ELEC 340 – Applied Electromagnetics and Photonics
Term – Spring 2015 (201501)

Instructor
Poman So, Ph.D., P.Eng.
Phone: 250-472-4224
E-mail: Poman.So@UVic.CA

Office Hours
Days: Tue, Wed & Fri
Time: 13:30 – 14:30
Location: EOW 417

Lectures
A-Section(s): A01 / CRN 21079
A02 / CRN 21080
Days: Tue, Wed & Fri
Time: 12:30 – 13:20
Location: HSD A240

B-Section(s)

Labs Location: ELW A309

See the attached schedule for details

Required Text
Author: Fawwaz T. Ulaby, Eric Michielssen, Umberto Ravaiolli
Publisher: Pearson / Prentice Hall
Year: 2015

References
Title: Engineering Electromagnetics, 7ed
Author: W.H. Hayt, J.A. Buck
Publisher: McGraw-Hill
Year: 2006

Assessment
Assignments: 10%
Labs*1: 20%
Mid-term*2: 10%
Final*2&3: 60%

Date: Fri 20 February 2015

*Note
1. Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.
2. Must attend all labs and at least 80% of the lectures in order to qualify to write the midterm and final examinations (http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/Atte.html)
3. Failure to pass the final examination will result in a grade of F being awarded for the course.
4. 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 (http://library.uvic.ca/instruction/cite/plagiarism.html).
Assignment Requirements

- Assignments are due one week after the assignments are posted on CourseSpaces.
- Students must submit their assignments via CourseSpaces. Files uploaded to CourseSpaces must be in PDF, MS Word, or Open Office format. Files submitted in any other formats will not be graded.
- Files contain poorly reproduced images will not be graded.

Lab Requirements

- Tentatively, lab begins on Monday, 26 January 2015.
- Lab reports are due one week after the experiments are completed.
- Students must submit their lab report via CourseSpaces. Files uploaded to CourseSpaces must be in PDF, MS Word, or Open Office format. Files submitted in any other formats will not be graded.
- Files contain poorly scanned images will not be graded.

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>0 - 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>

*Assignment of E grade will be at the discretion of the Course Instructor.

The rules for supplemental examinations are found on page 80 of the current 2014/15 Undergraduate Calendar.

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

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:** Study electromagnetic field theory and its applications in engineering electromagnetics.

2. **Learning Outcomes:** Upon completion of this course students should be able to:
   a. Describe mathematically the electric and magnetic fields of TEM waves.
   b. Relate the propagation parameters of a wave to the constitutive parameters of the medium.
   c. Calculate the rate of power carried by an EM wave in both lossless and lossy media.
   d. Characterize wave propagation in a rectangular waveguide.
   e. Determine the behaviour of resonant modes inside a rectangular cavity.
   f. Calculate the electric and magnetic fields of waves radiated by a dipole antenna.
   g. Calculate the Doppler frequency shift observed by a radar.
   h. Describe the basic operation of satellite communication systems.
   i. Describe the basic operation of photonic structures.
   j. Design electromagnetic structures for polarization of electromagnetic waves.
   k. Design electromagnetic structures to optimize transmission behavior of plane-waves incident upon plane boundaries, for both normal and oblique incidence.

3. **Syllabus:** Field concept, Maxwell's equations, power, and energy. Plane wave propagation, polarization, and reflection and transmission at material interfaces. Introduction to waveguides, antennas, and photonic structures. Engineering electromagnetics design concepts and examples with emphasis on impedance transformers and shielding structures.

**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 eceasst@uvic.ca to set up an appointment.*

**Accommodation of Religious Observeance**
See [http://web.uvic.ca/calendar2014/GI/GUPo.html](http://web.uvic.ca/calendar2014/GI/GUPo.html)

**Policy on Inclusivity and Diversity**
See [http://web.uvic.ca/calendar2014/GI/GUPo.html](http://web.uvic.ca/calendar2014/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/assets/docs/professional-behaviour.pdf](http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf) 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/calendar2014/FACS/UnIn/UARe/PoAcI.html](http://web.uvic.ca/calendar2014/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.*

[http://library.uvic.ca/instruction/cite/plagiarism.html](http://library.uvic.ca/instruction/cite/plagiarism.html)
Class Schedule Listing

Second Term: Jan - Apr 2015
Dec 17, 2014

Sections Found

APPLD: ELECTRMAGNTCS+PHOTONCS - 21079 - ELEC 340 - A01
Reserved for ECE students.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lecture Schedule Type
Face to Face Instructional Method
1.500 Credits
View Catalog Entry

Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>12:30 pm - 1:20 pm</td>
<td>TWF</td>
<td>Human &amp; Social Development A240</td>
<td>Jan 05, 2015 - Apr 02, 2015</td>
<td>Lecture</td>
<td>Poman Pok Man So (P)</td>
</tr>
</tbody>
</table>

APPLD: ELECTRMAGNTCS+PHOTONCS - 21080 - ELEC 340 - A02
Not open to ECE students.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lecture Schedule Type
Face to Face Instructional Method
1.500 Credits
View Catalog Entry

