Studio Report: Audio Technology at American University
Improving Curriculum through upgrading Facilities

Paul A. Oehlers, Teresa Larkin, Fred Katz, Matt Boerum, and Matt Weiner
American University
cap@american.edu
oehlers@american.edu

Abstract
The Audio Technology program at American University combines elements of the arts and sciences to provide a unique educational experience to its fifty-five majors. Housed in the Computer Science, Audio Technology, and Physics Department, the practical aspects of the discipline are complemented with the study of acoustics and physics. The facilities assist the faculty in demonstrating the technology and provide student centered and real world experiences in their classes.

1 Introduction

The Audio Technology program at American University focuses on both the art and the science of audio and music technology. With our strong core courses in Sound Synthesis, Multi-track Audio Production, Digital Audio Workstations, Electronics, and Physics, we are unique in our approach to blending the art and science in audio in the context of an educational program. The program is administered by the Computer Science, Audio Technology, and Physics Department. This unique grouping of disciplines allows students to explore different aspects of the discipline. The program also maintains an active working relationship with the performing arts and communications departments, which enables students to explore these areas as well. Started in the late seventies, the program continues to grow into a comprehensive curriculum, with over fifty majors and a fifteen percent increase in enrollment each of the past two years.

2 History
The Audio Technology Program at American University was started in 1978 by Physics professor Romeo Segnan as an extension of the acoustics class. A year later, a control room and session room were built in the basement of the McKinley Building, home of the Physics department.

In 1996, American University hired its first full time non-tenure track instructor solely to teach Audio Technology. The first tenure-track position was created a year later. The Audio Technology program currently has two full time instructors – one tenure track and one non-tenure track. In 2004, Paul A. Oehlers was hired as director of the program and Assistant Professor of Audio Technology. Fred Katz currently serves as the non-tenure track instructor. Past instructors have included Steve Augustine (audio engineer for the band Sugarcult), and Mark Sarisky (Assistant Professor of Recording at the University of Texas at Austin).

The Studio Manager’s responsibility has grown since its creation to include maintaining, scheduling, and managing the audio facilities. Matt Weiner served as Studio Manager for the Audio Technology program from 2003 until the opening of the new Katzen Arts Center in 2005, where he was hired to serve as Computer and Audio Technician. Matt Boerum became the studio manager in 2005.

3 Curriculum
American University currently offers two degrees in Audio Technology, the B.S. in Audio Technology and the B.A. in Audio production. A minor in Audio Technology is also offered. Both degrees include the same core courses as part of the major. These courses consist of an introductory course and one year sequences in recording, digital audio workstations, and sound synthesis. Both degrees also require a recently added course, Audio Technology Capstone, a class that results in a professional caliber project for the student’s portfolio. The projects have been as varied as the completion of a compact disc recording, post-production audio mastering of a broadcast quality television program, and construction of an analog synthesizer.

The differences in the two degrees primarily consist of the secondary courses. Audio Technology supplements the core requirements with Electronics, Acoustics, and Physics, as well as other related courses. Audio Production supplements the requirements with courses in Music Theory, Communications, Business, and Multimedia (including classes in Max/MSP and Jitter).

Classes in Audio Technology provide students with the opportunity to explore real world issues in audio
engineering through the recording of various types of music and audio for film, radio, and theater. Projects include recreating a commercially recorded song, recording the orchestra, and providing foley for short cartoons.

4 Facilities

More than in other academic disciplines, the practical aspects of Audio Technology require a focus on the facilities of the program. As the purpose of the degree is to train audio engineers in the operation and maintenance of recording equipment, it is essential that students receive training on technology comparable to industry standard. American University has made substantial progress in this area since 2003, with the addition of two new buildings, the Greenberg Theatre and the Katzen Arts Center, and a substantial upgrade of the existing facilities in the McKinley Building. At present the facilities that are used by the Audio Technology program consist of three performance spaces (the Greenberg Theatre and the Abramson Recital Hall and the Studio Theater at the Katzen Arts Center), one recording and control room space, one sound synthesis studio, four digital audio workstations, two shared multi-station classrooms, and two repair and maintenance for the studio manager and studio assistant, respectively.

