

# B.S. IN ELECTRICAL ENGINEERING - AUDIO ENGINEERING OPTION

Audio Engineering at the University of Miami was established 1992. The program brings together faculty expertise from Electrical and Computer Engineering and from the Frost School of Music. It uniquely meets the needs of industry, training professionals with solid foundations in technical areas where sound and acoustics play a key role. Students gain theoretical knowledge from engineering and music, along with analytical, technical and design skills that can only be acquired with an engineering degree.

The Audio Engineering option curriculum combines traditional electrical engineering areas such as electronics, digital systems, microprocessors and digital signal processing with audio studies in acoustics, digital speech and audio, and acoustic transducers. Students work in modern laboratory facilities where they can experiment with electronics, digital design, microprocessors, audio recording, audio synthesis and acoustics. UM Audio Engineering graduates are audio-specialized electrical engineers who are highly sought-after by the industry.

During its 27 successful years, Audio Engineering at UM has produced an impressive group of alumni successful careers in music, gaming and entertainment, telecommunications, the analog and digital electronics, computer and software industries, and in the biomedical systems and instrumentation industry. Many have pursued graduate degrees at other top universities. The program implements continuous improvements, including innovative teaching and hands-on audio engineering design projects, as well as ever-deeper links with industry.

## Curriculum Requirements

Code	Title	Credit Hours
<b>Common Engineering Requirements</b>		
ECE 111	Introduction to Engineering I	3
ECE 112	Introduction to Engineering II	2
ECE 118	Introduction to Programming	3
ECE 201	Electrical Circuit Theory	3
ECE 202	Electronics I	3
ECE 203	Electrical Circuits Laboratory	1
ECE 206	Circuits, Signals, and Systems	3
ECE 211	Logic Design	3
ECE 212	Processors: Hardware, Software, and Interfacing	3
ECE 218	Data Structures	3
ECE 302	Electronics II	3
ECE 303	Electronics Laboratory	1
ECE 315	Digital Design Laboratory	1
ECE 316	Structured Digital Design	1
ECE 336	Discrete-Time Signals and Systems	3
ECE 481	Senior Project I	1
ECE 482	Senior Project II	2
EE Core Electives		6
ECE Design Elective		3
<b>Engineering and Technical Electives</b>		
ECE 502	Engineering Acoustics	3
ECE 540	Digital Speech and Audio Processing	3
Audio Engineering or Technical Electives		9
<b>Other Courses</b>		
MMI (Music Media) Credit Hours		9
MTC (Music Theory) Credit Hours		3
<b>Math &amp; Basic Science Credit Hours</b>		
ECE 310	Introduction to Engineering Probability	3
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 210	Introduction to Linear Algebra	3
MTH 311	Introduction to Ordinary Differential Equations	3

CHM 151	Chemistry for Engineers	3
CHM 153	Chemistry Laboratory for Engineers	1
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 224	University Physics II Lab	1
PHY 223	University Physics III	3
PHY 225	University Physics III Lab	1
<b>General Education Credit Hours</b>		
ENG 105	English Composition I	3
ENG 107	English Composition II: Science and Technology	3
Arts and Humanities Cognate		9
People and Society Cognate		9
<b>Total Credit Hours</b>		<b>132</b>

