ 94720
Phone: (510) 643-9990, ext. 302
Program Web site: http://cnmat.berkeley.edu/people/david_wessel

Contact at ASU:

Thanassis Rikakis, Professor and Director
Arts, Media, and Engineering Program
PO Box 878709
Arizona State University
Tempe, AZ 85287-8709
Phone: (480) 965-9438
Program Web site: <http://ame2.asu.edu/faculty/thanassis/>

11. Fiscal, Facilities, Enrollment Impact, and Estimated Budget

- a. No Tuition Differential is being requested for this program.
- b. Library and learning resources.

In the specific area of Music Technology, traditional music library collections do not appropriately support this new and developing discipline. While there are monographs and technical manuals that should be available to students and faculty, the vast majority of critical research material is in the form of journals, periodicals, and on-line scholarship. These are well within the capability of the Library to support and the methods of doing so are detailed below.

Music Technology is by definition an interdisciplinary enterprise. It draws continually upon the closely allied fields of electrical engineering, mechanical engineering, computing, psychology, and the sciences. The Library shelf collections and electronic resources in these areas are extensive and well supported. Students and faculty have ready access to key resources such as Compendex (the most comprehensive interdisciplinary engineering database in the world), the ACM Digital Library (providing access to citations and full-text content of journals, newsletters, articles and conference proceedings published by the Association for Computing Machinery), and JSTOR (Journal Storage Project – an electronic archive of core scholarly journals), Inspec (providing access to journal and conference citations in physics, electrical engineering, electronics, and computing), and IEEE Xplore (providing full-text access to Institute of Electrical and Electronics Engineers and Institution of Electrical Engineers transactions, journals, magazines, standards, and conference proceedings).

Regarding the music shelf collection, the Department has been working with the Library to identify lacunae in the Music Technology area and have successfully secured a number of books to support the Masters program. In terms of traditional music collection content, the Georgia Tech Libraries' music shelf collection is limited. This is completely understandable, as the institution has not supported a music major to date. The collection has been developed recently to support general interest and introductory undergraduate courses for the music minor. Currently, the traditional collection includes: approximately 1,100 volumes (books, bound periodicals, and reference works); 120 electronic publications (90 NetLibrary e-books provided by GALILEO, and 30 electronic journals and conference proceedings available through JSTOR, Project Muse, EBSCOhost, ProQuest, and other sources); 40 compact discs; 9 video recordings; and the RILM online database of music abstracts.

To supplement the Georgia Tech collections, students and faculty have access to music and other related resources at other Atlanta universities (including Emory) and to resources nationally.

c. Information Technology.

No additional resources are required as the current technological infrastructure of the Couch Building is sufficient to support the program.

d. No distance learning resources will be required to offer this degree program.

Provide a narrative that explains how current institutional resources will be expended specifically for this program. Provide a narrative that explains how the institution will fiscally support the establishment of the new program through the redirection of new resources. Indicate whether the institution will submit a request for new funds as part of its budget request. The narrative also needs to explain the basis of the institution's projections with regard to anticipated EFT, head count student enrollment, estimated expenditures, and projected revenues.

NARRATIVE:

The Ph.D. in Music Technology will not require additional funding for faculty, staff, facilities, or the library. The program will build on the resources used for the successful M.S. degree in Music Technology (MSMT) that has grown to fourteen students within two years of inception. The proposed Ph.D. program will add several research-

focused classes, such as advanced research methods, to existing graduate curriculum offerings. These classes will not significantly impact course loads.

There will be no requests for additional or new funds and impact on the Institute's EFT, head count, and enrollment will be negligible as it is anticipated that from 2 to 6 students will be enrolled in the Ph.D. program at any given time. Similarly, expenditures will not be impacted, as the funding for the Ph.D. students will be derived from external grants and contracts. To date, Music Technology faculty members have raised close to \$2M by to support graduate students, equipment and other research expenditures. These funds have been granted by external sources such as the NSF and the Georgia Research Alliance. We plan to maintain and enhance this level of external support.

