



CS 738

Embedded Systems Programming

Spring 2016 (short) Syllabus (sv2)

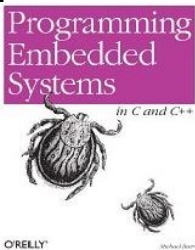
I will see you in class on Tuesdays and Thursdays from 11:00 a.m. to 12:15 p.m. in Jabara Hall 261.

COURSE OBJECTIVE:

Demands for embedded systems are ever growing. The objective of this course is to study the design and programming of hardware/software embedded systems using Assembly/C/C++ languages. Special attention is given to application oriented programming and research oriented team-project activities.

TEXT BOOK

Reference Books



Programming Embedded Systems: With C and GNU Development Tools by Michael Barr and Anthony Massa; O'Reilly Media; 2 ed. (Feb. 2009). If you have programming experience and a familiarity with C, *Programming Embedded Systems* (2nd Ed.) is the right book for you.

Embedded System Design: A Unified Hardware/Software Introduction by Frank Vahid and Tony D. Givargis; Wiley, New ed. (Oct. 2001); introduces a modern approach to designing embedded systems in a unified manner.



A S MD Asaduzzaman (DRZ), Instructor

Please contact me!



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Phone: (316) 978-5261

@ Abu.Asaduzzaman@wichita.edu

Student / Office Hours:

Tuesdays and Thursdays
12:15 – 1:45 p.m.



!! Handouts via Blackboard !!

GTA: Kishore K. Chidella



I am here to help!

kkchidella@wichita.edu

CAPPLab @ Jabara Hall 245
Tue & Thu 12:30–1:30 p.m.

Definition and Assignment of Credit Hours:

Success in *this 3 credit hour course* is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction and preparation/studying or course related activities for a total of *135 hours*.

Course Learning Outcomes

- ◆ Understand embedded systems programming – languages, development boards and tools, etc.
- ◆ Know and apply various sensors programming (using ADC, PWM, etc.).
- ◆ Effectively program DC motors for different control systems.
- ◆ Realize different Timers and program them to design complex embedded systems.
- ◆ Identify and program multiple interfaces.
- ◆ Comprehend the State Machine and Concurrent Process Model concepts for embedded systems.
- ◆ Become knowledgeable about contemporary embedded systems design factors and performance issues.
- ◆ Comprehend and use general purpose popular processors and software.
- ◆ Able to program standard single purpose processors and peripherals.
- ◆ Obtain skills for efficient use of memory in embedded systems; cache memory to improve performance to power ratio.
- ◆ Work in a team; give demo, perform oral presentation, write technical report, etc.

GRADING

WSU uses a +/- grading scale to calculate grade point averages for final grades. In this class, grades are assigned using the chart below. It is important to note that other classes may assign grades differently so make sure you understand the different grading policies in all of your classes for each semester.

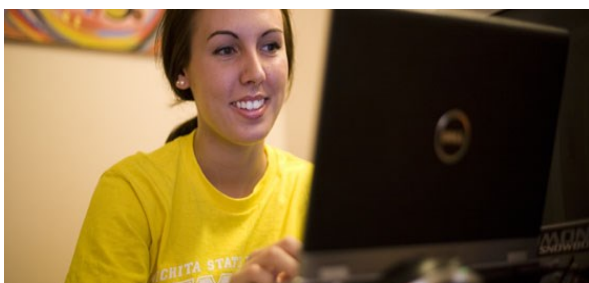
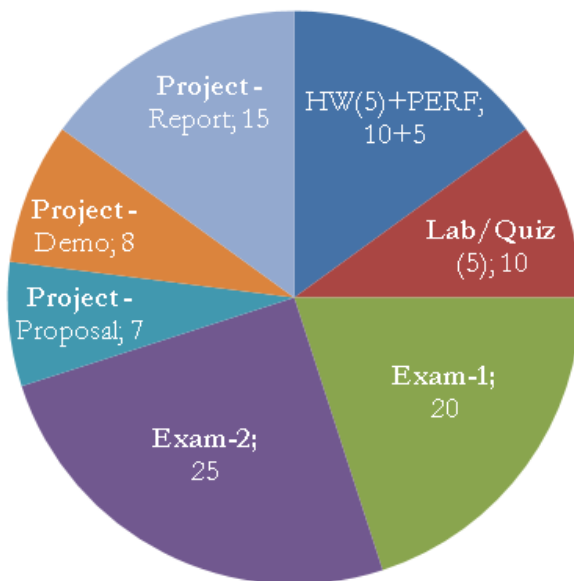


Earned Points	Letter Grade	Grade Points
93 +	A	4.00
90 +	A-	3.70
87 +	B+	3.30
83 +	B	3.00
80 +	B-	2.70
77 +	C+	2.30
73 +	C	2.00
70 +	C-	1.70
67 +	D+	1.30
63 +	D	1.00
60 +	D-	0.70
Below 60	F	0.00

Extra Credit

Opportunities for extra credit will be available at various points throughout the course. You are encouraged to use these opportunities to improve your grade.

