Studio and Live Sound Engineering

Syllabus

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Course information:

Course materials will be posted to www.psprosound.org. Lecture notes, old quizzes, assignments, and a class calendar will be available.

Course description:

Live sound engineers must have the engineering skills to safely control vast amounts of electric and acoustical energy, and the artistic skills to mix a tasteful, enveloping show. This course will heavily stress the underlying principles of acoustics and electro acoustics, while encouraging students to listen critically and to mix artistically. Students will submit listening, research, and recording projects to evaluate their development. Advanced topics will be omitted or only briefly mentioned if needed to allow for complete explanation of key concepts.

Prerequisites:

Though there are no firm prerequisites, students are recommended to take physics or conceptual physics prior to enrollment in this course. The tools used in sound reinforcement employ powerful means of coping with wave and electrical physics phenomena. Poor understanding of the underlying principles can destroy a mix, damage valuable equipment, or even cause severe injury.

Serious musical study or experience is also essential to successful sound engineering. Casual music listeners will be able to succeed in this course if they apply themselves, but are encouraged to actively pursue instrumental or vocal musical studies.

Learning Objectives:

At the end of this course students should be able to:

- Design, set up, and tune a mid-sized sound reinforcement system with minimal supervision
- Mic musical performers for optimal sound quality, noise and feedback rejection
- Sound check and mix the performance
- Apply effects, equalization, and other signal processing in order to convey the performance to a large audience in an engaging, enveloping fashion
- Record and edit a two-track recording
- Understand the underlying causes of common PA and studio problems, and mitigate them accordingly

Evaluation:

The overall grading scale will be as follows: A: 90 %<, B: 80-90%, C: 70-80%, D: 60%-70, F: 60%>.

Students can choose the weighting of individual assignments within the following limits:

1. Quizzes (10% - 25%)
2. Listening project and presentation (15%-25%)
3. Research paper (15%-25%)
4. Recording (15%-25%)
5. Final exam (20%-30%)

This flexible weighting system has been implemented to cater to the diverse strengths of students, and to the lack of prerequisites.

Quizzes and the final:

Quizzes will be given once weekly, starting the 3rd lecture. Quizzes may involve listening or written questions. Each quiz will be given during the first 15 minutes of class. All quizzes will carry equal weight. The final exam will consist of both listening and written questions.

There will be seven quizzes in total, but the grade will be for six quizzes. This will be essentially the same as dropping the lowest quiz, but could potentially allow greater than 100% overall for students who perform well on every quiz.

Other assignments:

Students will also be required to submit a research paper, a recording project, and a listening project. No other assignments will be graded.

Community Connection:

Grammy-winning engineer, John Pellowe will be giving a guest lecture on April 29th. Pellowe's lecture will focus on variable acoustics systems and on mixing classical music.

Students will also be engaged in hands-on activities with the Live at Lunch concert series in PSU's park blocks.

Textbook:

Readings will be assigned from:

The Sound Reinforcement Handbook by Gary Davis and Ralph Jones, 2nd edition (1988), ISBN: 0881889008

Academic Honesty:

Students are expected to submit their own work, and to cite all references. Any form of academic dishonesty will result in a failing grade for the course.

Accessibility:

If you have a documented disability and wish to discuss academic accommodations, please contact either instructor as soon as possible.

Course Framework:

Week	Lecture Topics	Readings	Due
1	Course introduction, conceptual wave physics	SRHB – Ch. 1	
	Conceptual wave physics	SRHB – Ch. 5	
2	Psychoacoustics – loudness and frequency selectivity, timbre, phantom harmonics	SRHB – Ch. 3	Quiz 1 – Wave basics
	Psychoacoustics – spatial perception, reverberation, early reflections	SRHB – Ch. 4	**Research topic decision Grading Menu**
3	Basics of electronics in audio	SRHB – Ch. 2, 12	Quiz 2 – Psychoacoustics
	Microphones – basics of input transducers	SRHB – Ch. 10	**Listening project selection, grading menu**
4	Microphone applications	Shure Microphone Techniques for live sound, free online	Quiz 3 – microphones and electronics basics
	Introduction to the mixing console	Soundcraft mixing guide, free online	
5	Signal flow Live mix demonstration – analog	SRHB – Ch. 11, Ch. 17	**5 Annotated sources**
	Guest Lecture with John Pellowe	SRHB – Ch. 14	Quiz 4 – basic mixing

6	Advanced mixing – mixing signal processing Live digital mix demonstration	SRHB – Ch. 6	Quiz 5 – mixing signal processing and
	Environmental acoustics – rooms, recording studios, indoor venues	SRHB – Ch. 13	
7	Presentations		Quiz 6 – room acoustics, loudspeakers
	Presentations		**Listening Presentations and paper**
8	Loudspeakers	SRHB – Ch. 14	**Listening Presentations and paper** - No quiz
	Loudspeaker coverage goals		
9	Post mix processing	AES Journal article on time alignment vs. equalization	Quiz 7 - safety
	Safety in live sound – electricity and rigging	Excerpt from Entertainment Rigging by Harry Donovan	
10	The live sound process – arena show setup overview	SRHB – Ch. 17	
	Final exam review		No quiz
11	Final Exam		**Research paper, Recording project**

* Lecture may be omitted or shortened if needed to allow more complete coverage of a more essential topic