In addition to the resources of the Music Department, the recently founded Georgia Tech Center for Music Technology that draws faculty from the College of Architecture, Engineering, and Computing, will provide an environment for Ph.D. students to engage with affiliated faculty and a wide variety of research projects ranging from acoustics to music therapy to interactive game design. This highlights one of the key differentiators of the program: a fundamental commitment to training truly interdisciplinary researchers with deep and broad artistic and technical skills.

The information below is provided as explanation and clarification of the Estimated Budget figures:

Section I – Enrollment Projections

- The enrollment numbers reflect the stated intention of keeping the program small and selective. One student per year is admitted for the first two years, and then two students per year after that. Thus, by year four, six students will be enrolled and two graduating per year as two new students are admitted.
- Course Sections and Credit Hours generated figures are based on current Master of Science in Music Technology numbers in conjunction with the projected PhD courses.

Section II – Expenditures

- Faculty EFT dollars for years 1-3 are the “spendable dollars” derived from currently awarded NSF grants. Year 4 is a very conservative estimate and current grant awards suggest that there will be more faculty time supported by outside funds.
- Graduate Assistant figures are also based on spendable dollars from NSF grants. The funds have been awarded and allocated as indicated for years 1-3. Year 4 is the logical continuation of the funding curve, but is an estimate.
- There are no Start-up Costs as sufficient space exists in the Couch Building, the requisite music-technology equipment is in place, and Library resources will be appropriate.
- The figures in the Operating Costs for years 1-3 are derived from the awarded NSF grants. The estimate for Year 4 is an estimate, but logical.

Section III. Revenue Sources

- The figures listed are derived from the spendable dollars of currently awarded NSF grants. There is a drop between years 1 and 2 as 2009-2010 is the third and final year for one of our grants. As has been the case above, Year 4 is an estimate based on the current award success rate.

Table 2: Enrollment and Budget Projections

	1 st Year FY 2010	2ndYear FY 2011	3 rd Year FY 2012	4 th Year FY 2013
I. ENROLLMENT PROJECTIONS				
Student Majors				
Shifted from other programs	0	0	0	0
New to the institution	1	1	2	2
Total Majors	1	2	4	6
Course Sections Satisfying Program Requirements				
Previously existing	12	12	12	12
New	2	3	4	4
Total Program Course Sections	14	15	16	16
Credit Hours Generated by Those Courses				
Existing enrollments	336	384	432	480
New enrollments	6	12	48	92
Total Credit Hours	342	396	480	572
DEGREES TO BE AWARDED				
	0	0	1	2
	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>
II. EXPENDITURES				
	EFT Dollars	EFT Dollars	EFT Dollars	EFT Dollars
Personnel – reassigned or existing positions				
Faculty	34,400	35,000	17,500	2,500
Part-time Faculty	0	0	0	0
Graduate Assistants	69,000	70,000	71,000	72,000
Administrators	0	0	0	0
Support Staff	0	0	0	0
Fringe Benefits	0	0	0	0
Other Personnel Costs	0	0	0	0
Total Existing Personnel Costs	0	0	0	0
Personnel – new positions				
Faculty	0	0	0	0
Part-time Faculty	0	0	0	0
Graduate Assistants	0	0	0	0
Administrators	0	0	0	0
Support Staff	0	0	0	0
Fringe Benefits	0	0	0	0