Breakdown of Available Points



BLACKBOARD

The Blackboard system is available for you to access through your MyWSU login. This is where you will find all of your assignments posted, be able to contact your instructor and access additional resources that will help you succeed in this course. You should try to logon to Blackboard to view important announcements, access course content and check the status of your grade. Students have free access to computers in the Ablah Library and in various student computing labs around campus.

Academic Integrity

Students are responsible for knowing and following the **Student Code of Conduct** and the **Student Academic Honesty** policy

Code of Conduct at (http://webs.wichita.edu/inaudit/ch8_05.htm)

Academic Honesty at (http://webs.wichita.edu/inaudit/ch2_17.htm)

Students who commit acts of academic dishonesty in this course will automatically fail the assignment or fail the course, at the instructor's discretion. No exceptions will be made to this policy. It is up to the student to understand and follow standards of academic honesty, appropriate use and citation of materials created by others, and other standards for academic work. If you have questions about any of this, ask your instructor. Claiming to not understand the standards of academic integrity will never be an acceptable excuse.

Notice of Nondiscrimination

Wichita State University does not discriminate in its programs and activities on the basis of race, religion, color, national origin, gender, age, sexual orientation, marital status, political affiliation, status as a veteran, genetic information or disability. The following person has been designated to handle inquiries regarding nondiscrimination policies: Director, Office of Equal Employment Opportunity; telephone (316) 978-6791

General Information

The **outcomes** of this course include: (i) Students learn to apply knowledge of programming embedded systems using Assembly/C/C++, emphasizing control of tasks/devices, process interrupts, interfacing to assembly and high-level languages, etc. (ii) Students recognize the need for and an ability to engage in continuing professional development. And, (iii) students learn how to use current knowledge and skills necessary for future embedded systems.

The **pre-requisite** for this course is CS 594/594L (or equivalent). Students who enroll in this class are expected to have a good understanding of microprocessor architectures and adequate knowledge in Assembly/C programming languages. By continued enrollment in this class, you are certifying that you have met the pre-requisite.

SPECIAL NOTES

If you have a physical, psychiatric/emotional, or learning disability that may impact your ability to carry out assigned coursework, contact the Office of Disability Services. Grace Wilkie Annex Room 150, (316) 978-3309 (voice), (316) 854-3032 (videophone)

Get emergency information that you need by signing up for the Shocker Alert System. You will be notified of any emergency or weather alerts that affect the campus. Sign up at www.wichita.edu/alert.

WSU's Student Health Services is located on the 2nd floor in Ahlberg Hall. You can be seen for preventative care or for minor injuries. All services are low cost and confidential. For more information, go to www.wichita.edu/shs.

The WSU Counseling and Testing Center provides professional counseling services and administers tests. All services are low cost and confidential. 320 Grace Wilkie Hall, (316) 978-3440

MY EXPECTATIONS

Show respect for your fellow students, your GTA, and your instructor at all times by doing the following:

- ⇒ Listen to others and wait for your turn to contribute to class discussions.
- ⇒ Personal electronic devices are distracting and cause the mind to wander so they should be off and put away during class (clickers are the exception).
- ⇒ Let me know if you will be absent from class for any reason. I will be able to excuse you for a valid reason if you have documentation.
- ⇒ Turn in all assignments on time to avoid the penalty of 10% per day. No late submission after five days from the original due date/time. No late submission for (group) project report. Use "handin" to submit.
- ⇒ Check your @wichita.edu e-mail daily to stay informed.
- ⇒ Participate in activities and discussions.
- ⇒ Have fun!!

