

Computer Engineering – Certificate Descriptions

C PROGRAMMING – OPEN SOURCE DEVELOPMENT (C40160B)

This certificate provides a solid programming foundation in C and C++, the primary programming languages used for Linux kernel, system, and utility code. Students may choose to substitute Java instead, with permission of the CET department head. Once a solid foundation is built with respect to the moving parts of open source programs (i.e. threads, processes, dynamic libraries, and so on), the student masters some of the many tools that support the open source development community. Examples of such tools are CVS, SourceForge, Bugzilla, GNU tools, Eclipse, scripting languages and so on. The list of tools may evolve to keep pace with the fast changing open source landscape. Upon completion, students should be able to participate in open source code development, whether contributing bug reports to existing SourceForge projects or sponsoring their own projects. Open source software developers start between \$38,000 and \$50,000 per year, depending on background, and can earn \$100,000 or better with experience. For entrepreneurs, there is no practical salary cap. It's a whole new ballgame, so jump in and play! Required courses are:

CSC133 – C Programming
CSC134 – C++ Programming (*Or Java or Python or Perl, with permission.*)
CSC233 – Advanced C Programming
CET251 – Software Engineering Principles (*Assumes Linux proficiency.*)

PENTIUM SYSTEM ARCHITECTURE (C40160D)

The Pentium (x86) processor family, long familiar to consumers due to its dominance in the personal computer market, is increasingly being deployed in new settings from aircraft control to embedded robotic systems. Extension of the x86 platform is also driven by the widespread adoption of Linux, a free, high performance operating system applicable to everything from cell phones to super-servers. This certificate provides the student with a solid foundation in digital electronics and microprocessor operations, followed by a specific examination of the Pentium architecture versus PowerPC, AMD, and various microcontrollers. Whether you simply want to understand how to tune PC performance, or whether you want to build a new processor-based system of your own, this certificate can help. When coupled with additional electronics or low-level programming skills, employment opportunities start between \$30,000 and \$50,000 per year and can range up to \$100,000 per year with experience. For entrepreneurs, there is no practical salary cap. Required courses are:

ELN133 – Digital Electronics
ELN232 – Introduction to Microprocessors
CET222 – Computer Architecture
CET111 – Computer Upgrade/Repair I

LINUX KERNEL DEVELOPMENT (C40160E)

The Linux phenomenon is driven by a combination of the open source Linux kernel, open source tools, and the widespread porting of these to diverse processor platforms. Linux now runs on everything from cell phones to super-servers, and Linux distributions are too numerous to keep up with. This certificate provides a foundation in programming languages, development tools, and processor architecture to provide the kernel context, followed by a detailed examination of kernel operation and creation. Various kernel configurations, such as live (CD-bootable) kernels, remote boot (PXE) kernels, and small footprint kernels for embedded systems will be studied *and built* by the students. Kernel skills are highly technical; salaries range widely, from \$35,000 to \$100,000 per year. Required courses are:

CSC233 – Advanced C Programming (*Requires CSC133 or CSC134 or experience.*)
CET251 – Software Engineering Principles (*Assumes Linux proficiency.*)
CET222 – Computer Architecture
CET193 – Selected Topics in Computer Engineering