Term Information

Effective Term   Spring 2016

General Information

Course Bulletin Listing/Subject Area	Adv Computing Cntr Arts&Design
Fiscal Unit/Academic Org	Advanced Computing Center/Arts - D0210
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	4101
Course Title	Performance and Installation Technology
Transcript Abbreviation	Perfm Install Tech
Course Description	An overview of technologies useful for creating interactive installations and performance systems, using video projection, 3D graphics, environmental sensors and visual programming.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Laboratory, Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Permission of Instructor
Exclusions	Permission of Instructor

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	10.0304
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior, Senior

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Learn emerging flexible technologies that enable creation of complex data re-mappings not requiring traditional in-depth software programming.
- Learn underlying concepts relevant to the representation and translation of data to and from digital and analog forms.
- Learn processes to track emerging technologies and integrate them with their current interests and skills. Relevant for students working with performance and / or installation-based research.

Content Topic List

- 1. Overview of Hardware & Software Resources. Examples of Installation, performance & data remapping. Hardware, Software, state transition diagrams. 2. Data processing environment: objects, message passing, math and logic.
- 3. Programming, Visual Data Representation: encapsulation, functional decomposition, debugging, matrices, planes, channels, frames, pixels, codecs. 4.Video Filtering & Mixing: real-time image processing, compositing methods.
- 5. Live Video, Computer Vision: analog vs. digital signals; DV uncompressed, wireless, VGA, HD, displays, projection, surfaces, detection tracking. 6. Computer Vision, Sound Generation: image analysis, depth cameras, digital audio introduction
- 7. Sampling, Playback control: input, output, modifying properties, processing sound clips, interfacing with video. 8.Cameras, Geometry, Rendering: geometry processing via matrix manipulation, transformations, animation, interactive control.
- 9. Lighting, texturing: color intensity, placement, video mapping, dynamic texture mapping. 10. 3D motion and Networking Introduction: animation control, physics, LAN/WAN
  Networking / Physical Computing
- 11, Networking: Web upload/ download, MIDI, Bluetooth, OSC. 12. Physical Computing: sensor intro, electronics interface, external control resources, simple circuits.

Attachments

- VpitSyl4k2016.pdf: 4101 Syllabus

  (Syllabus. Owner: Smith,Mary Elaine)

- VpitSyl7k2016.pdf: 7101 Syllabus

  (Other Supporting Documentation. Owner: Smith,Mary Elaine)

- BachelorOfScienceREV1.pdf: Music BS requirements

  (Other Supporting Documentation. Owner: Smith,Mary Elaine)

- ACCAD7101PerfTechRequestCover.pdf: Palazzi cover

  (Cover Letter. Owner: Smith,Mary Elaine)

- BS_MapREV1.pdf: BS Curricular Map

  (Other Supporting Documentation. Owner: Heysel,Garett Robert)

Comments

- Wouldn't a curricular map be required from both SOM and ACCAD?

  Map has been added. *(by Heysel,Garett Robert on 04/20/2015 11:24 AM)*

- SOM has submitted the curricular map to Garett. He will attach it at his approval point. *(by Palazzi,Maria on 04/20/2015 10:51 AM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Smith,Mary Elaine	03/27/2015 12:28 PM	Submitted for Approval
Approved	Palazzi,Maria	03/27/2015 12:45 PM	Unit Approval
Revision Requested	Heysel,Garett Robert	04/15/2015 10:52 PM	College Approval
Submitted	Smith,Mary Elaine	04/20/2015 10:33 AM	Submitted for Approval
Approved	Palazzi,Maria	04/20/2015 10:52 AM	Unit Approval
Approved	Heysel,Garett Robert	04/20/2015 11:24 AM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	04/20/2015 11:24 AM	ASCCAO Approval

THE OHIO STATE UNIVERSITY

College of Arts and Sciences

Advanced Computing Center for the Arts and Design

331 Sullivant Hall
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Columbus, OH 43210

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accad.osu.edu

March 26, 2015

Dear Curriculum Committee,

The Advanced Computing Center for the Arts and Design (ACCAD) welcomes a request from the School of Music to formulate an undergraduate version of our ACCAD 7101 course, *Performance and Installation Technology* which will be a required course for the new B.S. in Music, Sonic Arts track.

I am submitting a new course request and accompanying syllabus for the creation of ACCAD 4101 *Performance and Installation Technology* and the syllabus for the existing graduate level ACCAD 7101 *Performance and Installation Technology*.

