



**COURSE OUTLINE**  
**ELEC 453 – 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 21112  
Days: Mondays, Thursdays  
Time: 10:00-11:20  
Location: DSB C126

**Labs:**

**Location: ELW**

**Required Text:**

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

**Optional Text:**

Title: Antenna Theory and Design  
2<sup>nd</sup> or 3<sup>rd</sup> 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 %  
Final 60 %

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.

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

Passing Grades	Grade Point Value	Percentage for Instructor Use Only	
A+	9	90 – 100	
A	8	85 – 89	
A-	7	80 – 84	
B+	6	77 – 79	
B	5	73 – 76	
B-	4	70 – 72	
C+	3	65 – 69	
C	2	60 – 64	
D	1	50 – 59	
Failing Grades	Grade Point Value	Percentage for Instructor Use Only	Description
E	0	35 - 49	Fail, conditional supplemental exam. (For undergraduate courses only)
F	0	0 – 49	Fail, no supplemental.
N	0	0 – 49	Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.

The rules for supplemental examinations are found on page 80 of the current 2013/14 Undergraduate Calendar.

Term in which E Grade Was Obtained	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept – Dec)	February 28 in the following term	First week of following May
Second term of Winter Session (Jan – Apr)	June 30 in the following term	First week of following September
Summer Session (May – Aug)	October 31 in the following term	First week of following January

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.

## 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.

### 3. Syllabus:

### Approx. No. Classes

1.	Introduction	1
2.	Fundamental Parameters of Antennas and Propagation	3
3.	Propagation	3
4.	Potential Functions	1
5.	Wire Antennas	3
6.	Antenna Arrays	2
7.	Aperture and Horn Antennas	2
8.	Microstrip Antennas	3
9.	Reflector Antennas	1
10.	Ultra-Wideband Antennas	1
11.	Corrugated Horns	1
12.	<u>Antenna Measurements</u>	<u>1</u>
	<i>Mid-term test</i>	1
	<i>Review</i>	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.

<p><b>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.</b></p>
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