## Suggested Plan of Study

Course	Title	Credit Hours
<b>Freshman Year</b>		
<b>Fall</b>		
ECE 111	Introduction to Engineering I	3
ENG 105	English Composition I	3
MTH 151	Calculus I for Engineers	5
MMI 201	Introduction to Music Recording	3
PHY 221	University Physics I	3
<b>Credit Hours</b>		<b>17</b>
<b>Spring</b>		
ECE 112	Introduction to Engineering II	2
ECE 118	Introduction to Programming	3
ENG 107	English Composition II: Science and Technology	3
MTH 162	Calculus II	4
PHY 222	University Physics II ( Substitutes PHY 206)	3
PHY 224	University Physics II Lab	1
<b>Credit Hours</b>		<b>16</b>
<b>Sophomore Year</b>		
<b>Fall</b>		
ECE 201	Electrical Circuit Theory	3
ECE 218	Data Structures	3
MTH 311	Introduction to Ordinary Differential Equations	3
HA Cognate (Humanities and Arts Elective) <sup>2</sup>		3
PHY 223	University Physics III ( Substitutes PHY 207)	3
PHY 225	University Physics III Lab	1
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
ECE 202	Electronics I	3
ECE 203	Electrical Circuits Laboratory	1
ECE 206	Circuits, Signals, and Systems	3
ECE 211	Logic Design	3
CHM 151	Chemistry for Engineers	3
CHM 153	Chemistry Laboratory for Engineers	1
MTH 210	Introduction to Linear Algebra	3
<b>Credit Hours</b>		<b>17</b>

<b>Junior Year</b>		
<b>Fall</b>		
ECE 302	Electronics II	3
ECE 303	Electronics Laboratory	1
ECE 315	Digital Design Laboratory	1
ECE 336	Discrete-Time Signals and Systems	3
ECE 310 or IEN 310	Introduction to Engineering Probability or Introduction to Engineering Probability	3
Audio Engineering Elective <sup>1</sup>		3
HA Cognate <sup>2</sup>		3
<b>Credit Hours</b>		<b>17</b>
<b>Spring</b>		
ECE 212	Processors: Hardware, Software, and Interfacing	3
ECE 316	Structured Digital Design	1
ECE 436	Digital Signal Processing	3
EE Core Elective <sup>1</sup>		3
MMI 503	Audio Signal Processing II	3
HA Cognate (Adv. HA Elective) <sup>2</sup>		3
<b>Credit Hours</b>		<b>16</b>
<b>Senior Year</b>		
<b>Fall</b>		
ECE 481	Senior Project I	1
ECE 502	Engineering Acoustics	3
ECE Design Elective <sup>1</sup>		3
Audio Engineering or Tech. Elective <sup>1</sup>		3
Audio Engineering Elective <sup>1</sup>		3
PS Cognate (People and Society Elective) <sup>1</sup>		3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
ECE 482	Senior Project II	2
ECE 540	Digital Speech and Audio Processing	3
MMI 436	Audio Postproduction <sup>4</sup>	3
MMI 501	Transducer Theory	3
PS Cognate (People and Society Elective) <sup>1</sup>		3
PS Cognate (Adv. PS Elective) <sup>1</sup>		3
<b>Credit Hours</b>		<b>17</b>
<b>Total Credit Hours</b>		<b>132</b>

<sup>1</sup> See description of electives under the Electrical and Computer Engineering Section.

<sup>2</sup> Recommended a cognate that includes a Musicology Elective.

<sup>3</sup> Offered only in the Fall semester.

<sup>4</sup> Note that MMI 504 could be substituted for MMI 436.

## Mission

The mission of the Department of Electrical and Computer Engineering is to achieve and maintain, through a continuous improvement process, excellence in undergraduate and graduate education, research, and service to the community and the nation. We endeavor to accomplish this by providing high-quality education and research programs which will impart the requisite knowledge and skills to our students enabling them to assume leadership roles in contributing to the advancement of the underlying electrical and computer engineering technologies which sustain the current world economy, to promote a strong commitment to life-long learning, to prepare them for a variety of alternative career paths and to participate as responsible citizens in a rapidly changing and shrinking global community.

## Program Educational Objectives

We expect that the alumni of the Electrical Engineering Program will exhibit the following:

1. Successful careers in dynamic and multidisciplinary fields with the ability to apply electrical engineering practices within societal, global, and environmental contexts in an ethical manner.
2. Demonstrating life-long learning through activities such as completion of graduate studies and/or professional development.

## **Student Learning Outcomes**

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.