

**MUSC 51B Course Outline as of Fall 2009****CATALOG INFORMATION**

Dept and Nbr: MUSC 51B Title: DIGITAL AUDIO-MULTIMEDIA

Full Title: Digital Audio: Mastering for Multimedia

Last Reviewed: 11/9/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	2.00	17.5	Lab Scheduled	35.00
		Contact DHR	1.00		Contact DHR	17.50
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

An intermediate- to advanced-level hands-on workshop in digital audio focusing on signal processing and the production of master mixdowns for video, multimedia, gaming, Internet audio, compact disc, and DVD.

**Prerequisites/Corequisites:**

Course Completion of MUSC 51A

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: An intermediate- to advanced-level hands-on workshop in digital audio focusing on signal processing and the production of master mixdowns for video, multimedia, gaming, Internet audio, compact disc, and DVD. (Grade Only)

Prerequisites/Corequisites: Course Completion of MUSC 51A

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;  
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:

<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
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<b>CSU Transfer:</b>	Transferable	Effective:	Fall 2009	Inactive:
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<b>UC Transfer:</b>	Effective:	Inactive:
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**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

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

1. Utilize and apply a working vocabulary of digital audio terminology.
2. Demonstrate hands-on proficiency with a DAW at an advanced level.
3. Explain and demonstrate a variety of digital signal processing techniques.
4. Explain perceptual coding and its role in the development of the MPEG (Motion Picture Experts Group) audio standards.
5. Prepare master mixdowns for digital video, multimedia, gaming, Internet audio, podcasting, and/or digital broadcasting.
6. Explain and implement the process of mastering digital audio for compact disc and DVD.

### **Topics and Scope:**

Lecture Topics:

#### **I. Digital Signal Processing (DSP)**

- A. Fundamentals of DSP
- B. Discrete systems
- C. Digital filters
  1. Filter applications
  2. Sources of errors
- D. Integrated DSP processors
- E. DSP programming and applications
  1. Delay
  2. Reverberation
  3. Loudspeaker correction
  4. Noise removal

#### **II. Sigma-Delta Conversion and Noise Shaping**

- A. Sigma-delta conversion, modulation, and idling patterns
- B. One-bit D/A conversion with second-order noise shaping
- C. Multi-bit D/A conversion with third-order noise shaping

- D. Multi-bit D/A conversion with quasi fourth-order noise shaping
- E. Psychoacoustically optimized noise shaping

### III. Perceptual Coding

- A. Psychoacoustics
- B. Physiology of the human ear
- C. The rationale for perceptual coding
- D. Data reduction coding
- E. The MPEG-1 audio standard
  - 1. Psychoacoustic models
  - 2. Layer I
  - 3. Layer II
  - 4. Layer III (MP3)
- F. The MPEG-2 audio standard
- G. AC-3 (Dolby Digital) coder

### IV. Surround Sound

- A. Fundamentals of 5.1 Surround Sound
- B. Monitoring in 5.1 surround
- C. Speaker placement for 5.1 surround
- D. Surround interfacing
- E. Surround formats
  - 1. Dolby Pro Logic
  - 2. 3D sound
  - 3. SRS
  - 4. Dolby Digital (AC3)
  - 5. DVD-Audio
  - 6. DTS
  - 7. Windows Media Audio 9 (WMA9)
  - 8. MP3 Surround
- F. Mixing in surround
- G. Virtual surround mixers

### V. The Compact Disc (CD)

- A. History and invention of the CD
- B. CD overview
- C. Disc specifications and data encoding
- D. Mastering: the "Red Book" audio standard
- E. Alternative CD formats

### VI. The Digital Video Disc (DVD)

- A. Physical specifications
- B. Universal disc format
- C. DVD-video format
- D. DVD-audio format
- E. Data compression
- F. Meridian Lossless Packing (MLP)

### VII. Internet Audio and Podcasting

- A. Computer networks and file transfers
- B. Internet audio
  - 1. MP3
  - 2. Secure Digital Music Initiative (SDMI)
- C. Streaming audio
  - 1. RealAudio G2 music codec
  - 2. Audio webcasting
- D. MPEG-4

- E. Encryption and watermarking
- F. Introduction to podcasting
- VIII. Digital Radio and Television Broadcasting
  - A. Satellite operation
  - B. Digital audio radio
  - C. Eureka 147/DAB
  - D. In-band digital radio
  - E. Direct satellite radio
  - F. Digital television (DTV) and MPEG video
  - G. ATSC (Advanced Television Standards Committee) vs. NTSC (National Television Standards Committee) protocols

**Laboratory Topics:**

- I. Advanced-Level Usage of the Digital Audio Workstation
  - A. Mark of the Unicorn (MOTU) Performer
  - B. Propellerhead Reason
- II. Use of Software Plug-ins
- III. Digital Signal Processing
- IV. Production of a Final Mixdown
- V. Mastering

**Assignment:**

1. Reading (10-20 pp. per week) from the text and handouts.
2. Hands-on proficiency demonstrations (3-5) on the hardware and software.
3. Quizzes (3-5) on vocabulary and technical terminology.
4. Completion of required laboratory hours.
5. Final project: an original recording or composition (minimum of 3 minutes in length) that demonstrates mastery of the concepts of the course.

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Audio project(s)

Problem solving  
40 - 55%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Hands-on proficiency demonstrations

Skill Demonstrations  
25 - 35%

**Exams:** All forms of formal testing, other than skill performance exams.

Terminology quizzes

Exams  
10 - 25%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance and participation, lab hours

Other Category  
5 - 10%

**Representative Textbooks and Materials:**

Principles of Digital Audio, 5th ed. Pohlmann, Ken C. McGraw Hill/TAB Electronics, 2005.

Audio in Media, 8th ed. Alten, Stanley R. Wadsworth, 2007.

Instructor prepared materials.