Proposed Course Syllabus Music 158B:

Situated Instrument Design for Musical Expression

Course Description

The practice and theory of contextual instrument design for use in musical expression is explored. Students create new instruments and performance environments using a variety of physical interaction paradigms, programming practices, and musical processes emerging from the UC Berkeley, Center for New Music and Audio Technologies (CNMAT). Building on methodologies established in Music 158A, the course develops aesthetic, analytic and technical skills through discussion, empirical study, and collaborative engagement. With a balance of artistic and technical concerns, participants deepen understanding of the creative process, demonstrating the results through class installation and public performance. Course can be repeated for credit. Prerequisite: Music 158A or consent of instructor.

Weekly Lab and Homework Assignments. Each week students are assigned a specific paradigm of instrument design to be worked through in groups. Students individually prepare design sketches to be shared and tested with their teammates. Concluding each week is a critique session with the full class, where each group presents their lab work, shares their evaluation, and discusses ideas for future developments.

Final Project Presentations

Music 158B students do not take a standardized final exam. In lieu of a standardized final exam, students work in groups to create final projects applying the skills and techniques developed in class. Final projects will be submitted as video documentation and technical materials by the scheduled exam date, and will be presented to the public at a class performance-installation.

Office Hours: Instructor is available for weekly office hours

Music 158B Materials

Music 158B will use the Cycling'74 MaxMSP programming environment extensively. Students must have access to a laptop computer with MaxMSP, please see the instructor for computer access options. Students may choose to purchase MaxMSP, or alternatively there are student authorization options for under $100 available at http://cycling74.com/products/max/individual-academic/ (Links to an external site.). Lab materials, including software, tangible user interfaces, sensors, actuators, will be made available to students by the Center for New Music and Audio Technologies throughout the semester. Lab materials are not available for home use. Students will learn techniques for prototyping instrument design away from the lab.

Grading

Graded assignments have the following weight:

Graded Work	%-Value
Final Project and Presentation	30%
Midterm Project	20%
Lab Work	15%
Group Engagement	15%
Critique Engagement	20%

The grade distribution is:

Percent	Grade
100% -- 90%	A
89% -- 89%	B
79% -- 70%	C
69% -- 60%	D
59% -- 0%	F

Plusses are awarded for the top three percent and minuses are reserved for the bottom three percent of each grade distribution above. Opportunities for extra-credit will be announced during class hours.

Midterm and **final projects** will be graded in terms of their synthesis and personalized approach to ideas and techniques discussed in the course. Instrument projects should demonstrate thoughtful attention to detail in the experience of the performer, the listener/viewer, and context surrounding the performance.

Lab assignments are structured as group activities where each student is assessed independently according to their work contribution and engagement in group collaboration.

At the conclusion of each lab assignment there will be a **critique** session in which the lab groups present their work to the other groups, and self-evaluate their approaches to the lab summarizing the things that they felt worked and things that could be improved. Engagement in the critique discussion is mandatory for all students.

Attendance

Attendance is required for every class without exception. Unexcused absences will effect lab and critique grades.

Schedule

week   1   **Intro I: Input Devices**

         A   **Lecture:**
Overview input interaction paradigms, places, models, and natures. Performance gestures in music, dance, film, and puppetry. Instrument Design Model. Sensing the environment.

Lab A:
Presentation of input device kits:
- Surface Interaction (buttons, knobs, sliders, tablet, contact mic)
- Wearable/Biometric (gloves, heart sensor, accelerometers)
- Unencumbered (kinect, camera, theremin, air microphone)

         B   **Lab B:**
Guided experimentation in groups on input device kits.

Discussion / Critique:
How do these input devices relate to movement? How well does the range of values relate to the gesture of input? How do the names of sensor values change the way we think about them?

week   2   **Intro II: Output Devices**

         A   **Lecture:**
Activating the environment, mechatronic sound, speaker coils, digital signal processing.

Lab A:
Presentation of output device kits:
- Embodied: transducers, localized speakers
- Disembodied: surround sound, headphones
- Hybrid:

         B   **Lab B:**
Guided experimentation in groups on output device kits.

