ELEC5260/6260 - Embedded Computing Systems
Spring Term, 2012

2012 Catalog Data: ELEC 5260/6260. EMBEDDED COMPUTING SYSTEMS (3). Pr. ELEC 2220 or COMP 3350. The design of systems containing embedded computers. Microcontroller technology, assembly language and C programming, input/output interfacing, data acquisition hardware, interrupts, and timing. Real-time operating systems and application programming. Embedded system application examples.

Textbook: Computers as Components: Principles of Embedded Computing System Design. 2nd Edition, Wayne Wolf, Morgan Kauffman, 2008, ISBN 978-0-12-374397-8 (Soft cover)

References: Professor Wolf's book web site: http://www.waynewolf.us/embedded-book-2e/
Course Web Site: http://www.eng.auburn.edu/~nelson/courses/elec5260_6260/

Coordinator: Victor P. Nelson, Professor of Electrical & Computer Engineering

Goals: This course examines intelligent systems that are embedded into products such as automobiles, mobile phones, appliances, motors, etc. The use of computer hardware and software in the design of real-time embedded systems will be studied, including input/output interfacing, timing and interrupts, application programming, real-time operating systems, and networks. Several case studies will be examined, looking at both hardware and software.

Primary ELEC/ECPE/WIRE undergraduate program outcomes related to this course:

Outcome 1. Ability to apply knowledge of math, science and engineering to solve problems.
Outcome 2. Ability to apply in-depth knowledge in one or more disciplines
Outcome 3. Ability to design an electrical component or system to meet desired needs.
Outcome 6. Proficiency in the use of computers and other modern tools to solve engineering problems.

Prerequisites by topic:

1. Computer organization and system design
2. Assembly language & C programming

Class Meetings: Monday, Wednesday & Friday, 9:00 to 9:50 a.m. in Broun 306.

Topic #	Topics:	Text Sections
1	Introduction to embedded systems & examples	1.1, 1.2
2	Embedded system design & modeling with UML	1.3, 1.4, Apdx. A
3	Embedded CPUs, ARM instruction set	2.1, 2.2,Web doc's
4	ARM "uCdragon" development board	Web documents
5	DSP instruction sets (TI C55x)	2.3
6	Input/output programming	3.1
7	Interrupts and real-time operation	3.1, 3.2
8	Memory systems	3.4
9	System performance & power consumption	3.5, 3.6
10	Computing platforms – buses	4.1, 4.2
11	I/O devices	4.3, 4.4, 4.5
12	Embedded program design & modeling	5.2 – 5.6
13	Embedded operating systems, processes	6.1, 6.2
14	Static and real-time scheduling	6.2, 6.3
15	Inter-process communication	6.4
16	Multiprocessor systems	7.1, 7.2, 7.3
17	Consumer electronics architecture	7.4 - 7.8
18	Real-time embedded networks	8.2 - 8.6
19	Embedded system design methodologies	9.1 - 9.4
20	Embedded system design case studies (throughout the course)	End of each chapter
	Friday, May 4 (8 a.m. - 10:30 a.m.) - Final Exam	

Method for Evaluating Student Performance:

Mid-term Exams (2) @20%:	40%
Homework Assignments:	40%
Final Exam:	20%

Policy on Unannounced Quizzes:

There will be no unannounced "pop" quizzes.

Policy on Attendance:

Attendance is strongly encouraged, but will not be recorded.

Computer Usage/Laboratory Projects:

There will be a number of system design projects, utilizing ARM development boards (uCdragon), in addition to a few "paper designs". ELEC 5260 and ELEC 6260 students will do different projects after mid-semester. Programming will be done in assembly language and/or C, to be compiled by the Kiel MDK-ARM IDE tools (evaluation version is a free download at http://www.keil.com/demo/eval/arm.htm).

Special Accommodations:

Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by E-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Haley Center, 844-2096 (V/TT).

Academic Honesty Policy:

All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Estimated ABET Category Content:

Engineering Science: 1 credit or 33%
Engineering Design: 2 credits or 67%

Prepared by: Victor P. Nelson Date: January 8, 2012