Other personnel costs	0	0	0	0
Total New Personnel Costs	103,400	105,000	88,500	74,500
Start-up Costs (one-time expenses)				
Library/learning resources (GT Library)	0	0	0	0
Information Technology (OIT)	0	0	0	0
Distance Learning (DLPE)	0	0	0	0
Equipment	0	0	0	0
Other	0	0	0	0
Physical Facilities: construction or major renovation	0	0	0	0
Total One-time Costs	0	0	0	0
Operating Costs (Recurring costs – base budget)				
Supplies/Expenses	0	0	0	0
Travel	5,000	10,000	15,000	15,000
Equipment	3,000	3,000	4,000	4,000
Library/learning resources (GT Library)	0	0	0	0
Information Technology (OIT)	0	0	0	0
Distance Learning (DLPE)	0	0	0	0
Other	0	0	0	0
Total Recurring Costs	8,000	13,000	19,000	19,000
GRAND TOTAL COSTS	111,400	118,000	107,500	93,500
III. REVENUE SOURCES				
Source of Funds				
Reallocation of existing funds	0	0	0	0
Tuition Differential ¹	0	0	0	0
New student workload	0	0	0	0
New Tuition (tuition does not go to the program)	0	0	0	0
Federal funds	254,124	194,233	194,233	210,000
Other grants	0	0	0	0
Student fees	0	0	0	0
Other	0	0	0	0
New state allocation requested for budget hearing	0	0	0	0
Nature of Funds				
Base budget	0	0	0	0
One-time funds	0	0	0	0
GRAND TOTAL REVENUES	254,124	194,233	194,233	210,000 (est)

¹ The Board of Regents approval is required for “Tuition Differential” requests. Read Section 11, Note a. for instructions.
Georgia Institute of Technology-Formal Proposal for Ph.D. in a major in Music Technology
Submitted to USG: October 22, 2009

12. Facilities Information for New Academic Programs

Proposed Location(s)/Campus(es) for the Program:

The Music Technology graduate-student lab at Georgia Tech is located in the Music Department's Couch Building at 840 McMillan St, Atlanta, GA, 30332. The lab provides individual desks and computer workstations for each student and audio recording and production equipment, including common research software such as Matlab and Max/MSP. There are currently 15 workstations in Room 202 of the Couch building, with room for additional workstations in Room 201.

The Couch Building also houses multiple music rehearsal rooms with pianos and a broadcast and Internet production studio with advanced video, lighting, and audio equipment. The Department recently created a state-of-the-art audio recording studio that includes a Digidesign ICON multi-track digital control console coupled with Digidesign Pro Tools recording software running on a multi-core Mac Pro computer workstation. Numerous professional microphones from Shure, Rode, and Audio Technica are also available.

The Music Technology program and the Georgia Tech Center for Music Technology have presented or are currently scheduled to present concerts, exhibitions, and events in the Couch Building's Rehearsal Hall (seats 100), at the Georgia Tech Alumni House (seats 150), at the Eyedrum Music and Art Gallery (seats 200), and at the Rich Auditorium at the Woodruff Arts Center (seats 400). The Music Department also regularly presents events at the Ferst Center for the Arts (seats 1,155).

Floor area required for the program (gross and net square feet): 10,150 GSF and 7,400 NSF

Types of space required:

- No. of classrooms 3 – already in existence: Couch 102, 104, and 201
- No. of labs 3 – already in existence: Couch 100, 102, and 201
- No. of offices 7 – already in existence: Couch 109D, 111, 203A, 203C, 203B, 205A, 205B
- Other spaces 2 – already in existence: Couch 113 (recording studio) and 115 (Rehearsal Hall)

Place an "X" beside the appropriate selection:

Existing facility will be used as is: 30,000 GSF in the J. Allen Couch Music Building and Georgia Tech Center for Music Technology.

Existing facility will require modification (Area s.f.): [Name(s) of the facility(ies)]

Construction of new facilities will be required (Area s.f.):

List any campus infrastructure impacts that the program will have (i.e., parking, power, HVAC, etc.) and indicated estimated cost and source of funding.

There will be no campus infrastructure impacts posed by the addition of this program.

Other comments: *[Provide additional information as needed.]* None.

USG Note: One of the USG Facilities Project Managers may contact you with further questions separate from the review of the new academic program.

Appendix A Course Descriptions

Required Courses (existing courses in Oscar)

MUSI 6001 – Music Perception & Cognition – 3 Credit Hours

This course examines how humans process musical sound, including topics such as the auditory system, psychacoustics, music cognition, and psychology.