Scheduled Meeting Times

<table>
<thead>
<tr>
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<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>12:30 pm - 1:20 pm</td>
<td>TWF</td>
<td>Human &amp; Social Development A240</td>
<td>Jan 05, 2015 - Apr 02, 2015</td>
<td>Lecture</td>
<td>Poman Pok Man So (P)</td>
</tr>
</tbody>
</table>

APPLD: ELECTRMAGNTCS+PHOTONCS - 21081 - ELEC 340 - B01
ELEC340 labs meet on alternate weeks.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lab Schedule Type
Face to Face Instructional Method
0.000 Credits
View Catalog Entry

Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every Week</td>
<td>12:00 pm - 2:50 pm</td>
<td>M</td>
<td>Engineering Lab Wing A309</td>
<td>Jan 26, 2015 - Jan 26, 2015</td>
<td>Lab</td>
<td>TBA</td>
</tr>
<tr>
<td>Every Week</td>
<td>12:00 pm - 2:50 pm</td>
<td>M</td>
<td>Engineering Lab Wing A309</td>
<td>Feb 16, 2015 - Feb 16, 2015</td>
<td>Lab</td>
<td>TBA</td>
</tr>
<tr>
<td>Every Week</td>
<td>12:00 pm - 2:50 pm</td>
<td>M</td>
<td>Engineering Lab Wing A309</td>
<td>Mar 02, 2015 - Mar 02, 2015</td>
<td>Lab</td>
<td>TBA</td>
</tr>
<tr>
<td>Every Week</td>
<td>12:00 pm - 2:50 pm</td>
<td>M</td>
<td>Engineering Lab Wing A309</td>
<td>Mar 16, 2015 - Mar 16, 2015</td>
<td>Lab</td>
<td>TBA</td>
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### APPLD: ELECTRMAGNTCS+PHOTONCS - 21084 - ELEC 340 - B04

ELEC340 labs meet on alternate weeks.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lab Schedule Type
Face to Face Instructional Method
0.000 Credits
View Catalog Entry

### Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Jan 27, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
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<tr>
<td>Week</td>
<td>pm</td>
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<td>A309</td>
<td>Jan 27, 2015</td>
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</tr>
<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Feb 17, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
</tr>
<tr>
<td>Week</td>
<td>pm</td>
<td></td>
<td>A309</td>
<td>Feb 17, 2015</td>
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</tr>
<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Mar 03, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
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<tr>
<td>Week</td>
<td>pm</td>
<td></td>
<td>A309</td>
<td>Mar 03, 2015</td>
<td></td>
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</tr>
<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Mar 17, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
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<tr>
<td>Week</td>
<td>pm</td>
<td></td>
<td>A309</td>
<td>Mar 17, 2015</td>
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### APPLD: ELECTRMAGNTCS+PHOTONCS - 21085 - ELEC 340 - B05

ELEC340 labs meet on alternate weeks.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lab Schedule Type
Face to Face Instructional Method
0.000 Credits
View Catalog Entry

### Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
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<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Feb 03, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
</tr>
<tr>
<td>Week</td>
<td>pm</td>
<td></td>
<td>A309</td>
<td>Feb 03, 2015</td>
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<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
<td>T</td>
<td>Engineering Lab Wing</td>
<td>Feb 24, 2015 -</td>
<td>Lab</td>
<td>TBA</td>
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<tr>
<td>Week</td>
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<td>A309</td>
<td>Feb 24, 2015</td>
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</tr>
<tr>
<td>Every</td>
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<td>Engineering Lab Wing</td>
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<td>A309</td>
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<tr>
<td>Every</td>
<td>1:30 pm - 4:20</td>
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<td>Engineering Lab Wing</td>
<td>Mar 24, 2015 -</td>
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<td>Mar 24, 2015</td>
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APPLD: ELECTRMAGNTCS+PHOTONCS - 21088 - ELEC 340 - B08

ELEC340 labs meet on alternate weeks.
Associated Term: Second Term: Jan - Apr 2015
Registration Dates: Jun 16, 2014 to Jan 21, 2015
Levels: Graduate, Law, Undergraduate

Main Campus
Lab Schedule Type
Face to Face Instructional Method
0.000 Credits
View Catalog Entry

Scheduled Meeting Times

<table>
<thead>
<tr>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
<th>Date Range</th>
<th>Schedule Type</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>4:30 pm - 7:20 W</td>
<td>W</td>
<td>Engineering Lab Wing A309</td>
<td>Mar 04, 2015 - Mar 04, 2015</td>
<td>Lab</td>
<td>TBA</td>
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<tr>
<td>Every</td>
<td>4:30 pm - 7:20 W</td>
<td>W</td>
<td>Engineering Lab Wing A309</td>
<td>Mar 18, 2015 - Mar 18, 2015</td>
<td>Lab</td>
<td>TBA</td>
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Release: 8.5.1