EE 1301 - Introduction to Computing Systems

Catalog Description: (4 credits; prereq Concurrent registration is required (or allowed) in MATH 1271 or Concurrent registration is required (or allowed) in MATH 1371)

Fundamental concepts of programming, binary arithmetic, data representation, data types/structures, arrays, pointer addressing, control flow, iteration, recursion, file I/O, basics of object-oriented programming. A lab is integral to the course.

Textbook (both optional):

- Y. N. Patt and S. J. Patel, "Introduction to Computing Systems: From Bits and Gates to C and Beyond", second edition.

- Kernighan and Ritchie, " The C Programming Language", 2nd Edition. (You can find it either new or used in good bookstores or from online sellers, or rent it from the usual places.)

Course Objectives and Outcomes: The main objective of this course is to provide students with solid C programming skills and some level of understanding of the underlying hardware that runs them. The weekly C programming lab is an integral component of the course. Students also work on end-of-semester projects that could be purely software or hardware/software based on existing boards such as the Arduino platform. The students learn how compilers, assemblers, and linkers (and of course the computers themselves) work, data representations, basic programming constructs, arrays, file I/O, dynamic memory management, recursive functions, basic pointer arithmetic and data structures such as linked lists, and a brief introduction to object-oriented programming.

Course Outline:
There are 15 weeks in the course, and 3 hours per week.

Chapters in the two optional textbooks are marked as PP x (Patt and Patel), and KR y (Kernighan and Ritchie).

topic	hours	"text"
Fundamental concepts: computers, compilers	3	PP 4, 11
"Hello World" program, data types, basic arithmetic	2	KR 2, PP 12
Arithmetic Operator Precedence, Casting	1	KR 2
IF-else constructs and conditional expressions	3	KR 3, PP 13
Basic Loop Constructs (while, for)	6	KR 3, PP 13
Arrays (1D and 2D)	3	KR 5, PP 16.3
Variable addresses in memory, including 2D arrays	3	KR 5, PP 16.2
Data Structures, struct	3	KR 6, PP 19
Functions	3	KR 4
Global and local variables, array initialization	3	KR 4
Recursive Functions, File I/O	3	KR 7, 8, PP 17, 18
The C library, strings	3	KR Apdx B
Dynamic Memory Management	3	KR 8
An Introduction to Object-Oriented Programming	6	—

Grading:

Laboratories:	25%
Mid-Term:	30%
Project:	15%
Final Examination:	30%