

MEMORANDUM

To: The Computer Science Faculty

From: Brian Cullinan

Subject: Technical Elective 200 Level or Above Overrides

Date: 8/22/2010

This memo provides a case for using an alternative field outside of the recommended fields EE, MAT, STA, PHY, CHM, and BIO in section III.2 of the “2005-2006” academic catalog for Computer Science. These requirements can also be found under the “Pre-professional Requirements” in the academic catalog.

This document will answer the following questions:

- What credits would normally satisfy these requirements?
- What credits do I already have available that should satisfy these requirements?
- What was covered in the course that is relevant to a Computer Science degree?
- Conclusion with explanation of credits needed.

Satisfying technical elective credits:

The technical elective credits require 10 units chosen with your advisor from EE, MAT, STA, PHY, CHM, and BIO 200 level, or above, classes. Taking 400 level computer science classes, like I have decided to fill my transcript with, is beyond the usual requirements; additionally, I have taken almost every CS class offered. A few examples of other classes that would satisfy these electives include, higher level math classes such as Calculus 3 (MAT 238), Computer Graphics, and Computer Security (CS 499). Taking a class such as Calculus 3 would be a good way to pursue a minor in Mathematics. Unfortunately, it is outside of the scope of my computer science degree and no longer an option for me.

Alternative technical elective credits:

Because the technical elective credits are so open to many different fields, I would like to use the work done in the field of radio engineering to satisfy these requirements. Electronic media and film is a field within the School of Communications; it focuses on delivering media to viewers and listeners and, more specifically, provides some career emphases that are very relevant to computer science. While working at the radio station, my job title was “Engineer”. It was my responsibility to maintain and install new computer equipment, learn and manage software relevant to both computer science and radio, and later to construct a brand new website similar to my Capstone project.

Computer Science in radio:

I began my first semester learning the intricacies of how a radio station operates and the equipment used. I worked with my peers, and well-educated people in the field, in order to rebuild the radio station from the ground up. This relates not only to computer science, but also electrical engineering. It would be impossible for me to explain everything I learned in the context of this memo, but I will list a few of the relevant topics. In later semesters working for KJACK, I installed new audio hardware, new software, and finally designed and built a new website.

Audio Engineering:

While working for KJACK, I learned the details of balanced and unbalanced audio; adding another wire and splitting the signal in to two mirrored wave forms allows the ground to change at any point, due to static or interference with other wiring, without destroying the integrity of the analog signal. In addition, I learned how grounding audio makes analog wave forms relative to the devices on either end. These topics were touched on in Chemistry, but mainly applied to light concepts, not practical examples.

We rewired the entire station, including constructing audio cables with various different types of connectors such as XLR, RCA, and 1/4 and 1/8 inch stereo. This is important practical experience for any technical degree. I would now be confident in running wire through ceilings and organizing them in a manner to reduce interference from high power devices.

In the second and third semesters, I learned the intricacies of audio processors. We worked with equipment such as Voice Processors, various types of microphones, equalizers, Dorough meters, and distributive amplifiers. I learned how these devices function and how they process analog and digital signals in order to achieve the desired effect.

Software:

We worked extensively with in-depth software that runs the radio station. We managed six computers, most of which ran Ubuntu or Debian. This was a unique experience because few computer science classes encourage the use of various operating systems. One application we used was Powergold which manages and organizes large amounts of music, and prepares it for broadcast using queues. Another was Rivendell; used for on-air broadcasting, this suite ties together the inputs and outputs with recording software and the music library.

We spent many hours updating computers, installing newer operating systems, and correcting bugs with drivers for the robust AudioScience card.

The Website:

We built a website, using Drupal, that was similar in execution to my Capstone project. This required extensive scripting in order to tie the site to the status update for the radio station. We wrote scripts to provide a stream for listeners, automatically updated list of DJs and recorded shows. We also wrote scripts to create a "now playing" list based on logs from the Rivendell suite. All of these features were tied in to the website with a Drupal foundation. Other features include CAS Authentication, Google Calendar integration, blogs for each DJ or scheduled show, and chat capabilities.

Conclusion:

I would like to use the seven credits that I earned during my time with KJACK to fulfill the technical elective section. I have learned an extraordinary amount working for the radio station, and my responsibilities there could not be more relevant to Computer Science and Engineering. I would be happy to attach more information about the research articles we studied, and the required work logs, at your request.