Discussion / Critique:
How do these output devices relate to the performance experience? How well does the range of values relate to the gesture of output? How do the names of output processes change the way we think about them?

week   3   **Intro III: Data Mediation**

         A   **Lecture:**
Agency, composing instruments, embedded knowledge, digital dynamism music theory, state constraints, scores, convention, stochastic design.

Lab A:
Presentation of data mediation software kits:
- Preset Mangament (odot, Max for Live, SVG score)
- GDIF structure
- Mapping
- Analysis

B **Lab B:**
Guided experimentation in groups on data mediation software kits.

Discussion / Critique:
How do these data mediation paradigms relate to the performance experience?
How well does the range of sensor values relate to values expected by the output
devices? What kind of knowledge is embedded in the data mediation process?
Is data mediation itself an instrument?

week 4 **Instrumental Design Practice I:**
Exploratory Learning: Kinesphere, Improvisation, and Agency

A **Lecture:**
Learning to play an unknown instrument by moving between exploratory
"babbling" to build a catalog of repeatable figures — this may change each time
you sit down to play.

Lab A:
Create at least 3 different mappings for the other group members to explore.

B **Lab B:**
Experiment with the mappings your teammates created.

Discussion / Critique:
What was your experience improvising with your teammates' mappings? What
was intuitive and counterintuitive? What makes a successful mapping?

week 5 **Instrumental Design Practice II:**
Feel: Fiducial Repeatability, Hysteresis, Transfer & Easing Functions

A **Lecture:**
How the instrument's tactile, and response effects experience; towards extended
appendages. "Dipping" as a way to test repeatability.

Lab A:
Create 3-4 contrasting "feels" of instrumental interaction and resulting sounds
that relate to the "feels"

B **Lab B:**
Experiment with the "feels" your teammates created.

Discussion / Critique:

Describe the experience of performing with different physical and data mediated "feels." Which gestures were easier to accomplish, which were more difficult? How does the situation surrounding the gesture effect the experience of the performer versus the audience?

week   6   **Instrumental Design Practice III:**
           Musical Texture and Gesture

     A   **Lecture:**
           Contrapuntal textures in time-based arts. Micro-gestures, Polyphonies of movement and their affect on our perception of sound.

           Lab A:
           Make examples of each musical texture with input, data mediation and output stages.

     B   **Lab B:**
           Present your examples of texture to your teammates.

           Discussion / Critique:
           How does the resulting musical texture effect the experience of performance? Describe your experience of gesture in contrast to the sounding results.

week   7   **Instrumental Design Practice III:**
           Musical Form, Differentiation, and Expressive Richness

     A   **Lecture:**
           Strategies for flexibility, modes vs statelessness; found content vs composed embedded content

           Lab A:
           Create 3-4 examples of dynamic transitions of state, or modes of performance. Experiment with creating musical structure from changes of sound and gesture.

     B   **Lab B:**
           Present your examples of texture to your teammates.

           Discussion / Critique:
           How does the instrument modality effect the performer's gesture and musical use of the instrument? Which aspects of performance gesture and sounding results create a sense of musical progression and change? Compare modalities between your instruments and those of other electronic and acoustic instruments.

week   8   **Midterm Project Assignment**

     A   Midterm work in lab

     B   Midterm work in lab

week	9	**Midterm**

		A	Midterm Student Presentations
		B	**Final Project Proposals Due**

week 10 (Spring Break)

Final Project Development and Special Topics

week 11

		A	Final Project Assignments / Group Discussion and Work Session
		B	Group Work Session

week 12   A   Project Discussions / Special Topics

               B   Group Work Session

week 13   A   Project Discussions / Special Topics

               B   Group Work Session

week 14   A   Project Discussions / Special Topics

               B   Group Work Session

week 15   A   Project Discussions / Special Topics

               B   Group Work Session

week 16   Reading Week

Final Performance Presentations & Video Documentation are due during exam week.