Course Description:
Principles of electrical circuits and systems. Basic circuit elements (resistance, inductance, mutual inductance, capacitance, independent and dependent controlled voltage, and current sources). Topology of electrical networks; Kirchhoff’s laws; node and mesh analysis; DC circuit analysis; operational amplifiers; transient and sinusoidal steady-state analysis; AC circuit analysis; first- and second-order circuits; and use of computer simulation software to solve circuit problems. Lecture and laboratory grades are computed independently.

Prerequisites: MATH 2313 (MTH 233)  
Co-Requisites: ENGR 2105 (EGR 215L)

Credits: 4 Hours  (Lecture: 3 Hours, Laboratory: 1 Hours)

Instructor: Hacer Varol


Supplemental Materials:

Topics Covered:
In this course the student will cover DC and AC circuit analysis techniques; Kirchoff’s Laws; Thevenin and Norton transformations; transformers; DELTA to Y transformations; operational amplifiers; 1st order circuits and brief introduction to 2nd order circuits

Course Learning Outcomes
By the end of the course, a successful student will be able to:

1. Explain the concept of electric potential, current, and power. (SO-1)
2. Identify concepts of electric network topology: nodes, branches, and loops. (SO-1)
3. Describe the relationship of ideal voltage and current in resistors, capacitors and inductors. (SO-1)
4. Describe the relationship of ideal voltage and current in mutual inductance. (SO-1)
5. Apply Kirchhoff’s Laws (KVL and KCL) to analyze electric circuits. (SO-1)
6. Explain the concept of Thevenin and Norton equivalent. (SO-1)
7. Apply Thevenin and Norton equivalent to circuits. (SO-1)
8. Analyze simple operational-amplifier circuits using an ideal op amp model. (SO-1)
9. Perform transient analysis of first- and second-order circuits. (SO-1)
10. Apply the phasor transform to sinusoidal steady state analysis of electric circuits. (SO-1)
11. Perform basic laboratory experiments using bench equipment. (Lab - SO-6)
12. Use simulation software to analyze electrical circuits. (Lab - SO-6)
13. Design circuits based on specific user requirements. (Lab - SO-2)
14. Write effective laboratory reports. (Lab - SO-3)
15. Understand importance of electric circuits in the real world. (SO-4)

**Student Outcomes**

Graduates of the program will have:

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
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
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
Course Outline:

Linear Circuit Analysis I
ENGR 2305 & 2105

Name: Hacer Varol
Email: hacer.varol@sfasu.edu

E-mail is the best way for our communication.

Note: You are expected to add “ENGR/PHYS 2305/2105” in the subject of each e-mail so that I can easily retrieve the emails from students in this course.

Phone: 936-468-2097
Office: STEM 207N
Office Hours: T 11:00 am – 12:00 pm, 2:00 pm – 3:00 pm (in-person)
W 12:00 pm – 3:00 pm (via Zoom)
TR 11:00 am – 12:00 pm (via Zoom)
I will gladly make appointments for other times.
Face-to-face meetings can be accommodated based on prior appointment requests.
The office hour via the following zoom meeting session link:
https://sfasu.zoom.us/j/99638780468?pwd=K3ROYXZtQzVNWU11OXISOSf4dmpzQT09

Department: Department of Physics, Engineering and Astronomy

Class meeting time and place:

Lecture – T-TR 9:30 am – 10:45 am, STEM 111 or via Zoom (see link below)
Lab – W 3:00 pm – 5:50 pm STEM 111

Note: This course will be delivered as Livestream & Face-to-Face Instructional Method. A student can choose to join the class via face-to-face or via zoom livestream.

