Course Prerequisites, Basic Content, and Outcomes

Catalog Description: (3.0 cr; Prereq-2001; fall, spring, summer, every year)
Sinusoidal steady state analysis. AC power calculations. Laplace transforms. Laplace transforms
in circuit analysis. Elementary filter circuits. Frequency response of elementary MOSFET
amplifiers. BJT characteristics and biasing. BJT small signal models and elementary amplifiers.
Frequency response of BJT amplifiers. Use of circuit simulators.

Contact Hours: 3 hours of lecture 1 hour of discussion per week.

Text:
Microelectronic Circuits, Sixth Edition, Adel S. Sedra and Kenneth C. Smith, Oxford University
Press.

Prerequisites by Topic:
DC circuit analysis. Time domain analysis of RC and RL circuits. Diode, transistor dc and small
signal analysis.

Course Outcomes:
1) The ability to analyze circuits in the sinusoidal steady state using phasors.
2) The ability to analyze and design small scale transistor amplifiers using both large signal and
small signal concepts.
3) The ability to use Laplace Transform techniques to create system-level circuit descriptions in
order to do time-domain and frequency domain analysis of circuits.

Relationship to Student Outcomes:
In accordance with ABET accreditation criteria, all engineering programs must demonstrate that
their students achieve certain outcomes. This list of outcomes may be found on the ABET.org
website. Of the outcomes listed in the ABET criteria (enumerated as (a) through (k)), this course
teaches skills which help the student achieve the following outcomes:

(a) an ability to apply knowledge of mathematics, science, and engineering  
(e) an ability to identify, formulate, and solve engineering problems  
(i) a recognition of the need for, and an ability to engage in life-long learning  
(k) an ability to use the techniques, skills, and modern engineering tools necessary for
engineering practice
### Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sinusoidal steady state analysis; phasors, power calculations.</td>
</tr>
<tr>
<td>2</td>
<td>Sinusoidal Steady State Analysis</td>
</tr>
<tr>
<td>3</td>
<td>AC Power Calculations</td>
</tr>
<tr>
<td>4</td>
<td>Introduction to the Laplace Transform</td>
</tr>
<tr>
<td>5</td>
<td>The Laplace Transform in Circuit Analysis</td>
</tr>
<tr>
<td>6</td>
<td>Laplace Transforms in Circuit Analysis</td>
</tr>
<tr>
<td>7</td>
<td>Laplace Transforms in Circuit Analysis</td>
</tr>
<tr>
<td>8</td>
<td>Laplace Transforms in Circuit Analysis; Frequency Selective Circuits</td>
</tr>
<tr>
<td>9</td>
<td>Frequency Selective Circuits; Review of MOSFET characteristics and amplifiers</td>
</tr>
<tr>
<td>10</td>
<td>Frequency response of MOSFET amplifiers</td>
</tr>
<tr>
<td>11</td>
<td>Frequency response of MOSFET amplifiers</td>
</tr>
<tr>
<td>12</td>
<td>BJT Characteristics, load lines, and biasing</td>
</tr>
<tr>
<td>13</td>
<td>BJT Single transistor amplifiers</td>
</tr>
<tr>
<td>14</td>
<td>Frequency response of BJT amplifiers</td>
</tr>
</tbody>
</table>
Departmental and University Policies

**Student Academic Integrity and Scholastic Dishonesty:** Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else’s work as your own, can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

**Scholastic Dishonesty:** Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

**Incompletes:** A grade of I for Incomplete is given at the discretion of the course instructor when, due to extraordinary circumstances, the student who has successfully completed a substantial portion of the course’s work with a passing grade was prevented from completing the work of the course on time. Students must fill out an Incomplete Grade Agreement form found in Keller 3-166. The maximum time to remove and replace an incomplete grade is one year.

**Makeup Work for Legitimate Absences:** Consult university policy here:
http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html

**Personal Electronic Devices:** Consult university policy here:
http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html

**Mental Health:** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student’s ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website at http://www.mentalhealth.umn.edu