COURSE OUTLINE
ELEC 522 – ANTENNAS & PROPAGATION
Spring 2014

Instructor:
Dr. Jens Bornemann
Phone: 250-721-8666
E-mail:

Office Hours:
Days: Mondays, Thursdays
Time: 11:30-12:30
Location: EOW 309

Lectures:
A-Section(s): A01 / CRN 21139
Days: Mondays, Thursdays
Time: 10:00-11:20
Location: DSB C126

Labs:
Location: ELW

Required Text:
Title: Antenna Theory: Analysis and Design, 2nd or 3rd Ed.
Author: C.A. Balanis
Publisher: J. Wiley & Sons
Year: 1997 or 2005

Optional Text:
Title: Antenna Theory and Design 2nd or 3rd Ed.
Author: W.L. Strutzman and G.A. Thiele
Publisher: J. Wiley & Sons
Year: 1998 or 2012

References:
Course Website: TBA

Assessment:
Assignments: 10 %
Mid-term 30 %
Project 10 %
Final 50 %
Dates: TBA; full marks for reasonable effort
Date: TBA

Notes:
1. Students failing the mid-term test (less than 15 out of 30) will be evaluated by a scheme, which adds the percentage of the test to that of the final exam.
   * This procedure will also be adopted for assignments and individually, if it results in a higher percentage for the student.
2. Students earning less than 45% (less than 27 out of 60) in the final exam will fail the course.
   ** Only the use of non-programmable calculators is allowed during tests and the final exam.
3. Failure to complete all project requirements will result in a grade of N being awarded for the course.
The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

<table>
<thead>
<tr>
<th>Passing Grades</th>
<th>Grade Point Value</th>
<th>Percentage for Instructor Use Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>9</td>
<td>90 – 100</td>
</tr>
<tr>
<td>A</td>
<td>8</td>
<td>85 – 89</td>
</tr>
<tr>
<td>A-</td>
<td>7</td>
<td>80 – 84</td>
</tr>
<tr>
<td>B+</td>
<td>6</td>
<td>77 – 79</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>73 – 76</td>
</tr>
<tr>
<td>B-</td>
<td>4</td>
<td>70 – 72</td>
</tr>
<tr>
<td>C+</td>
<td>3</td>
<td>65 – 69</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>60 – 64</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>50 – 59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Failing Grades</th>
<th>Grade Point Value</th>
<th>Percentage for Instructor Use Only</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>0</td>
<td>35 - 49</td>
<td>Fail, conditional supplemental exam. (For undergraduate courses only)</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>0 – 49</td>
<td>Fail, no supplemental.</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>0 – 49</td>
<td>Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.</td>
</tr>
</tbody>
</table>

NOTE: Graduate students earning a grade less than B will NOT get credit for this course towards their program. The supervisory committee will decide on an appropriate course of action.

Course Description

1. Course Objectives
   - To introduce students to fundamental radiation, propagation and antenna concepts
   - To familiarize students with the terminology used in antenna engineering
   - To expose students to basic analysis and design aspects.

2. Learning Outcomes
   At the end of the course, students will be able to ...
   - understand the principles of radiation
   - understand fundamental parameters as they apply to antennas and propagation
   - evaluate the influences of reflection, diffraction, fading, scattering, absorption, etc on the transmission and reception of radio signals
   - calculate link budgets in the presence of a variety of losses and obstacles
   - design straight wire antennas, loop antennas and helical antennas
   - design basic feed networks for wire antennas
   - understand the fundamental concepts and limitations of antenna arrays
   - design broadside, endfire and phased-array antennas
   - apply aperture antenna principles to the design of slot antennas
   - design sectoral, pyramidal and conical horn antennas
   - understand the radiation mechanism of microstrip antennas
   - design rectangular and circular patch antennas including their feeding networks
   - assess the necessity for reflector antennas in communication links
   - calculate the characteristic properties of reflector antennas
   - design simple reflector antennas
   - understand the principles of broadband antennas with respect to multi-channel and pulse propagation
- explain the advantages of and requirements for corrugated horns
- understand and describe the basics of individual techniques and setups for antennas and propagation measurements
- understand and explain the fundamental electromagnetic principles (and their limitations) as applied to the material presented in the course.

3. Syllabus:  

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Approx. No. Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2. Fundamental Parameters of Antennas and Propagation</td>
<td>3</td>
</tr>
<tr>
<td>3. Propagation</td>
<td>3</td>
</tr>
<tr>
<td>4. Potential Functions</td>
<td>1</td>
</tr>
<tr>
<td>5. Wire Antennas</td>
<td>3</td>
</tr>
<tr>
<td>6. Antenna Arrays</td>
<td>2</td>
</tr>
<tr>
<td>7. Aperture and Horn Antennas</td>
<td>2</td>
</tr>
<tr>
<td>8. Microstrip Antennas</td>
<td>3</td>
</tr>
<tr>
<td>9. Reflector Antennas</td>
<td>1</td>
</tr>
<tr>
<td>10. Ultra-Wideband Antennas</td>
<td>1</td>
</tr>
<tr>
<td>11. Corrugated Horns</td>
<td>1</td>
</tr>
<tr>
<td>12. Antenna Measurements</td>
<td>1</td>
</tr>
</tbody>
</table>

Mid-term test 1
Review 1
Total 24

Note to Students:
Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the ECE Chair by email or the ECE Chair's secretary to set up an appointment.
Accommodation of Religious Observance
See http://web.uvic.ca/calendar2013/GI/GUPo.html

Policy on Inclusivity and Diversity
See http://web.uvic.ca/calendar2013/GI/GUPo.html

Standards of Professional Behaviour
You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.uvic.ca/engineering/current/undergrad/index.php#section0-25 which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult http://web.uvic.ca/calendar2013/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.

Plagiarism detection software may be used to aid the instructor and/or TA's in the review and grading of some or all of the work you submit.