4.2 Greenberg Theatre

The Harold and Sylvia Greenberg Theatre opened in March 2003 with the mission of providing the Washington, D.C. and American University communities a place to experience live performances in music, theatre and dance.

Audio is run at the Greenberg Theatre by an Audio Technology student, hired to a part time position. In addition, students in the Audio Production major learn lighting, ser design, technical operation, and other related issues in courses run by the theater department. In 2004, the Greenberg Theatre hosted the Washington, DC premiere of Most High, a film scored by Audio Technology professor Paul Oehlers.

![Figure 1. The Greenberg Theatre control booth (courtesy Greenberg Theatre Archives)](image1)

4.2 Katzen Arts Center

The Cyrus and Myrtle Katzen Arts Center brings all the visual and performing arts programs at American University into one 130,000 square foot space. Designed to foster interdisciplinary collaboration in the arts, the new center provides state-of-the-art instructional, exhibition, and performance space. The facilities in the Katzen Arts Center used by the Audio Technology program consist of the Abramson Recital Hall, the Studio Theater, and two shared classrooms, Katzen 135 and Katzen 210.

The Abramson Recital Hall provides a second concert venue. As with the Greenberg Theatre, students in Audio Technology assist in the operation and maintenance of this facility. The control room contains a Pro Tools system, a Soundcraft mixing console, and other outboard digital signal processors. The hall is equipped with an automated microphone, video projection, and lighting systems. The opening event in the hall was a concert featuring the music of composers from the music, multimedia, and Audio Technology programs.

![Figure 2. The Abramson Recital Hall control booth](image2)

The studio theater provides a black box configuration for students to set up lighting sets, and audio and experiment with production techniques. Current projects utilizing the studio theater include the recording of dramatic monologues by theater students for the inclusion on portfolio DVDs made by Audio Technology students.

The computer classrooms in the Katzen art center provide interactive and hands on learning experiences for the students. In previous classes, teachers in Audio Technology had to design the curriculum with class discussions that consisted almost entirely of passive learning experiences. The new classrooms in the Katzen Arts Center, provide active learning experiences for students at all levels in the program. The two classrooms used by Audio Technology are Katzen 135 and Katzen 210.

Katzen 135 contains eighteen iMac workstations, with M-Boxes and keyboard controllers. Each station also has software such as Protools and several plugins, as well as music software such as Sibelius and Finale. The typical lecture style configuration lends itself to classes that require more of a lecture/demonstration approach, such as the
introductory class, Fundamentals of Audio Technology and its related lab course.

The second classroom is a facility shared with the Multimedia program. This classroom consists of fifteen 2.0 Ghz dual processor G5 Power Macs with M-Boxes Mini-DV decks, and keyboard controllers. Software includes the multimedia production bundles by Adobe, Apple, and Macromedia, Pro Tools, Max/MSP, and Native Instruments Komplete, as well as other software bundles. This classroom is configured for a group or project based learning style, which is ideal for classes such as sound synthesis that require the creation of original music.

McKinley Rooms 6, 8, 9, and 10.

4.3 McKinley Building

The McKinley Building is the home of the Computer Science, Audio Technology, and Physics department. In addition to housing the offices of the faculty, the building contains the primary recording, editing, and maintenance facilities for the program. The recording studios a housed in McKinley Rooms 6, 8, 9, and 10.

McKinley Room 6 serves as an advanced laboratory for individual student use, particularly for more advanced projects in Sound Synthesis. The studio consists of synthesizers that span the history of electro-acoustic music from a Moog 900 Series synthesizer, an EMS Synthi, and an Arp 9000 to the latest software synthesizers. In this studio, students experiment with Fourier Synthesis, Wavetable Synthesis, Subtractive Synthesis, Physical Modeling, and Granular Synthesis.

