PURDUE
UNIVERSITY

SCHOOL OF ELECTRICAL
AND COMPUTER ENGINEERING
UNDERGRADUATE COUNSELING OFFICE

To: The Engineering Faculty
From: School of Electrical and Computer Engineering
Re: ECE 20001

The School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 20001 Electrical Engineering Fundamentals I
Lecture: 3 credits
Semesters offered: Fall, Spring Summer
Non-repeatable

Pre-requisites: (ENGR 13100 or ENGR 14100 or ENGR 16100 or ENGR 13300) and (PHYS 17200 or PHYS 15200 or [ENGR 16100 and 16200]) and (MA 16600 Minimum Grade of C- or MA 16200 Minimum Grade of C-) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27101 [may be taken concurrently])

Requisites by Topic:
Prerequisites: Two semesters of calculus; complex numbers; computer literacy and experience with MatLab or equivalent; some familiarity with vectors and matrices. Concurrent Prerequisites: Third semester of calculus.

Course Description
This course covers fundamental concepts and applications for electrical and computer engineers as well as for engineers who need to gain a broad understanding of these disciplines. The course starts by the basic concepts of charge, current, and voltage as well as their expressions with regards to resistors and resistive circuits. Essential concepts, devices, theorems, and applications of direct-current (DC), 1st order, and alternating-current (AC) circuits are subsequently discussed. Besides electrical devices and circuits, basic electronic components including diodes and transistors as well as their primary applications are also discussed.

Reason
Content from current ECE 20100, 20200 and 25500 has been evaluated and redistributed into two new courses that will replace these three aforementioned courses. Please see syllabus (currently being taught as a variable title experimental course ECE 29595).

History of Previous Offering
This course has run as an experimental course for three semesters.

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ECE 29595 – Fall 2018

ECE Fundamentals I

1. **Instructor:**

   Dimitrios Peroulis, Reilly Professor of Electrical and Computer Engineering
   Associate Dean for External Affairs, College of Engineering
   Office: WANG 3057; phone: (765) 494-3491; email: dperouli@purdue.edu
   Lecture times: M,W,F: 9:30-10:20am at PHYS 223
   Office hours: M,T,W,R,F: 4-5pm at WANG 3057 and by appointment. Check the course website for changes on these (e.g. due to traveling).

2. **Textbook and Class Notes:**

   This class will be primarily based on class notes that will be made available to you through the class's website (Blackboard). The ECE 20100 indicated textbook (Linear Circuit Analysis: Time Domain, Phasor, and Laplace Transform Approaches, 3rd Edition, R. DeCarlo and P. M. Lin, Kendall Hunt, 2009, ISBN No. 9780757564994) is *not* required.

3. **General Class Information**

   This course covers fundamental concepts and applications for electrical and computer engineers as well as for engineers who need to gain a broad understanding of these disciplines. The course starts by the basic concepts of charge, current, and voltage as well as their expressions with regards to resistors and resistive circuits. Essential concepts, devices, theorems, and applications of direct-current (DC), 1st order, and alternating-current (AC) circuits are subsequently discussed. Besides electrical devices and circuits, basic electronic components including diodes and transistors as well as their primary applications are also discussed.

4. **Class Attendance**

   Attending class is very important. A good portion of your learning actually occurs in class. It is the time that you will be able to consolidate the material. If you must miss class, you are responsible for any material, information, handouts, announcements, etc. that you missed. Late arrivals and early departures from class can be very disruptive, so please keep these to a minimum.

5. **Class Participation - Piazza.com**

   This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. **It is likely that you will get an answer to your question much faster if you post it in piazza.com rather than if you email it to me or the TA.** The class on piazza is structured so you can discuss each homework and topics on each exam. Please post to the relevant thread to ensure a proper response.

   You will receive an invitation to join piazza. If you register late for the course or if you don't receive the email, please go to piazza.com and register for the class yourself using the link "piazza.com/purdue/fall2018/ece29595."

6. **Homework**

   Approximately three homework assignments will be distributed every week. All homework assignments will be distributed, submitted, and graded through the course website. Late homework will

NOT be accepted but the lowest four (4) homework scores for the semester will be dropped; no explanations required. This will allow a small buffer for late registration, illness, or hectic times of the semester. Working the homework is the only way to learn the material. Students who do not work the homework typically do not perform well in class.

You may work together as you solve your homework problems, as this can be an effective means of learning the material. You are however expected to find your own solution independently. Copying the solution from a shared set of notes will not help you learn and will be considered cheating.

Solutions to the homework assignments will be posted on Blackboard.