Join Zoom Meeting
https://sfasu.zoom.us/j/93967766694?pwd=OGRTSHVua3h6T29RK2hyc1BPaDl5Z209

Meeting ID: 939 6776 6694
Passcode: 505770

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Principles of electrical circuits and systems. Basic circuit elements (resistance, inductance, mutual inductance, capacitance, independent and dependent controlled voltage, and current sources). Topology of electrical networks; Kirchhoff’s laws; node and mesh analysis; DC circuit analysis; operational amplifiers; transient and sinusoidal steady-state analysis; AC circuit analysis; first- and second-order circuits; and use of computer simulation software to solve circuit problems. Lecture and laboratory grades are computed independently.
Text and Material:

Course Calendar: (Tentative)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Chapter</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 23</td>
<td>Basic Concepts, Basic Laws</td>
<td>1, 2</td>
<td>No Lab</td>
</tr>
<tr>
<td>2</td>
<td>Aug 30</td>
<td>Basic Concepts, Basic Laws Methods of Analysis</td>
<td>2,3</td>
<td>Lab 1</td>
</tr>
<tr>
<td>3</td>
<td>Sep 6</td>
<td>Methods of Analysis</td>
<td>3</td>
<td>Lab 2</td>
</tr>
<tr>
<td>4</td>
<td>Sep 13</td>
<td>Methods of Analysis</td>
<td>3</td>
<td>Lab 3</td>
</tr>
<tr>
<td>5</td>
<td>Sep 20</td>
<td>Circuit Theorems</td>
<td>4</td>
<td>Lab 4</td>
</tr>
<tr>
<td>6</td>
<td>Sep 27</td>
<td>Circuit Theorems Exam 1 (Chapters 1,2,3)</td>
<td>4</td>
<td>Lab 5</td>
</tr>
<tr>
<td>7</td>
<td>Oct 4</td>
<td>Operational Amplifiers</td>
<td>5</td>
<td>Practicum</td>
</tr>
<tr>
<td>8</td>
<td>Oct 11</td>
<td>Capacitors and Inductors</td>
<td>6</td>
<td>Lab 6</td>
</tr>
<tr>
<td>9</td>
<td>Oct 18</td>
<td>First Order Circuits</td>
<td>7</td>
<td>Lab 7</td>
</tr>
<tr>
<td>10</td>
<td>Oct 25</td>
<td>Second Order Circuits Exam 2 (Chapters 4,5,6)</td>
<td>8</td>
<td>Lab 8</td>
</tr>
<tr>
<td>11</td>
<td>Nov 1</td>
<td>Sinusoids and Phasors</td>
<td>9</td>
<td>Lab 9</td>
</tr>
<tr>
<td>12</td>
<td>Nov 8</td>
<td>Sinusoids and Phasors</td>
<td>9</td>
<td>Lab 10</td>
</tr>
<tr>
<td>13</td>
<td>Nov 15</td>
<td>Sinusoidal Steady State Analysis</td>
<td>10</td>
<td>Lab 11</td>
</tr>
<tr>
<td>14</td>
<td>Nov 22</td>
<td>Thanksgiving</td>
<td></td>
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<tr>
<td>15</td>
<td>Nov 29</td>
<td>Sinusoidal Steady State Analysis</td>
<td>10</td>
<td>Practicum</td>
</tr>
<tr>
<td>16</td>
<td>Dec 9</td>
<td>Final Exam (All Chapters) 8 am to 10 am</td>
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</tbody>
</table>

Assignments:
There will be assignments almost every week, they are due one week after they have been posted. The assignments will be posted in McGraw-Hill Connect.

Quizzes:
Quizzes will be posted on D2L. The idea is to reinforce knowledge from lecture and reading assignments.

Exams:
There will be a total of two regular exams during the semester, and one comprehensive final exam. The exams will be based on the homework, and the materials covered during the lecture.
Laboratory Procedures:
The laboratory procedures will be returned by the end of the laboratory period to the Teaching Assistant.

Laboratory Reports:
Two laboratory reports will be required during the semester. The first will be at the beginning of the semester, and the last at the end of the semester. The report will be written based on the results from the laboratory procedures. The laboratory report template is located in D2L.

Practicum Exams:
Two practicums exams will be given during the semester. These are going to be individual, and you will be assessed based on your laboratory skills. The instructor will provide a grading rubric in advance. Be aware that all practicums will have a duration of 80 minutes.