We see the creation of this undergraduate version as an opportunity to offer this course to the Music students enrolled in the new B.S., as well as to a small number of advanced undergrads from other majors who may be interested in this subject matter. Both ACCAD 7101 and 4101 will be offered at the same time for the benefit of mixing advanced undergraduates with graduate students. Assignment requirements in 4101 are adjusted for the undergraduate student and reflected in the accompanying syllabus. Specifically, Assignment 1, requires less iterations of the hypothetical thinking exercise and the written component of the final project has been removed.

Please contact me with any questions.
Thank you for your consideration.

Sincerely,

Maria Palazzi
Director / ACCAD
Professor / Department of Design

ACCAD 4101 Syllabus: Performance and Installation Technologies
Instructor: Matthew Lewis, Office: 339C Sullivant, Phone: (614) 292-0747
Spring 2016   : Rm 349A Sullivant Hall, Tues/Thurs 12:45-2:05PM, 3 credits
Prerequisites: permission of instructor.
Description: An overview of technologies useful for creating interactive installations and performance systems, using video projection, 3D graphics, environmental sensors, and visual programming.

Course Objectives and/or Student Learning Outcomes:
There is a long-standing interest from an increasing number of disciplines in migrating interactive computer graphics away from traditional keyboard/monitor/mouse interaction and out into the broader environment. Applications commonly obtain data from disparate media sources (e.g., sound, video, network data feeds, sensors), process this data in real-time, and ultimately represent information in different forms. Movement becomes color, video controls sound, and light drives motion.

This course will expose students to current emerging flexible technologies that enable the creation of complex data re-mappings without requiring traditional in-depth software programming. They will learn underlying concepts relevant to the representation and translation of data to and from digital and analog forms. Most importantly students will learn processes they can use to track emerging technologies and integrate them with their current interests and skills.

Unlike related courses in specific departments such as art, design, dance, or theatre, this course is intentionally not intended for the development and evaluation of individual performance or installation works. Rather, it is about non-disciplinary approaches to using emerging technologies and their related system designs that are appropriate for (usually interdisciplinary) students working with performance and/or installation-based research (broadly defined).

Course Methodology:
The course will survey important issues surrounding the creation of systems for sampling, processing, and presenting visual media in installation and performance environments. Students will be shown existing work spanning the disciplines of art, dance, design, theater, music, computer science, and architecture. Examples of varying levels of complexity will be presented to demonstrate different techniques. Students will be required to use these techniques to design their own interactive, real-time data processing examples. (Basic knowledge of creating and manipulating digital images, video, 3D geometry, and HTML files will be assumed.) The assignments will be flexible enough to allow students from different disciplines to create demonstrations appropriate for their disparate fields and goals. While some students might work toward creating an art installation or dance performance system, others might create immersive design tools or an accessible information point. Collaboration will be encouraged.

While images, videos, and web sites illustrating different approaches will be demonstrated throughout the course, students will learn primarily by creating and experimenting with their own projects. The class format will take on a variety of styles as the disparate subjects dictate. Examples will be presented in lectures and demonstrations, and in-class hands-on labs will allow students to work together on problem solving. Assignment results will be presented in group critique sessions.

Students must demonstrate satisfactory achievement of course objectives through fulfillment of course projects and by contributing to class discussions and critiques. Course projects will require students to use a wide variety of software and equipment at ACCAD. Collaboration between students in the course and other faculty, staff and students at ACCAD is encouraged. Course evaluation will be based on the following:

Projects one through five:	12% each
Final Project (project six):	30%
Class Participation:	10%

A = 94 -100   A- = 91 - 93
B+ = 89 - 90   B = 83 - 88   B- = 80 - 82
C+ = 78 - 79   C = 73 - 77   C- = 71 - 72
D+ = 69 - 70   D = 64 - 68   E = 0 - 64

Grading Policy:
All students are required to be on time and in **attendance** for each and every class. Students arriving to class more than 10 minutes late will be counted as absent. Two absences will lower a final grade by 1/2 a letter, three absences will lower a final grade by one letter and four absences will result in failure of the course.

Adherence to deadlines is expected. It is the individual student's responsibility to keep track of deadlines and to present the work to the class and instructor on the specified dates. 15% per day will be subtracted from late assignments.

