Class Meetings

Mondays and Wednesdays

Section 01: 11:00 - 11:50 CAR 1210
Section 02: 12:00 - 12:50 CAR 1210
Section 03: 1:00 - 1:50 CAR 1210
Section 04: 2:00 - 2:50 CAR 1210

Instructors

Jeanne Christman
Office: ENT 2134
Office hours: Posted in schedule or by appointment
Email address: jxciee@rit.edu

Communications: Email will be the primary mode of communication for all class announcements and individual correspondence. Please use your RIT email address when contacting me.

Course Description

This course introduces students to the underlying building blocks of digital and microcontroller systems. Topics covered in the study of digital design include: number systems, truth tables, Boolean algebra, combinational and sequential logic, and finite state machines. These digital fundamentals are used in conjunction with a simple microcontroller to teach register programming, reading and writing of digital I/O, bitwise operations, bit-masking and microprocessor architecture.

Co-Requisite: CPET-133 Laboratory

Intended Learning Outcomes

1. Convert a number between the decimal, binary, and hexadecimal number systems.
2. Analyze and design combinational logic circuits containing up to four variables.
3. Describe the operation of, and construction of the excitation tables for J/K, & D Flip-Flops, which have both synchronous and asynchronous inputs.
4. Analyze and design sequential logic circuits including finite state machines
5. Explain the operation of logic decoders and multiplexers and list their typical applications.
6. Use an integrated Design Environment with an FPGA-based design platform to simulate and implement digital designs.
7. Explain the differences between microprocessors, microcontrollers and their applications and systems.
8. Describe a microcontroller's hardware and how it can be programmed.
9. Configure the direction of a microcontroller port and use port pins to both output and input data.

Course Policies:

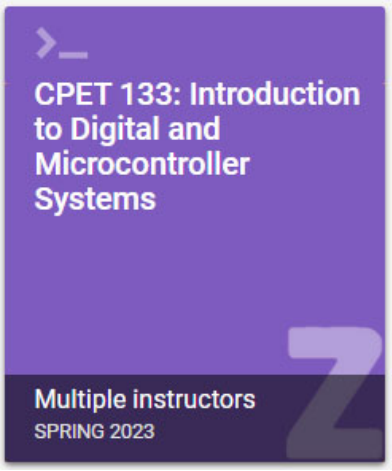
- Attendance and Textbook readings – 10%
  Attendance at each class is mandatory. You are allowed two unexcused absence for the semester. Following most lectures, there will be a short reading and participation activity assigned in the online textbook. These assignments will be graded on completeness (pass/fail) and are due prior to the next lecture.
- Homework and Quizzes -10%
  Quizzes will be given weekly on Wednesdays and will be based on the lecture content. The quizzes will be online in MyCourses and open from 9am – midnight. There will be weekly homework assignments, either in the online textbook (challenge activities) or to be submitted in MyCourses. The lowest grade from this category will be dropped from the average.
- Hour Exams (3) - 30%
  There will be three 60 minute exams given during the semester. The exams will be given during lecture and are scheduled for 9/25/2023, 10/23/2023 and 11/15/2023. Make-up exams will only be allowed for extreme circumstances. If you have a conflict, please make arrangements ***prior*** to the exam date.
- Final Examination - 20%
  The final examination day 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 two exams in one day. Do not make travel plans until the final exam schedule is finalized.
- Labs - 30%
  Please see the lab syllabus for lab requirements.
- **Important note for a blended lecture/lab class – The lecture portion of class accounts for 70% of the overall grade and lab accounts for 30%. Your average for the lecture section must be > 60% AND your average in lab must be > 60% in order to pass the class.**

- Final Letter Grade
  Your final letter grade for the class will be based on the following scale:

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

Course Supplies

- Textbook



To access the book ($64), complete the following steps:

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code: RITCPET133Fall2023
3. Subscribe – reference the top of this syllabus for your section number

- (optional) Altera Quartus Prime Lite Edition Software v18.1. Instructions for downloading the software can be found on MyCourses.
- (optional) 3-ring binder for lecture notes and lab materials

Use of MyCourses

- Lecture notes (PowerPoint) will be posted by Sunday each week. You should look at the notes prior to lecture so you are prepared. These notes will not be complete; it is recommended that you print them prior to class or have them in an electronic format so that you can annotate your own notes to the PowerPoint slides during class.
- Written homework assignments will be posted in the content section and should be submitted in the appropriate dropbox in the Assignments section. Assignments should be submitted using a single Word or .pdf file.
- All quizzes will be in MyCourses
- You should check MyCourses often for announcements and due dates.