McKinley Rooms 8 and 10 are the primary recording studio for advanced student projects. It is a semi-professional recording studio, which includes a control room (McKinley Room 8) and a session room (McKinley Room 10). The control room houses a Pro Tools TDM system running on a 2.0 Ghz dual processor PowerMac G5, a Studer A-80 24 track two inch tape machine, a Digidesign Control 24, and other professional grade monitoring and outboard units.

The session room is a large space, acoustically designed for recording instruments and other audio sources. The session room is equipped with a drum set, professional microphones, and amplifiers. Perhaps the largest addition to this room in the past year is the new projection system. The session room is directly linked to the control room via picture-in-picture projector and television. Since the control room is a relatively small space, this communication link allows classes to see what is being taught in the control room, while standing in the session room.

Students can now watch the software or observe the instructor or student in the control room while discussing recording and editing techniques through the video projection and intercom system. The system also allows for ADR (automated dialogue replacement) and foley (adding sound effects) for collaborative video projects to be recorded in the studio.
In addition to these studios, McKinley Room 9 provides the students with additional editing facilities. Student have twenty-four hour access to this room which contains four Pro Tools editing stations. This facility is ideal for students working on projects that are time intensive, as the studio facilities are in constant use.

5 Activities

Electro-acoustic music composition and research are an important aspect of the Audio Technology program at American University. Faculty and students regularly present compositions and research papers at conferences and professional artistic venues. Among the more recent accomplishments of the faculty and students are:

• Performances of music by Audio Technology faculty member Paul A. Oehlers at the 2004 International Computer Music Conference and the Walt Disney Concert Hall in January of 2006.

• A presentation on synchronization by instructor Fred Katz at the 117th Audio Engineering Society Convention.

• Presentation of the papers, “MFL: a collaboration integrating electro-acoustic music and video through magic squares as compositional models” and “Identity theft: concerns and solutions for professional musicians.” by Paul A. Oehlers at the 2006 Hawaiian International Conference on Arts and Humanities.

Students are also currently researching different aspects of the field. Dual Audio Technology and Physics major Kelly Reidy, for example, recently concluded research on bio-luminescence and audio technology and is currently studying the inherent use of golden section proportions in popular music. She plans on submitting articles on both of these areas to various conferences.

In addition to presenting creative and scholarly work at academic venues, the faculty, staff, and students in the Audio Technology program also are active in various aspects of the film and music industry. Among the recent professional projects completed by the Audio Technology faculty and students are:

• The film score for Most High by Paul A. Oehlers. Winner of the Grand Jury Prize at the Atlanta International Film Festival, the Hamptons International Film Festival, and Indiefest Film Festival. It will released nationally by Magnolia Pictures theatrically and on DVD in 2006.

• Sugarcult’s CD Back to the Disaster mastered by instructor Stephen Augustine. It was released nationally by Artemis Records in 2005.

• The compact disc Nice and Nicely Done released nationally by Bar None Records in 2005 by the Spinto Band featuring lead singer and Audio Technology student Nick Krill.

• Sound mixing for the IMAX film, The Persistence of Dreams, by two time Academy Award winning sound engineer and School of Communications Artist-in-Residence Russell Williams and Matt Weiner, with assistance from Matt Boerum and Paul A. Oehlers.

Students that graduate from the Audio Technology program have developed successful careers in every aspect of the field. In the film industry, alumni of the program have secured positions as post-production positions at the National Geographic Channel, Discovery Channel, MVI Post, and Soundwav, as well as directing television at 20th Century Fox. In the music industry, students have secured positions mastering with Bob Ludwig, touring with Philip Glass, engineering at Voice of America, and technical directing at The Barns at Wolf Trap.

6 Conclusion

Substantial progress has been made in the past few years in the development of the Audio Technology program. The addition of new facilities, increase of enrollment, and addition of new faculty have led the department to consider new methods to instruct students in a relatively new discipline. Keeping with its roots, the Audio Technology program continues to explore new methods of further incorporating computer science and physics into the curriculum.

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