Grading Policy:

<table>
<thead>
<tr>
<th></th>
<th>Lecture</th>
<th>Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
<td>Lab Procedures</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
<td>Lab Reports</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
<td>Attendance</td>
</tr>
<tr>
<td>Exams</td>
<td>40%</td>
<td>Practicum</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

Late Policy
Any assignment should be returned in time. In the case that the assignment is returned late it will be affected by the following policy:

<table>
<thead>
<tr>
<th>Time Late</th>
<th>Deduction</th>
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<tbody>
<tr>
<td>Less than 2 hours</td>
<td>5</td>
</tr>
<tr>
<td>More than 2 hours less than 12</td>
<td>10</td>
</tr>
<tr>
<td>More than 12 hours less than 24</td>
<td>20</td>
</tr>
<tr>
<td>More than 24 hours less than 48</td>
<td>50</td>
</tr>
<tr>
<td>More than 48 hours</td>
<td>100</td>
</tr>
</tbody>
</table>

Assignments will be affected by a different policy. A deduction of 2% will be applied to the assignment for every hour that is late. This will be done automatically by Connect.

Face Cover Policy
It is strongly recommended (not required) all who are eligible to take personal responsibility to get vaccinated against COVID-19 and wear a mask when indoors with others. Your actions are not just about protecting yourself, but protecting others – including children and others who are not eligible to be vaccinated. Individuals who take personal responsibility such as wearing a mask indoors help reduce the spread of COVID-19. This is voluntary, as all mandates regarding face coverings have been lifted at SFA to
comply with Governor Abbott’s Executive Order GA-38. Physical distancing, wearing face coverings indoors and washing hands regularly are still best practices for reducing the spread of COVID-19.

Two important things you should know:

- Students and employees should stay home when they are feeling sick or have symptoms related to COVID-19.
- Students and employees who test positive for COVID-19 must report their positive test in mySFA.

Additional guidance and FAQs can be found at www.sfasu.edu/covid19.

**Attendance Policy:**

Attendance will be based on the Quizzes, and Attendance to Lecture/Laboratory Sessions. I will take attendance during the lecture/laboratory sessions, this is to ensure that you are keeping up with the material, and practicing the concepts covered in the lectures. If you arrive late to any of the sessions is your responsibility to ensure that your attendance was recorded. If you have problems to attending the Zoom meetings, please contact me as soon as possible.

**General Education Core Curriculum Objectives/Outcomes (EEO)**

There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.

**Credit Hour Justification**

Meets 3 hrs/wk for 15 weeks, and also meets for a 2-hour final examination. This is a problem-oriented class and lab with homework problems. The lecture and lab combine for 5 hours and 20 minutes of contact time each week and the work outside of classes each week for the combined courses averages much more than 10 hours and 40 minutes in working homework problems, preparing and answering quizzes, reading the book to understand the theories used in lecture and in homework problems and exams, reading the lab manual to prepare for the lab experiments done each week, writing up the lab experiments, writing formal laboratory reports, and studying for exams which include major exams and possibly short lecture quizzes.

**Academic Integrity (A-9.1)**

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of
another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades Semester Grades Policy (A-54)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Student with Disabilities: To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to https://www.sfasu.edu/disabilityservices/

Students with special accommodation requests have the responsibility to immediately initiate a meeting with the instructor to discuss how the special accommodations will be provided. Students who are aware of these special needs at the beginning of the semester must inform the instructor in person before the twelfth class day about any class activity, which will require special accommodations.

Mental Health and Wellness:
SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support student’s mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
SFA Counseling Services
www.sfasu.edu/counselingservices
Rusk Building, 3rd Floor
936.468.2401

SFA Human Services Counseling Clinic
www.sfasu.edu/humanservices/1
39.asp Human Services, Room
202 936.468.1041

**Crisis Resources:**
Burke 24-hour crisis line: 1.800.392.8343
Suicide Prevention Lifeline: 1.800.273.TALK (8255)
Crisis Text Line: Text HELLO to 741-741