7. **Exams/Final Exam**

   We will have three (3) in-class exams. Each exam will be approximately 45-min. long. Their dates are listed in the syllabus. If you have a scheduling conflict with any examination you should discuss this with me at least two weeks ahead of time. An oral or written makeup exam may be given at the discretion of the instructor. An unexcused absence will result in a zero for the missed exam. Students missing an exam without permission from the Dean of Students Office will receive a zero. If you have three exams in one calendar day during Final Exams Week, you are allowed to reschedule one of them. Again, you should discuss this with me at least two weeks ahead of time.

   A written request to regrade a test must be filed with me within one week after the test results have been posted. No such requests will be honored after the one week deadline has passed.

8. **Quizzes**

   We will have five (5) in-class quizzes. Each quiz will be approximately 10-15-min. long. Unlike exams, these quizzes will primarily focus on concepts and their links to applications. If you have a scheduling conflict with any quiz you should discuss this with me at least two weeks ahead of time. An oral or written makeup exam may be given at the discretion of the instructor. An unexcused absence will result in a zero for the missed quiz. Students missing a quiz without permission from the Dean of Students Office will receive a zero. The lowest quiz grade will be dropped in calculating your course grade.

   A written request to regrade a quiz must be filed with me within one week after the test results have been posted. No such requests will be honored after the one week deadline has passed.

9. **Grading**

   Your final class grade will be the highest grade as calculated from the following two methods:

Method 1	
Homework	15%
Quizzes	15%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam	25%
TOTAL	**100%**

Method 2	
Homework	10%
Quizzes	15%
Exam with lowest grade	5%
Other exam	20%
Other exam	20%
Final Exam	30%
TOTAL	**100%**

Your course letter grade will be determined from your standing in comparison to your peers in this class. In addition to the grading scheme outlined above, each student must demonstrate a minimum level of competency in each of the Course Outcomes, as defined in our ABET accreditation standards. These course outcomes are listed in the class's website. You will have more than one opportunity to satisfy these ABET outcomes.

The primary means will be through the exams and quiizes. We will write questions for each exam and quiz around each of the Course Outcomes. You will satisfy each Course Outcome when your score for the test question(s) equals or exceeds a minimum value. If you fail to meet this level of minimal competency on a specific Course Outcome, you will have additional chances, typically on later exams that cover overlapping material. Alternate arrangements may be made in extenuating circumstances.

10. **Teaching Assistants**

You are encouraged to attend Prof. Peroulis office hours for questions on the class material, homework or anything else that concerns you. In addition, we will have a Teaching Assistant (Mr. Alden Fisher, fishe128@purdue.edu) who will assist you by holding additional office hours. The TA's office hours are as follows:

Monday: 12-4pm
Wednesday: 12-4pm
Thursday: 10am-12pm
Friday: 2-4pm
Location: Wang Hall 3003

11. **Calculator, digital devices, and Formula-page Policies**

The only calculator allowed for exams/quizzes will be the TI-30X IIS, as per policy of the School of Electrical and Computer Engineering. It is available online and at local retail stores.

No digital devices of any kind (e.g. cell phones, smart watches, etc.) will be allowed during an exam or quiz unless required due to medical reasons (e.g. pacemaker).

To avoid having to memorize formulas, we will provide some formulas for your use during the exam. We will post the formula page on Blackboard prior to each exam. You are NOT allowed to bring your own book, notes, or scratch paper to any of the exams

12. **Students with Documented Disabilities**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

13. **Academic Honesty Policy**

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

In addition, the Purdue Honors Pledge applies to this course. The statement as written by our own students is "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

Based on the above, we expect every member of the Purdue community to practice honorable and ethical behavior in and outside of the classroom. Any actions which might unfairly improve a student's score on homework, quizzes, or examinations will be considered cheating, and will not be tolerated. A few examples of cheating are:

- Submitting homework that is not your own work. While I encourage you to work together, your work should not be a copy of your partner's.
- Sharing results or notes during exams/quizzes.
- Bringing notes, in hard copy or electronic form, into an exam/quiz.
- Continuing work on your exam/quiz after we have called for papers.
- Requesting a regrade on an exam/quiz that has been altered.

Cheating on homework, quizzes, or exams will result in a zero score for the assignment/exam/quiz, or a failing grade for the course, at my discretion. I may also ask the Office of the Dean of Students to help me handle such cases.

14. **Electronic mass mail:**

A mass email list will be established so we can communicate with you easily. Important announcements and other information will be distributed through this email.

15. **Campus Emergencies**

Emergency preparedness is your personal responsibility. Please review the information discussed in class and the emergency preparedness attachment.

Please also keep in mind that in the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. In such an event, information will be provided through Blackboard and/or email.

EMERGENCY PREPAREDNESS SYLLABUS ATTACHMENT

EMERGENCY NOTIFICATION PROCEDURES are based on a simple concept – if you hear a fire alarm inside, proceed outside. If you hear a siren outside, proceed inside.