MUSI 6002 – Interactive Music – 3 Credit Hours

Theoretical and practical issues in computer supported interactive music. The course involves readings, class discussions, student presentations, and the design of a final project.

MUSI 6003 – Music Technology History & Repertoire – 3 Credit Hours

Overview of the history, aesthetics, and technology of electronic and computer music over the past century through selected readings, musical analysis, and individual research projects.

MUSI 6004 – Technology Ensemble – 3 Credit Hours

Practice and performance of original and repertoire works in live audio settings using commercial and propriety technology.

MUSI 6201 – Computational Music Analysis – 3 Credit Hours

This class addresses theory and techniques of Music Information Retrieval (MIR). Topics include computational analysis of audio signals, symbolic representations, and pattern recognition techniques.

MUSI 6202 – Digital Signal Processing for Music – 3 Credit Hours

Research in music, as well as music production and composition increasingly relies on sophisticated digital signal processing techniques. This course will review fundamental elements of digital audio signal processing, such as sinusoids, spectra, digital filters, and Fourier analysis and their application to the fundamental music analysis problems of modeling and synthesis. The course will focus particularly on the algorithmic implementation sound transformation and synthesis techniques through intensive programming assignments in Matlab and CSound.

MUSI 6203 – Project Studio in Music Technology – 3 Credit Hours

Discussion, design and development of computer music applications and performance controllers.

MUSI 7100 – Music Technology Research Lab – 12 Credit Hours

Advisor guided research and creative work in music technology. Investigation of novel technological and artistic concepts. Design and develop new hardware, software, and musical artifacts.

***Required Courses (New courses)**

MUSI 8001 – Research Methods in Music Technology – 3 Credit Hours

Overview of research techniques, experimental designs, and critical writing skills in music technology.

MUSI 8002 – Teaching Practicum – 3 Credit Hours

Pedagogical approaches to music technology, focusing on hands-on teaching experience.

***Additional New Courses**

MUSI 7998 – Preparation for Doctoral Qualifying Paper – variable credit

Preparation of qualifying paper for Ph.D. in Music Technology.

MUSI 7999 – Preparation for Doctoral Qualifying Examination – variable credit
Preparation for qualifying examinations for Ph.D. in Music Technology.

MUSI 9000 – Doctoral Thesis – variable credit
Preparation of doctoral thesis for Ph.D. in Music Technology.

Elective Courses (existing courses in Oscar)

MUSI 6103 – Music Recording & Mixing – 3 Credit Hours
Overview of concepts, techniques, hardware, and software used in audio production as well as aesthetic concerns and considerations.

MUSI 6104 – Integrating Music into Multimedia – 3 Credit Hours
To familiarize students with the tools and techniques for effectively utilizing music and audio in the context of digital multimedia and the internet.

MUSI 6105 – Digital Media Production & Mastering – 3 Credit Hours
Tools and techniques for effectively mastering, optimizing, finalizing, and producing digital media for multimedia and the Internet.

MUSI 6301 – Music Interface Design – 3 Credit Hours
Theory and practice of designing and prototyping new forms of music interfaces including percussion, haptic, and augmented traditional constructs.

MUSI 6302 – The Musical Mind – 3 Credit Hours
This course teaches the science of music, nature of music, perception of music, analysis of musical talent, development of musical skills, and approaches to musical esthetics.

MUSI 6303 – Network Music – 3 Credit Hours
Exploration of distributed music systems over local-area networks and Internet, including discussion of existing technologies, works, literature, and hands-on experimentation with tools and techniques.

MUSI 6304 – Computer Music Composition – 3 Credit Hours
Realization of individual composition projects in music technology and consideration of related theory, aesthetics, and repertoire.

