COURSE NUMBER AND TITLE: MUSI 3770 – Project Studio: Technology

CREDITS & HOURS: 4 credit hours – lecture

REQUIRED PREREQUISITE:

MUSI 2013 Fundamentals of Musicianship IV and MUSI 2526 Introduction to Audio Technology II

PURPOSE:

This class focuses on a foundational research question in music technology that requires an interdisciplinary solution combining both technical and creative approaches. The specific thematic topic changes each year. Drawing on the rich heritage of musical instrument design at Georgia Tech and the university’s annual Guthman Musical Instrument Competition, this term’s focus is on musical instrument design. Specifically, students will create innovative software or hardware artifacts that are grounded in scientific research and enable novel musical composition, performance, sound design, production, or other applications in the music industry.

LEARNING OUTCOMES:

Upon completion of the course, students will be able to:

1. Describe, classify, and evaluate a musical instrument in terms of its approach to input, output, and mapping.
2. Design, prototype, and build a novel musical instrument that incorporates digital sensors, sound synthesis, and both direct and indirect mappings.
3. Develop and present a musical performance that demonstrates the unique features of the newly-created instrument.

EXPECTATIONS:

**Preparation for class** includes completing assigned listening and reading and individual practice of music in preparation for rehearsals and performances.

**Analysis Paper and Presentation (1)** discusses an existing new musical instrument and its musical, design, and engineering context, placing it in the context of the field and assessing its strengths and weaknesses. Students should select an instrument from the Guthman Musical Instrument Competition to analyze. This paper is to be completed individually.

**Musical Instrument Project (1)**, done in a group of 3-4 students, involves bringing a new musical instrument to fruition from initial concept through to a final, functional implementation. The instruments may be acoustic or electronic but must be entirely new instrument concepts or substantial transformations of existing instruments.

GRADING BREAKDOWN:

The following evaluative tools will be utilized in measuring progress towards obtaining the class objectives:

Analysis Paper / Presentation 20%

Instrument Project 50%

Midterm 20%

Participation and attendance 10%

TOTAL 100%

All assignments, quizzes, and tests will be graded by points. The final grade for the course will be determined by dividing the total points earned by the number of points possible for each of the categories listed in Method of Evaluation. These numbers will be converted into a grade according to the following scale: A=100-90%, B=89-80%, C=79-70%, D= 69-60%, F= 59% and below.

GRADING POLICIES:

Homework assignments are due *by the beginning of class* ON THE DUE DATE. A penalty of one letter grade per day will be applied to all late assignments. Documented illnesses and family emergencies are excepted, of course. Quizzes and exams cannot be made up unless you have a valid, documented excuse.

ACADEMIC INTEGRITY: Students must do their own work on assignments, projects, and tests unless collaboration is previously specified and approved by the instructor. Students caught cheating will receive zero credit for that assignment/quiz/test and may be subject to further sanctions through the Office of Student Integrity. Students are expected to abide by the Georgia Tech Honor Code and avoid any instances of academic misconduct, including but not limited to:

1. Possessing, using, or exchanging improperly acquired written or oral information in the preparation of a paper or for an exam.
2. Substitution of material that is wholly or substantially identical to that created or published by another individual or individuals.
3. False claims of performance or work that has been submitted by the student.

Please refer to the published Georgia Institute of Technology Academic Honor Code for further information:

* osi.gatech.edu/plugins/content/index.php?id=46

STATEMENT REGARDING STUDENTS WITH DISABILITIES:

In accordance with the Americans with Disabilities Act, students with bona fide disabilities will be afforded reasonable accommodation. The ADAPTS Office will certify a disability and advise faculty members of reasonable accommodations. The web site for a student requesting accommodation is:

* <http://www.adapts.gatech.edu/plugins/content/index.php?id=12>

MATERIALS:

All reading and listening assignments will be posted to T-Square; there is no textbook for this course.

Students will likely need a variety of software and hardware tools to complete their projects and should take advantage of on-campus resources including the CoA Design Shop and/or the Invention Studio. The School of Music has a limited supply of physical computing supplies (e.g. Raspberry Pi, Arduino) available for loan as well.

COURSE OUTLINE:

Week 1: Course Introduction; History of Instrument Design

Week 2: Current Challenges in Instrument Design (Jorda); Group Formation

Week 3: Gestures (Tanaka); Control Signals and Latency (Wessel / Wright)

Week 4: Instrument Concepts Due; Presentation and Discussion of Concepts

Week 5: Guthman Musical Instrument Competition

Week 6: Analysis Paper due; Analysis Presentations

Week 7: Design considerations; Acoustics

Week 8: Sensor selection and integration; midterm exam

Week 9: Embedded computing: Arduino and Raspberry Pi; sensor calibration and scaling

Week 10: Gesture-Driven Sound Synthesis, physical modeling (Serafina)

Week 11: Draft Instrument Presentations / Discussion

Week 12: Musical mappings: one-to-one

Week 13: Musical mappings: meta-instruments / generative music (Weinberg)

Week 14: Musical mappings: machine learning (Fiebrink)

Week 15: Final Instrument Presentations / Demonstrations