Students choosing to use "at home" hardware and software must have their current working files on the system and available for review at the beginning of each and every class. Problems with home systems and/ or incompatibility will not be an acceptable excuse for missed goals. Technical problems will happen frequently during the quarter and students may have trouble accessing the computer lab during "prime time" hours. Students must make their own arrangements for overcoming these difficulties and submitting their work on time. Unless there is a complete system failure in a computer-related course, technical difficulties are never an acceptable excuse for not meeting a deadline. Students should plan their time and work so as to anticipate the technical hurdles that are a part of this profession.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5- 487). For additional information, see the Code of Student
Conduct http://studentlife.osu.edu/csc/.

"Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/."

Topics and Assignments:

1. Introduction, Overview, Resources
   a. Hardware and software overview
   b. Installation, performance, data remapping examples
   c. Hardware, software, state transition diagrams
2. Data-processing Environment
   a. Objects, message passing
   b. Math, logic
   c. Assignment 1 due (system design)
3. Programming, Visual Data Representation
   a. Encapsulation, functional decomposition
   b. Debugging, style
   c. Matrices, planes, channels, frames, pixels, codecs
4. Video Filtering and Mixing
   a. Realtime image processing
   b. Compositing methods
   c. Assignment 2 due (data processing system infrastructure)
5. Live Video, Computer Vision
   a. Analog vs digital signals
   b. DV, uncompressed, wireless, VGA, HD
   c. Hardware: displays, projection, surfaces
   d. Detection, tracking (color/motion)
   e. Assignment 3 due (real-time processing and compositing)

6. Computer Vision, Sound Generation
    a. Image Analysis
    b. Depth cameras
    c. Digital audio introduction
7. Sampling, Playback Control
    a. Input, output, modifying properties
    b. Processing sound clips
    c. Interfacing with video
8. Cameras, Geometry, Rendering
    a. Geometry processing via matrix manipulation
    b. Transformations, animation
    c. Interactive control
    d. Assignment 4 due (interactive live video manipulation/control)
9. Lighting, Texturing
    a. Color, intensity, placement
    b. Video mapping, fog, and lighting
    c. Dynamic texture mapping
10. Spring Break
11. 3d Motion and Networking Introduction
    a. Animation control
    b. Physics
    c. LAN/WAN
12. Networking
    a. Web upload / download
    b. MIDI, Bluetooth, OSC
    c. Assignment 5 due (sound + 3D graphics control)
13. Physical Computing
    a. Sensor intro
    b. Electronics interface overview
14. Physical Computing
    a. External control resources
    b. Simple circuit examples
15. Final project
    a. Problem solving
    b. Evaluation
    c. Assignment 6 due (finals week at scheduled final time)

Assignments:
1. **System diagrams:** create a high-level data-flow diagram for hypothetical computer-mediated systems. This will visually communicate data sources, output, translation, control, and interaction.
2. **System infrastructure:** learn to use our system architecture by creating a series of simple solutions to given problems. Create a basic drawing system applying these concepts.
3. **Designing Diversity:** Create a real-time, non-interactive stochastic system using video manipulation and compositing.
4. **Multi-modal Integration:** Create a system that drives video and sound mixing and manipulation via interaction with a live video feed.
5. **Virtual Environments**: Create a system in which user interaction drives multiple attributes (position, color, sound, texture, lighting, etc) of a 3D environment containing live video.
6. **Final Project:** Explore, extend, and/or integrate one or more of the previous concepts or projects.

Reading List:
There are no required textbooks. Software documentation, tutorials, and examples are provided with the software installation and are available for download, on the class web pages, and on ACCAD computers.

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For examples of recent online resources for several topic areas see:
> http://accad.osu.edu/~mlewis/Jitter/Class/DataRemappingExamples.html
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> https://www.accad.ohio-state.edu/~mlewis/Jitter/Class/iot.html

Bibliography and Resources:

Chamagne, Mathieu and Lê Quan Ninh. "Max Objects Database." http://maxobjects.com

Cycling '74, "Cycling '74 Forums." https://cycling74.com/community/
Fry, Ben and Casey Reas. "Processing." http://processing.org/
Moere, Andrew Vande. "Information Aesthetics" http://infosthetics.com/
Vice Media, "The Creators Project" http://thecreatorsproject.vice.com/
Watz, Marius. "Generator.x" http://www.generatorx.no/
Winkler, Todd. *Composing Interactive Music: Techniques and Ideas Using Max*. MIT Press, 1998. ISBN 0-262-23198-X. (Contains chapters on Max programming and interface design.)