*New Courses were approved by Institute Curriculum Committee on September 3, 2009:

MUSI 7998 – Preparation for Doctoral Qualifying Paper – 1 to 21 Credit Hours
MUSI 7999 – Preparation for Doctoral Qualifying Examination – 1 to 21 Credit Hours
MUSI 8001 – Research Methods in Music Technology – 3 Credit Hours
MUSI 8002 – Teaching Practicum – 3 Credit Hours
MUSI 9000 – Doctoral Thesis – 1 to 21 Credit Hours

Name of Institution(s): Georgia Institute of Technology

Date Form Completed: August 14, 2009

Name of Academic Area(s), Discipline(s), Department/School(s): Doctor of Philosophy with a major in Music Technology

CIP: 50.0999

1	2	3	4	5	6
Full Name, Rank (F) Full-time or (P) Part-time	Courses Taught: Number, Title	Academic Degrees Earned (Highest First): Degree, Awarding Institution, Year	Other Noteworthy Qualifications [May include url for CV]	Responsibilities and Title for this Degree Program	Current Workload
GT ACADEMIC UNIT(S):					
(F) Frank Clark Professor	MUSI 6104 – Integrating Music into Multimedia MUSI 6302 – The Musical Mind MUSI 8002 – Apprentice Teaching	PhD 1990 University of Arizona MM 1981 Stanford University BM, 1980 University of the Pacific	http://www.coa.gatech.edu/music/about_us/faculty/frank_clark.php	Director of Music Department, Multimedia Technology	20% Teaching 70% Administration 10% Service
(F) Parga Chordia Assistant Professor	MUSI 6001 – Music Perception & Cognition MUSI 6201 Computational Music Analysis MUSI 6202 – Digital Signal Processing in Music MUSI 6203 – Project Studio in Music Technology MUSI 7000 – Master’s Thesis MUSI 7100 – Music Technology Research Lab MUSI 7998 – Preparation for Qualifying Paper MUSI 7999 – Preparation for Qualifying Examination MUSI 8001 – Research Methods in Music Technology MUSI 8002 – Apprentice Teaching MUSI 8903 – Special Problems MUSI 9000 – Doctoral Thesis	PhD Stanford University 2006 BA Yale University 1997	http://paragchordia.com/	Machine Listening, Music Cognition, Machine Learning, Music Signal Processing	40% Teaching 50% Research 10% Service
(F) Jason Freeman Assistant Professor	MUSI 6002 – Interactive Music MUSI 6003 – Music History & Repertoire MUSI 6303 – Network Music MUSI 6304 – Computer Music Composition MUSI 7000 – Master’s Thesis MUSI 7100 – Music Technology Research Lab MUSI 7998 – Preparation for Qualifying Paper MUSI 7999 – Preparation for Qualifying Examination MUSI 8001 – Research Methods in Music Technology MUSI 8002 – Apprentice Teaching MUSI 9000 – Doctoral Thesis	DMA Columbia University 2005 MA Columbia University 2001 BA Yale University 1999	http://www.jasonfreeman.net/	Composition, Distributed Music, Interactive Systems	40% Teaching 50% Research 10% Service
(F) Chris Moore Assistant Professor	MUSI 6004 – Technology Ensemble MUSI 6103 – Music Recording and Mixing MUSI 6203 Project Studio in Music Technology	MM East Carolina University 1988 BA Jacksonville State University 1986	http://www.coa.gatech.edu/music/about_us/faculty/chris_moore.php	Recording Technology, Percussion Technology	60% Teaching 30% Administration 10% Service
(F) Gil Weinberg Associate Professor	MUSI 6004 – Technology Ensemble MUSI 6203 Project Studio in Music Technology MUSI 7000 – Master’s Thesis MUSI 7100 – Music Technology Research Lab MUSI 7998 – Preparation for Qualifying Paper MUSI 7999 – Preparation for Qualifying Examination MUSI 8001 – Research Methods in Music Technology MUSI 8002 – Apprentice Teaching MUSI 9000 – Doctoral Thesis	PhD Massachusetts Institute of Technology 2003 MS Massachusetts Institute of Technology 1999 BA Tel Aviv University 1994	http://www.cc.gatech.edu/~gilwein/	Director of Music Technology, Associate Professor, Musical Interfaces, Interactive Music, Musical Robotics	30% Teaching 30% Research 30% Administration 10% Service