- **Indoor Fire Alarms** mean to stop class or research and immediately **evacuate** the building.
  - Proceed to your Emergency Assembly Area away from building doors. **Remain outside** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.
- **All Hazards Outdoor Emergency Warning Sirens** mean to immediately seek shelter (**Shelter in Place**) in a safe location within the closest building.
  - "Shelter in place" means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, an active threat including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency*. **Remain in place** until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave.

**In both cases, you should seek additional clarifying information by all means possible…Purdue Emergency Status page, text message, Twitter, Desktop Alert, Albertus Beacon, digital signs, email alert, TV, radio, etc.…review the Purdue Emergency Warning Notification System multi-communication layers at http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html*

EMERGENCY RESPONSE PROCEDURES:

- Review the **Emergency Procedures Guidelines** https://www.purdue.edu/emergency_preparedness/flipchart/index.html
- Review the **Building Emergency Plan** (available on the Emergency Preparedness website or from the building deputy) for:
  - evacuation routes, exit points, and emergency assembly area
  - when and how to evacuate the building.
  - shelter in place procedures and locations
  - additional building specific procedures and requirements.

EMERGENCY PREPAREDNESS AWARENESS VIDEOS

- **"Run. Hide. Fight.®"** is a 6-minute active shooter awareness video that illustrates what to look for and how to prepare and react to this type of incident. See: https://www.youtube.com/watch?v=5mzI_5aj4Vs (Link is also located on the EP website)

MORE INFORMATION

Reference the Emergency Preparedness web site for additional information: https://www.purdue.edu/ehps/emergency_preparedness/

ECE 29595 – ECE Fundamentals I – Fall 2018 Tentative Schedule

DATE	LECTURE NO.	TOPICS	CHAPTERS/ SECTIONS	HOMEWORK SET **DUE**
8/20-M	1	Basic concepts: general circuit elements, charge, current, voltage		--
8/22-W	2	Power, independent and dependent sources		1
8/24-F	3	Source connections; resistance and Ohm's law, Kirchhoff's Laws		2
8/27-M	4	Resistor combinations; voltage/current division		3
8/29-W	5	Kirchhoff's Current Law (KCL) and Nodal Analysis		4
8/31-F	6	Kirchhoff's Current Law (KVL) and Mesh Analysis		5
9/3-M		**NO CLASS – LABOR DAY**		--
9/5-W	7	Additional examples – **Quiz 1**		6
9/7-F	8	Dependent sources and equivalent resistance concept		7
9/10-M	9	Linearity and superposition		8
9/12-W	10	Thevenin's and Norton's theorems and source transformations		9
9/14-F		**EXAM 1**		--
9/17-M	11	Thevenin's and Norton's theorems: additional examples		--
9/19-W	12	Capacitance and capacitors		10
9/21-F	13	Inductance and inductors; Inductor/Capacitor combinations		11
9/24-M	14	First-order circuits: zero input response		12
9/26-W	15	First-order circuits: step response		13
9/28-F	16	Linearity/Response classification & waveform generation – **Quiz 2**		14
10/1-M	17	First-order circuits: applications		15
10/3-W	18	AC circuits: complex forcing function		16
10/5-F		**EXAM 2**		--
10/8-M		**NO CLASS – FALL BREAK**		--
10/10-W	19	Phasors: Ohm's phasor law, KVL & KCL		--
10/12-F	20	Impedance/admittance of 2-terminal devices		17
10/15-M	21	Sinusoidal steady-state (SSS) analysis		18
10/17-W	22	Frequency response		19
10/19-F	23	Instantaneous, average power and effective value		20
10/22-M	24	Power Transfer		21
10/24-W	25	SSS additional examples and applications – **Quiz 3**		22
10/26-F	26	Magnetically coupled circuits		23
10/29-M	27	Magnetically coupled circuits: applications		24
10/31-W	28	Semiconductors: Introduction		25
11/2-F		**EXAM 3**		--
11/5-M	29	Carriers in intrinsic semiconductors		--
11/7-W	30	Carriers in doped semiconductors		26
11/9-F	31	Energy bonding model		27
11/12-M	32	pn junction I		28
11/14-W	33	pn junction II		29
11/16-F	34	Diode circuits and applications I – **Quiz 4**		30
11/19-M	35	Diode circuits and applications II		31
11/21-W		**NO CLASS – THANKSGIVING BREAK**		--
11/23-F		**NO CLASS – THANKSGIVING BREAK**		--
11/26-M	36	MOSFET transistor structure and operation		--
11/28-W	37	MOSFET amplifiers I		32
11/30-F	38	MOSFET amplifiers II – **Quiz 5**		33
12/3-M	39	Transistors applications I		34
12/5-W	40	Transistors applications II		35
12/7-F		**REVIEW**		36
TBA		**FINAL EXAM** (*To Be Announced*)		