ECE 7440 – Laser Engineering
COURSE OUTLINE – FALL 2014

COURSE DESCRIPTION:
This course will cover engineering principles of modern laser technology.

COURSE OBJECTIVE:
To provide background knowledge to understand the principles, basic types and main operation regimes of different laser sources and amplifiers (solid-state, semiconductor, fiber, etc.). The course will also discuss various applications of laser light-matter interaction in nonlinear optics that are widely used in biomedical laser technologies.

PRE-REQUISITES:
Undergraduate courses in physics and optics

CONTACT HOURS:
4 hours per week (2 lectures) – 3 credits

COURSE CONTENT:
1. Basics properties of light, light amplification and oscillation
2. Fundamentals of laser technology
3. Solid-state, semiconductor, and fiber lasers
4. Thermal and optical effects, beam shaping
5. Laser amplifiers: continuous way and pulsed
6. Modes of laser operation: continuous way and pulsed
7. Laser characterization principles and techniques
8. Light and matter interaction, nonlinear optics
9. Optical harmonics, parametric processes, Raman effect

HOMEWORK:
Assignments on covered material in class

TEXTBOOK:

REFERENCE TEXTBOOK:

EVALUATION:
Your final course grade is determined by your performance in assignments, term test, and a final examination. The weighting of each of these components is as follows:
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<tr>
<th>COMPONENT</th>
<th>NO</th>
<th>VALUE %</th>
<th>TOTAL VALUE</th>
<th>DETAILS / ADDITIONAL INFO</th>
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<tr>
<td>Seminars</td>
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<td>Homework/Assignments</td>
<td>5</td>
<td>4%</td>
<td>20</td>
<td>Take home assignments</td>
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<td>Project</td>
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<td>Presentation and a written report</td>
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<td>Midterm Exam</td>
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<td>Final Examination</td>
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**INSTRUCTOR INFO:**

Name: A. Major  
Office: E3-559  
Tel: 474-7541  
Email: major@cc.umanitoba.ca  

**Office Hours:**  
After class, TBA  

**VOLUNTARY WITHDRAW:**  
Wednesday, Nov. 12, 2014  

**REQUIREMENTS/REGULATIONS**

- **Student Responsibilities:** It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, and attendance and withdrawal.  
  - **Lectures:** Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

**ACADEMIC INTEGRITY:**

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media  
  - examinations  
  - assignments  
  - laboratory reports  
  - term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

*Plagiarism: to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source