Tentative Schedule

Week	Date	Topic	Lecture	Book sections (due by the next lecture)
	28-Aug	Introduction, Digital vs. Analong, Electronic Basics	1	1.1, 1.2
1	30-Aug	Basic Gates (NOT, AND, OR, NAND, NOR)	2	1.3, 1.4
	4-Sep	No class - Labor Day		
2	6-Sep	Timing Diagrams and Truth Tables	3	1.5, 1.6 , 1.7
	11-Sep	AOI and SOP	4	1.8, 1.9, 1.10
3	13-Sep	Karnaugh Maps	5	1.11, 1.12
	18-Sep	K-maps, XOR & XNOR	6,7	1.13,1.14, 1.15
4	20-Sep	Number Systems and 2's complement*	8	2.1, 2.2
	25-Sep	Exam #1		
5	27-Sep	Binary Arithmetic*	9	2.3,2.4, 2.5
	2-Oct	Muxes and Decoders	10	2.6, 2.7, 2.8, 2.9
6	4-Oct	flip-flops I	11	3.1,3.2
	9-Oct	No class - Fall Break		
7	11-Oct	Flip-flops II	12	supplemental
	16-Oct	registers and shift registers	13	3.3,3.4, 3.5
8	18-Oct	counters, Finite State Machines I	14	3.6 , 4.1
	23-Oct	Exam #2		
9	25-Oct	Finite State Machines II	15	4,2, 4.3, 4.4, 4.5
	30-Oct	Introduction to microcontrollers and embedded systems	16	5.1, 5.2, 5.3
10	1-Nov	C Programming	17	
	6-Nov	I/O Ports	18	5.4, 5.5
11	8-Nov	Bitwise operations I	19	
	13-Nov	Bitwise operations II	20	6.1, 6.2, 6.3
12	15-Nov	Exam #3		
	20-Nov	Code Structure and Software State Machines I	21	7.1, 7.2, 7.3
13	22-Nov	No Class - Thanksgiving Break		
	27-Nov	Software state machines II	22	7.4
14	29-Nov	PWM	23	8.1
	4-Dec	TimerA	24	
15	6-Dec	Architecture I	25	9.1-9.4
16	11-Dec	Review		

RIT Resilience

Success depends heavily on your personal health and well-being. **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 instructors strongly encourage you to **reframe** challenges as opportunities for growth. **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 your professors about any difficulty you are having that may impact your performance as soon as it occurs and before it becomes unmanageable. In addition to your academic advisor, you are strongly encouraged to contact a number of other support services on campus that stand ready to assist you.

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

As an institution of higher learning, RIT expects students to behave honestly and ethically at all times, especially when submitting work for evaluation in conjunction with any course or degree requirement. RIT Online encourages all students to become familiar with the RIT Honor Code and with RIT's Academic Integrity Policy.

Do not cheat and do not allow others to cheat from you. Avoid the appearance of cheating in this class.

D.08.0 Student Academic Integrity Policy:
IV. ACADEMIC INTEGRITY - A breach of student academic integrity falls into three basic areas: cheating, duplicate submission and plagiarism

A. Cheating: Cheating is any form of fraudulent or deceptive academic act, including falsification of data, possessing, providing, or using unapproved materials, sources, or tools for a project, exam, or body of work submitted for faculty evaluation.
B. Duplicate Submission: Duplicate submission is the submitting of the same or similar work for credit in more than one course without prior approval of the instructors for those same courses.
C. Plagiarism: Plagiarism is the representation of others' ideas as one's own without giving proper attribution to the original author or authors. Plagiarism occurs when a student copies direct phrases from a text (e.g. books, journals, and internet) and does not provide quotation marks or paraphrases or summarizes those ideas without giving credit to the author or authors. In all cases, if such information is not properly and accurately documented with appropriate credit given, then the student has committed plagiarism. If you are caught cheating on any assignment or exam, appropriate academic disciplinary

action will be taken to the fullest extent allowed by the University. Refer to your "Students Rights and Responsibilities" handbook for further guidance on the Academic Dishonesty policy at RIT.

https://www.rit.edu/academicaffairs/policiesmanual/d080.

Consequences of academic dishonesty: Any act of Academic Dishonesty will incur the following possible consequences. After notifying and presenting the student with evidence of such misconduct, the instructor has the full prerogative to assign an "F" for the offense, or to assign an "F" for the entire course. The instructor will inform and, if possible, meet with the student concerning the decision reached on the "F" for the offense, or the "F" for the entire course. A student may be brought before the Academic Conduct Committee of the College in which the alleged offense occurred, and may face academic suspension or dismissal from the Institute (See D17.0, Academic Conduct and Appeals Procedures," and D18.0, "RIT Student Conduct Process.").

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).

Diversity, Inclusion, and Respect

RIT has put forth Policy P05.0 Diversity Statement for all community member. RIT through its policies and practices is responsible for building an inclusive environment where membership in the community allows for faculty, staff and students to reach their fullest potential, both professionally and personally. RIT is committed to the development, administration and interpretation of policies and procedures in a way that is consistent with our commitment to diversity and is in compliance with federal, state and local laws. RIT's policies and procedures are administered in a way that supports fair treatment for all faculty, staff, students, and the RIT community at large.