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6. **Final Project:** Explore, extend, and/or integrate one or more of the previous concepts or projects. Write a one page reflection on lessons learned, applications to discipline, and useful extensions.

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Vice Media, "The Creators Project" http://thecreatorsproject.vice.com/
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Name: _____

Survey Course – 1 unit	Units	Sem
Arts College 1000	1	Au

General Education Courses: 60-62 Units
Writing: 6 units

English 1110	3	
Second Level Writing Course	3	

Literature: 3 units

Literature	3	

Arts: 3 units

Arts	3	

Math and Data Analysis: 6 - 8 units

Engineering Calculus I (CSE track) or Math	3-5	
Data Analysis (Stats recommended for CSE)	3	

Natural Sciences: 10 units
Must be taken from both areas below. One of the courses must have a lab.

Biological science	1-5	
Physical science	1-5	

Culture & Ideas/Historical Study: 6 units

Cultures & Ideas OR Historical Study	3	
Cultures & Ideas OR Historical Study	3	

Social Sciences: 6 units

Social Science (category A)	3	
Social Science (category B)	3	

Open Options: 6-8 units

Engineering Calculus II (CSE track) or Open	3-5	
Additional Math or Science (CSE track) or Open	3	

Foreign Languages: 12 units

Foreign Language, levels 1 – 3	12	

Social Diversity in U.S.[1]		
Global Studies[1]		
Music 2240-2241		

[1] Typically embedded in other requirements

Req'd Overall GPA…..…….....................3.0
Req'd CPHR Required…………………...3.0
GPA in Major………..………………….....3.0
Major course work must be C- or better on the BS

*Open option courses can be selected from any of the following:
   Another GE approved course
   Service learning course
   Cross Disciplinary seminar
   Education abroad

NASM Guidelines	minimum	target
Musicianship	19	(20% – 25%)
Performance and music electives	7	(10% – 20%)
General studies and general electives	50	(55% – 70%)
Musicianship, performance, and music electives	26	(30% - 45%)

Rev. 10/2/2013 TLL

Bachelor of Science in Music
School of Music

Music Major: 34 units

Music Theory: 6 units	Units	Sem
Mus 2221 – Music Theory 1*	2	Au
Mus 2222 – Music Theory 2	2	Sp
Mus 3421 – Music Theory 3	2	Au

Aural Training: 6 units		
Mus 2224 – Aural Training 1	2	Au
Mus 2225 – Aural Training 2	2	Sp
Mus 3424 – Aural Training 3	2	Au

Musicology: 9 units		
Mus 2251 – World of Classical Music	3	Sp
Mus 3351 – World Music	3	Au
Elective: Music 2240 or 2241 or 2242	3	Au/Sp

Keyboard Skills: 2 units		
PIA Principals: 2 units		
2264.01 – Keyboard Skills IV	1	Sp
2208.01 – Small Ensemble: Piano	1	Au/Sp
Other principals: 2 hrs		
2261.01 – Keyboard Skills I	1	Au
2262.01 – Keyboard Skills II	1	Sp

Ensemble or Applied Study: 4 units		
Music 2208, 2215, 2203, 2204, DME, 2206, 3312, 2201.xx	1-2	Au/Sp
Music 2208, 2215, 2203, 2204, DME, 2206, 3312, 2201.xx	1-2	Au/Sp
Music 2208, 2215, 2203, 2204, DME, 2206, 3312, 2201.xx	1-2	Au/Sp
Music 2208, 2215, 2203, 2204, DME, 2206, 3312, 2201.xx	1-2	Au/Sp

Acoustics: 3 units		
SHS 3340 – Intro to the Art and Science of Sound	3	

Music Electives: 4 units		
Music Electives (2000-level and above)	4	All

Tracks in CS, or ME or SA (Choose one):

Computer Sciences: 29-30 units	
CSE 2221 – Software I*	3
CSE 2231 – Software II	3
CSE 2321 – Foundations I	3
CSE 2421 – Systems I	4
CSE 3902 – Project: Interactive Systems	4
CSE 3541 – Computer Game and Animation Tech. **OR** CSE 5236 – Mobile Application Development **OR** CSE 5539 – Computational Audition	2-3
Music 5636.01 – Introduction to Electronic Music Synthesis	3
Music 5636.02 – Electronic Music Synthesis	3
Senior Project (4679.03 – *new course*)	4

