CPET-561 Embedded System Design

Fall 2241

Class Meeting:

Lectures: Mon and Wed 9:00am – 9:50am WAL-A420
Fridays Online using office hours link below
Labs: Tuesdays 2:00pm – 3:50pm GOL-1360
Wednesdays 4:00pm – 5:50pm GOL-1360

Instructor:

Holly Dickens
Office: GOL-1345
Phone: 585-475-5236
Please use following link for online class and personal meetings: https://rit.zoom.us/my/hldiee
Email: hldiee@rit.edu - Please use your RIT email account when sending emails.

Course Description:

This is an embedded systems architecture and design course. Microprocessor, as well as system level design principles, will be analyzed from both a hardware and software perspective. Assembly language and C are used to develop software applications for a 32-bit embedded processor. Application software emphasizes interrupt driven operation and peripheral interfacing. A hardware description language (VHDL) is used to design and debug embedded components for an FPGA-based system.

Students, upon successful completion of the course, will be able to design and debug hardware and software systems, evaluate design trade-offs and choose the best design solution, and perform functional and timing analysis of an embedded system.

Pre-Requisite: CPET-253 (Microcontroller Systems & Lab), CPET-343 (Hardware Description Language & Lab)

Co-Requisite: CPET-561-0L01 (Embedded System Design Laboratory)

Intended Learning Outcomes:

1. Design embedded systems using softcore processor
2. Use version control to track changes and implement features
3. Use I/O devices and peripherals
4. Interface and size different memory devices
5. Implement custom intellectual property cores
6. Design and implement custom busses and interfaces protocols
7. Properly constrain designs using timing analysis
8. Use benchmarking to measure hardware acceleration and design improvements

Course Grading Policy:

- Weekly Demos - 10%

  Demos will be assigned and collected weekly. Each demo will be graded for completeness and accuracy. Demonstrations may be completed during Fridays lecture or a video may be submitted to the dropbox by 11:59pm the day it is due.

- Weekly Quizzes - 10%

  Weekly quizzes will help review lecture materials. Each quiz will be 10 questions and 15 minutes will be allowed for the online quiz. Review of the material will be necessary to complete the quiz on time. Quizzes will be due Sundays by 11:59pm.

- Hour Exams (2) - 20%

  There will be two 50 minute exams given during class time in person. Make-up exams will only be allowed for extreme circumstances. If you have a conflict, please make arrangements ***prior*** to the exam date. See schedule for exam dates.

- Final Examination - 20%

  The final examination date and time are set by the university and may not be changed unless there is a direct conflict with another exam or you have more than 2 exams in one day.

- Labs -35%

  You MUST pass the lab section of this course with a 60% to pass ESD1. Labs will be assigned and collected as indicated in the lab schedule posted on myCourses. Each lab will be graded for completeness and accuracy. All lab materials must be zipped and submitted to the dropbox before a grade is given.
  Each lab will have equal weight toward the final lab grade.

- Class Participation and Attendance - 5%

  Class attendance and participation are critical for success in this class. As such, attendance is required and will be taken each day. At the end of the semester attendance will be heavily considered in determining the final grade for this section.

- Late Policy

  All lab and demo assignments are subject to the following late penalties. There will be no additional extensions except for in extreme circumstances.

  - Due date to 1 week late : 10 point penalty
  - 1 week – 2 weeks late : 25 point penalty
  - After 2 weeks late : No labs will be accepted

- Final Letter Grade

  Your final letter grade for the class will be based on the following scale that has been determined by the ECTET department:

93.00 – 100.00	A
90.00 – 92.99	A-
87.00 – 89.99	B+
83.00 – 86.99	B
80.00 – 82.99	B-
77.00 – 79.99	C+
73.00 – 76.99	C
70.00 – 72.99	C-
60.00 – 69.99	D
00.00 – 59.99	F

- Grade Dispute

  If you feel that you have been unfairly graded on any test or assignment, you will have 2 weeks from the time the work is returned to your mail folder to meet with your professor about it. It is your responsibility to check your mail folder regularly.

Course Supplies:
- There is no official text book for this class. Demos will replace the standard HW assignments.
- Altera DE1-SoC development board. Follow instructions in announcements.
- Altera Quartus Prime Lite Edition Software **v18.1.**

Lecture and Lab Schedule

The lecture and lab schedules are posted on myCourses. These schedules are an estimate and may change at any time. Look for changes in the announcements and in myCourses announcements page.

Academic Accommodations:

"RIT is committed to providing reasonable accommodations to students with disabilities. If you would like to request accommodations such as special seating or testing modifications due to a disability, please contact the Disability Services Office. It is located in the Student Alumni Union, Room1150; the website is www.rit.edu/dso. After you receive accommodation approval, it is imperative that you see me during office hours so that we can work out whatever arrangement is necessary."

Academic Dishonesty:

Students are encouraged to study together, but must do their own work. All students are required to submit original work. It is Plagiarism in any form will not be tolerated. All work is to be performed individually. At a minimum, plagiarism will result in a grade of 0% for that assignment as well as documentation of such being entered into the students' permanent records. If you are unclear as to what is considered plagiarism, please refer to the handbook: "Writing with Sources" by Gordon Harvey. This is on reserve in the library.

Policy C 6.0 Policy Prohibiting Discrimination and Harassment/Title IX Reporting:

RIT is committed to providing a safe learning environment, free of harassment and discrimination as articulated in our university policies located on our governance website. RIT's policies require faculty to share information about incidents of gender based discrimination and harassment with RIT's Title IX coordinator or deputy coordinators, regardless whether the incidents are stated to them in person or shared by students as part of their coursework.
If you have a concern related to gender-based discrimination and/or harassment and prefer to have a confidential discussion, assistance is available from one of RIT's confidential resources on campus (listed below).

1. The Center for Women & Gender: Campus Center Room 1760; 585-475-7464; CARES (Available 24 hours/7 days a week) Call or text 585-295-3533.
2. RIT Student Health Center – August Health Center/1st floor; 585-475-2255.
3. RIT Counseling Center - August Health Center /2nd floor - 2100; 585-475-2261.
4. The Ombuds Office – Student Auxiliary Union/Room 1114; 585-475-7200 or 585-475-2876.
5. The Center for Religious Life – Schmitt Interfaith Center/Rm1400; 585-475-2137.
6. NTID Counseling & Academic Advising Services – 2nd Floor Lynden B. Johnson; 585-475-6468 (v), 585-286-4070 (vp).

Student Success:

Success in this course depends heavily on your personal health and wellbeing. Recognize that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. Your other instructors and I strongly encourage you to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak.

Please feel free to reach out to me about any difficulty you may be having that may impact your performance in this course as soon as it occurs and before it becomes unmanageable.

In addition to your academic advisor, I strongly encourage you to contact the many other support services on campus that stand ready to assist you.