Instructor:
Dr. David Shaffer
Room 159 Hoyt Science
Cell: (724)372-0430 (please include your name in text messages)
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D2L: I post labs, projects, homeworks, announcements and other useful information on D2L. It is your responsibility to check it daily for updates.

Location: Patterson Hall 103

Prerequisite: CS311 (Computer Architecture)

Text: I recommend Make: AVR Programming by Elliot Williams. We will use a collection of online resources posted on D2L.

Objectives:
You will learn
- design and implementation of multiprogramming operating systems
- design and implementation of process synchronization primitives such as mutexes, semaphores
- to use the GNU toolchain for software development on embedded systems
- design and implementation of process intercommunication tools such as queues, mailboxes and events
- design and implementation of file systems
- design decisions associated with operating systems for embedded processors
- process scheduling algorithms
- memory management and virtual memory design, implementation and impact on programming
- differences between threads and processes and how to use each of them
- the impact of security on operating system design and existing security models

This class will focus on the development of a Real Time Operating System for the Atmel ATmega1284p processor.

Your responsibilities:
- Read ahead and understand text material.
- Complete/master the text, homeworks, labs and projects.
- Seek help immediately if you are struggling.
- Learn the material.
- Perform substantial work outside of class.
Grading:
Letter grades are assigned based on the percentage of the available points that you receive. The grading scale is fixed. **I do not curve.** The grading scale is as follows:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Percentage</th>
<th>Letter</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>[92,100]</td>
<td>A-</td>
<td>(90,92)</td>
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<tr>
<td>B+</td>
<td>(88,90)</td>
<td>B</td>
<td>(82,88)</td>
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<tr>
<td>B-</td>
<td>(80,82)</td>
<td>C+</td>
<td>(78,80)</td>
</tr>
<tr>
<td>C</td>
<td>(72,78)</td>
<td>C-</td>
<td>(70,72)</td>
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<tr>
<td>D</td>
<td>(60,70)</td>
<td>F</td>
<td>(0,60)</td>
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Attendance: You are expected to attend all classes. Attendance will not constitute part of your grade but failure to attend can result in no credit for missed labs, assignments, tests, quizzes etc. I do not provide class notes to students who miss class, excused or unexcused. You must **contact me in advance** if you are going to miss a class or you will get a zero on any work due or completed during that class.

Labs: A substantial portion of the class periods will be spent in the hands-on lab environment. Grading of labs will be based on:

- Preparation – did you correctly complete the preparatory assignment and do you understand the concepts necessary for the lab?
- Performance in lab – did you complete a reasonable portion of the lab during the class period?
- Completion of assignment – did you complete the lab assignment correctly and by the designated date?
- Independence – was your lab work reasonably independent? Points will be deducted for excessive cooperation with classmates such as copying **or consultation of a significant sections of their code.** Labs must be completed individually, with some help from your instructor or with a **very small amount of help from classmates.**

Point value of the labs may depend on their level of difficulty and is indicated clearly on the lab instructions.

Homework:
Homework assignments will be given to supplement the lab material or to cover material not relevant to our embedded system. Point value of homeworks will depend on their level of difficulty.

In-class exams:
There will be no in-class exams in this course.

We will meet during the final exam period for a “final lab.” This lab will be discussed in more detail towards the end of the semester.

Quizzes:
Quizzes may be given at any time throughout the semester. They will be worth 10 to 15 points each. Make sure you follow lectures and complete homework and reading assignments to help you prepare for quizzes.

Academic policies:
The department of Mathematics and Computer Science has a set of guidelines regarding academic honesty which can be found at: http://www.westminster.edu/staff/bonomojp/cheating.html

Unless otherwise specified all exams and projects must be entirely individual work. “Verbal” cooperation on lab projects is encouraged but the exchange of programs or program fragments either electronically or by visual inspection is not allowed. Keep your work to yourself and don’t copy from others.

Cheating on exams, quizzes or projects will result in a grade of 0 (zero) for that item. All academic policies offenses will be referred to the college dean.

**Special note:** Special attention should be paid to the policies on projects discussed above. That is, if you violate the policies regarding projects, I will report the incident to the Dean of the college and you will receive no credit for that project. In many cases it is very easy to identify cases of cooperation so **DON'T DO IT.**
**Disabilities and special needs:** I will make any necessary, reasonable accommodations for students with disabilities. If you have a disability which requires accommodations, it is your responsibility to indicate to me that you have a disability and to discuss with me what special needs you might have regarding this class. In addition to notifying me, if you have a disability which requires class accommodations, you must make it known to Westminster College’s student affairs office so that they can send me the proper paperwork.

Westminster College actively strives for the full inclusion of all our students. Students with disabilities who require access solutions for environmental or curricular barriers should contact Corey Shaw, Director of Disability Support Services, located in 209 Thompson-Clark Hall. phone: 724-946-7192 e-mail: shawcj@westminster.edu.