Media and Enterprise: 27 units	Units	Sem
Music 2271 – Intro to Music Enterprise	3	
Music 3330 – Music Production and Reception	3	
Bus Mhr 2500 – Innovation and Entrepreneurship in Modern Business	3	
Com 3440 – Mass Communication and Society	3	
Music, Communication, and Culture (Choose 1)		
Mus 3431 – Protest in American Music	3	
Mus 3432 – Spectacle: Music and Public Amusements in America	3	
Music 3348 – Music on the Move in a Globalized World	3	
COM 3413 – Media Entertainment	3	
COM 3466 – Communication and Popular Culture	3	
COM 3554 – Social Implications of Communications Technology	3	
Business and Entrepreneurship (Choose 1)	3	
Bus Mhr 3510 – New Venture Creation	3	
Bus Mhr 3665 – Personal Creativity and Innovation	3	
ArtEduc 3680 – Exploring the Creative Sector: Art in the 21st Century	3	
Media Production and Analysis (Choose 1)		
COM 2540 – Introduction and Communication Technology	3	
Theatre 5321 – Video Production I	3	
Mus 5638 – Audio Recording I	3	
Interdisciplinary Elective (Choose one (1) course from either CSMT or MT tracks)	2-4	
Senior Project (4679.03 – *new course*)	4	

Sonic Arts: 27 units		
Music 2271 – Intro to Music Enterprise	3	
Music 5636.01 – Introduction to Electronic Music Synthesis	3	
Music 5636.02 – Electronic Music Synthesis	3	
Music 5638.00 – Audio Recording	3	
Music 5677.01 – Multimedia for Musicians I	2	
Music 5677.02 – Multimedia for Musicians II	2	
ACCAD 7101: Performance and Installation Technologies	3	
Senior Project (4679.03 – *new course*)	4	
Choose 2 courses (6 credits) from the following:		
Music 5639.00 – Audio Recording Laboratory	3	
Theatre 5321 – Video Production	3	
CSE 2221 – Software I*	3	
CSE 2231 – Software II	3	

Major	60 - 63 units
GE	58 – 62 units
Survey	1 unit
Minimum Total Units to Graduate	**121 - 126 units**

* Requires placement exam by department

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	A	B	C	D	E	F	G	H	I	J	K
1	Core Courses All Tracks	M1	M2	M3	M4	M5	M6	M7	M8		
2	**Major Instrument**										
3	2201.xx	beginning	beginning		beginning	beginning	beginning	beginning			
4	3401.xx	intermediate	intermediate		intermediate	beginning	intermediate	intermediate			
5	**Aural Training**										
6	2224	beginning	beginning								
7	2225	beginning	beginning								
8	3424	intermediate	intermediate								
9	**Music History**										
10	2240	beginning		beginning	intermediate	intermediate					
11	2241	beginning		beginning	intermediate	intermediate					
12	2242	beginning		beginning	intermediate	intermediate					
13	2251	beginning		beginning	beginning	beginning					
14	3351	beginning		beginning	intermediate	intermediate					
15	**Keyboard Skills**										
16	2261.01		beginning	beginning			beginning				
17	2262.01		beginning	beginning			beginning				
18	2264.01		intermediate	intermediate			intermediate				
19	**Ensembles**										
20	2203.xx	intermediate	advanced		intermediate		intermediate	intermediate			
21	2204.xx	intermediate	advanced		intermediate		intermediate	intermediate			
22	2205.xx	intermediate	advanced		intermediate		intermediate	intermediate			
23	2206.xx	intermediate	advanced		intermediate		intermediate	intermediate			
24	2208.xx	intermediate	advanced		intermediate		intermediate	intermediate			
25	2215.xx	intermediate	advanced		intermediate		intermediate	intermediate			
26	3312	intermediate	advanced		intermediate		intermediate	intermediate			
27	Sonic Arts Ensemble (SAE)	intermediate	advanced		intermediate		intermediate	intermediate			

