Department of Electrical and Computer Engineering

**EEL 4730 – Programming Embedded Systems
Fall Semester**

Instructor   :   Dr. Herman Watson
Office Hours   :   by appointment with Zoom meeting

Tuesday & Thursday 3:30 – 5:00 pm

Office   :   EC - 3951
Sec. Phone   :   305.348.2807
Email   :   watsonh_fiu@yahoo.com (Note underscore) <<<< Use this email

Classroom/Time
                      :   RVC: Online

Web Page   :   http://web.eng.fiu.edu/watsonh/

Catalog Description:
Embedded Systems implementation using programming of synchronous state machines to capture behavior of time-oriented systems for running on microcontrollers.
(3 Credits)

Textbook – license required:
Frank Vahid and Tony Givargis
Programming Embedded Systems
zyBooks.com

Course Objectives:
Through successful completion of the course, the student will:
        Understand the stages of the embedded system problem solving process and
        and a relationship to the development of software for implementation.
        Use C Language to capture and study time-oriented behavior of systems.

Relationship of course to program outcomes:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Topics Covered:
- Introduction to embedded systems
- Bit-Level manipulation in C
- Time-ordered behavior and state machines
- Time intervals and synchronous SMs
- Input/output
- Concurrency
- Creating a task scheduler
- Communication
- Utilization and scheduling
- Embedded system coding issues

Grading Scale:		
A	92-100	"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."
A-	90-92	
B+	88-90	
B	82-88	
B-	80-82	
C+	78-80	
C	70-78	
D	60-69	
F	< 60	

Department Regulations Concerning Incomplete Grades
To qualify for an Incomplete, a student:
1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the Instructor. All missed work must be finished before last two weeks of the following term.

Policies:
1. **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result in at least a failing grade for the course.
2. **Absences:** Resolution of absences and materials missed are student responsibility
   Unexcused Absences: Two unexcused absences are permitted during the term. More than two will result in the loss of points from your final grade. (1 point per absence above two, 3 points per absence above 5).
   Excused Absences: Only emergency medical situations or extenuating circumstances are excused with proper documentation.
   1. Review documentation with the lecturer,
   2. email as a written record to watsonh_fiu@yahoo. (Note underscore)
      Name, SID, class, section, description and date of the absence
3. **On Time:** As in the workplace, on time arrival and preparation are required. Two "lates" are equivalent to one absence. (Leaving class early is counted the same as tardy.)
4. **Deadlines: Work is due by midnight on the date specified.** Late submissions within one week will receive up to half credit. **After one week, late work will not be accepted.** Late submissions are graded after the final exam. Participation deadlines are absolute – no late completions or makeups.
5. **Submissions: This class is paperless**. Submissions are made using the web form listed on the class web site. All submissions must be:
   a single document
   contain your name, date and time of completion within the document
   accessible by **anyone** and readable with a browser
   with a single URL reference. - permission: 'anyone with the link can view'.
6. **DO NOT** submit work by email.
7. Instructor reserves right to change course materials or dates as necessary.

Grading Scale: NOTE: There are *no makeup exams* offered

Topic	Percentage
Exam 1 *no makeup*	16%
Exam 2 *no makeup*	18%
Exam 3 *no makeup*	20%
Exam 4 *no makeup*	20%
Homework	10%

Participation
  Zybooks Exercises
  MQTT
	16%
	8%
	8%

Attendance	Unexcused absence penalty based on class policy

Class Schedule:

Module	Date	4730 Weekly Topic Fall Semester	HW Due Date
		Each chapter requires Participation exercises in text book	
1	08/22/22	Chap Z1 – Introduction V1 Order Now>>>>>>>>>>>>>>	HW01-Z1 08/30 Order your NodeMCU and Temp Sensors
2	08/29/22	Chap Z2 – Bit-Level in C V2, V3	HW02-Z2 09/06
3	09/05/22	Chap Z3 – State Machines V4, V5 (09/05 Mon Labor Day)	HW03-Z3 09/13
4	09/12/22	Tue: 09/13 Review V6/ **Thur: 09/15 Exam 1**	HW04-Z4 09/20
5	09/19/22	Chap Z4 – Time Intervals and Synchronous State Machines V7, V8	HW05-Z4 09/27
6	09/26/22	Chap Z6 – I/O, Chap Z5 – Multiple SM's V9, V10	HW06-Z6 10/04 HW07-Z5 10/04
7	10/03/22	Chap Z5 – Multiple SM's V11, V12	HW08-Z5 10/11
8	10/10/22	Tue: 10/11 Review V13 / **Thur: 10/13 Exam 2**	
9	10/17/22	Chap Z8 – Task Scheduler V14	HW09-Z8 10/25
10	10/24/22	Chap Z7 – Communication V15, V16	HW10-Z7 11/01 MQTT-L1
11	10/31/22	Chap Z10 - Utilization & Scheduling V17, V18 (10/31 Last Drop)	HW11-Z10 11/08 MQTT-L2
12	11/07/22	Tue: Review V19 **Thur: 11/10 Exam 3**	MQTT-L3 11/15
13	11/14/22	Tue: Chap Z9 – Programming Issues V20 Thur Chap Z11 – Control Systems V21	MQTT-L4 11/22
14	11/21/22	Chap 12 – Basic DSP V22 Tue - PQDSP (11/24-25 Thur-Fri Thanksgiving)	
15	11/28/22	Tue 11/39 Review V23 **Thur 12/01 Exam 4** **Senior Design Day: 12/02**	
16	12/05/22	No Final Exam in this course	