Important Dates

Classes begin — January 19 (Tue)

20th Day Report Cutoff — Feb. 15 (Mon)

Mid-term point — March 9 (Wed)

Spring Break begins — March 14 (Mon)

Spring Break end — March 20 (Sun)

Classes end — May 5 (Thu) ←

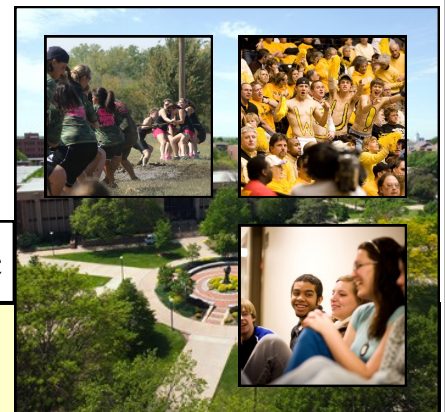
Study Day — May 6 (Fri)

Finals Exams — May 7 (Sat)-13 (Fri)

It's Your Time

I

know that college done right, will change you. I also want you to change this college. I challenge you to explore all that Wichita State has to offer and to leave your mark through your dedication and involvement.



Tentative Course Plan

Date ranges for each week of the semester	Remark	All of the topics, readings, assignments and reminders are located here so that you can organize your time and academic work. Please ask me any questions at any time (via e-mail) regarding this course.
Week 1 (Eval-1) 1/19, 1/21		CS 738: Embedded Systems Programming; Course Syllabus; K-probe ; Embedded Systems; Programming; DEMOED board; CodeWarrior Tools; Team Project ; HW-1 (assign); HW Submission/Grading Policy;
Week 2 1/26, 1/28	H1	Review; Team Project: Topics, Grading, etc. ; Reminder: Proposal due after Spring Break! HW-1: Due on Thu; hardcopy, before beginning of the class; Reminder: QUIZ/LAB 1-3! (Next 3 weeks; 30 minutes; closed book; note-sheet okay);
Week 3 2/2, 2/4	Q1 L1	Review; Lab-1: Programming Sensors; Quiz-1/Lab-1 (30-minute quiz, 45-minute Lab, Thu);
Week 4 2/9, 2/11	Q2 L2	Review; Lab-2: Programming Motors; Quiz-2/Lab-2 (30-minute quiz, 45-minute Lab, Thu);
Week 5 2/16, 2/18	Q3 L3	Review; Lab-3: Programming Timers; Quiz-3/Lab-3 (30-minute quiz, 45-minute Lab, Thu);
Week 6 2/23, 2/25	H2 L4	Review; Lab-4: Programming Interfaces; Reminder: EXAM-1 on Mar. 3! HW-2: Due on Thu; hardcopy, before beginning of the class; Lab-4 (45-minute), Thu;
Week 7 3/1, 3/3	Ex1	Overview: Exam-1; Due: P. Proposal (hardcopy, 7+ pages); discussions; Template on Bb; EXAM-1 (Thu, 70 minutes; Closed book; One 8.5x11 inches note-sheet is allowed);
Week 8 3/8, 3/10 Mid-term point	<u>L5</u> <u>3/9</u>	Exam-1 return; Lab-5: State Machine and Concurrent Process Model; HW-3 (assign); Lab-5 (Programming Control Systems, 45-minute), Thu; Reminder: Project Proposal (due after Spring Break)! 7+ pages; Template on Bb;
3/14 - 3/20		Spring Break!
Week 9 3/22, 3/24	H3	Embedded Systems Design: Introduction; HW-3: Thu; hardcopy, before the class; Project Proposal on Thu (no extension!);
Week 10 3/29, 3/31	H4	Review; Embedded Systems: Design Factors, Performance issues; HW-4 on Thu; hardcopy, before beginning of the class; Reminder: Quiz-4 next week!
Week 11 4/5, 4/7	Q4	Review; General-Purpose Processors: Software; Quiz-4 (30-minute, Thu);,
Week 12 4/12*, 4/14	H5	Review; Standard Single Purpose Processors: Peripherals; HW-5 on Thu; hardcopy, before beginning of the class; Reminder: Quiz-5 next week!
Week 13 4/19, 4/21	Q5	Review; Memory; Cache memory to improve performance to power ratio; Quiz-5 (30-minute, Thu);,
Week 14 4/26, 4/28		Project Demonstration; oral presentation – class/outside, 15/60 minutes per group; Project Report (15+ pages per group); Reminder: EXAM-2 on May 5!
Week 15 5/3, 5/5	Ex2	Overview: Exam-2 (Cumulative, Thu); Future of Embedded Systems; EXAM-2 (Thu, 70 minutes; Closed book; One 8.5x11 inches note-sheet is allowed); Project Report: Due by 5 PM on May 6; 15+ pages per group, hardcopy, Word file, Template and Information on Bb;
Final Week 5/7 - 5/13	NA	Finals None