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28	Core Courses All Tracks	M1	M2	M3	M4	M5	M6	M7	M8		
29	**Music Theory**										
30	2221	beginning	beginning	beginning				beginning			
31	2222	beginning	beginning	beginning				beginning			
32	3421	intermediate	intermediate	intermediate				beginning			
33	**Senior Project**										
34	4679.03	advanced	advanced	advanced	advanced	advanced	advanced	advanced	advanced		
35	**Music Electives**										
36	2000+	intermediate	intermediate	intermediate	intermediate		intermediate	intermediate			
37	**Music Technology**										
38	5636.01			advanced					advanced		
39	5636.02			advanced					advanced		
40	**Acoustics**										
41	SHS 3340								Intermediate		
42	**Data Analysis**										
43	Statistics								Intermediate		
44											
45	**Computer Science Track**	CS1	CS2	CS3	CS4						
46	CSE 2221	beginning	beginning	beginning	beginning						
47	CSE 2222	beginning	beginning	beginning	beginning						
48	CSE 2321	beginning	beginning	beginning	beginning						
49	CSE 2421	beginning	beginning	intermediate	intermediate						
50	CSE 3902	intermediate	intermediate	intermediate	intermediate						
51	CSE 3541	intermediate	intermediate	intermediate	intermediate						
52	CSE 5236	advanced	advanced	advanced	advanced						
53	CSE 5539	advanced	advanced	advanced	advanced						
54											
55	**Media and Enterprise Track**	ME1	ME2	ME3							
56	Music 2271	Beginning									
57	Music 3330			Advanced							
58	Bus Mhr 2500	Beginning									
59	Com 3440		Beginning								
60	Mus 3431			Intermediate							
61	Mus 3432			Advanced							
62	Music 3348		Intermediate								
63	COM 3413			Intermediate							
64	COM 3466		Intermediate								
65	COM 3554		Advanced								
66	Bus Mhr 3510		Intermediate								
67	Bus Mhr 3665			Advanced							

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68	ArtEduc 3680		Intermediate								
69	COM 2540		Beginning								
70	Theatre 5321	Beginning									
71	Mus 5638		Beginning								
72	Interdisciplinary Elective	Advanced	Advanced	Advanced							
73	**Sonic Arts Track**	SA1	SA2	SA3	SA4						
74	Music 2271	beginning									
75	Music 5636.01		beginning		beginning						
76	Music 5636.02		intermediate		intermediate						
77	Music 5638.00			beginning							
78	Music 5677.01		advanced		beginning						
79	Music 5677.02		advanced		intermediate						
80	ACCAD 4101		advanced		advanced						
81	Music 5639			intermediate							
82	Theatre 5321		advanced	intermediate	advanced						
83	CSE 2221				beginning						
84	CSE 2231				beginning						
85											
86											
87	Music (M)										
88											
89	1. The ability to hear, identify, and work conceptually with the elements of music such as rhythm, melody, harmony, structure, timbre, texture.										
90	2. An understanding of and the ability to read and realize musical notation.										
91	3. An understanding of compositional processes, aesthetic properties of style, and the ways these shape and are shaped by artistic and cultural forces.										
92	4. An acquaintance with a wide selection of musical literature, the principal eras, genres, and cultural sources.										
93	5. The ability to develop and defend musical judgments.										
94	6. Ability in performing areas at levels consistent with the goals and objectives of the specific liberal arts degree program being followed.										
95	7. Understanding of procedures for realizing a variety of musical styles.										
96	8. Knowledge and/or skills in one or more areas of music beyond basic musicianship appropriate to the individual's needs and interests.										
97											
98											
99	Computer Sciences (CS)										
100											
101	1. Develops a basic understanding of the role of computer science in music.										
102	2. Ability to design, implement, and evaluate a software system or component to solve problems either in computing or in music.										
103	3. Ability to function on multi-disciplinary teams.										
104	4. Ability to analyze the local and global impact of computing on individuals, organizations, and society.										
105											
106											
107											
108	Media and Enterprise (ME)										
109											
110	1. Develops a basic understanding of cultural, economic, and media theories as they pertain to music.										

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111	2. Develops an understanding of historical and contemporary practices and patterns in the music and entertainment industries.										
112	3. Develops a capacity for critical analysis of opportunities that arise from the intersections of music, technology, society, and commerce.										
113											
114	Sonic Arts (SA)										
115											
116	1. Develops a basic understanding of entrepreneurship.										
117	2. Gains an understanding of music synthesis and its application to composition and performance.										
118	3. Develops a basic understanding in audio recording technologies and in audio recording concepts.										
119	4. Develops a basic understanding of multimedia technologies.										