Course Objectives
As a continuation of ECE 2160 Electronics II, the objectives of this course are for students to learn to both analyze and design fundamental electronic circuits, and to explore their practical applications.

Prerequisites
ECE 2160 Electronics 2E

Course Content
The following topics will be covered:
- A review of electronics II
- MOSFETs
- Differential Amplifiers: Common-mode vs. differential mode, common-mode rejection ratio, small-signal and large-signal operation, input/output characteristics, non-ideal characteristics, active load, frequency response.
- Single-stage IC Amplifiers: BJT, biasing, high-frequency response, Miller effect, large-signal transfer characteristics, follower circuits, paired transistors, current mirror.
- Feedback: Theory, feedback topologies, examples of feedback circuits, circuit characteristics improvement using feedback.
- Electronic noise sources and analysis.
- Oscillators: Loop-gain criteria, Wien-Bridge oscillators, tank circuit/tuned circuit oscillators, crystal oscillators, multi-vibrators, timers.
- Power Amplifiers: Classification, some common configurations, detailed class B power amplifiers.
- Digital Circuits: Inverter characteristic, noise margins, loading and fan-out, power dissipation.

Accreditation Units
Mathematics: 0
Natural Science: 0
Complementary Studies: 0
Engineering Science: 67%
Engineering Design: 33%

Web Page
http://ece.eng.umanitoba.ca/undergraduate/ECE3670

Textbook

Other References

Evaluation Details
The final course grade will be determined from a student's performance on assignments, in laboratories (including a design project), and on examinations. Students must receive a minimum of 50% on the final examination in order to be eligible to receive a passing grade. Students who are unable to write the mid-term exam for medical (or other acceptable) reasons will have their final examination weighted to include the mid-term weighting.
Calculators (incapable of communicating with other devices) are allowed in the mid-term and final exams. Students must complete all the laboratories in order to be eligible to receive a passing grade.

**Mid-Term**
Tuesday, October 14, 2014, 6:00-8:00 PM (location TBA)

**Instructors**

Prof. Ani Gole  
E1-452 EITC  
Telephone: +1-(204)-474-9959  
Email: ani_gole@umanitoba.ca

Prof. Blair Yoshida  
E3-411 EITC  
Telephone +1-(204)-480-1402  
Email: blair.yoshida@umanitoba.ca

**Office Hours**

Prof. Ani Gole  
By appointment

Prof. Blair Yoshida  
Mondays: 12:30-13:30  
Tuesdays: 11:30-12:30  
Wednesdays: 13:30-14:30

**Teaching Assistants**

TBA

**Voluntary Withdrawal Date**
Wednesday, November 12th, 2014

**Requirements/Regulations**

- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.

- It is the responsibility of each student to contact the instructor *in a timely manner* if he or she is uncertain about his or 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, attendance and withdrawal.

- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

**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 in examinations, assignments, laboratory reports or term tests is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.
Learning Outcomes

1. Analyze and design differential amplifiers.
2. Analyze and design single stage amplifiers.
3. Analyze and design feedback and oscillators.
4. Analyze and design power amplifiers.
5. Analyze digital circuits.

Expected Competency Level **

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<th>Learning Outcome</th>
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*Attributes:
A1 A knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society/environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

**Competency Levels:
1 - Knowledge (Able to recall information)
2 - Comprehension (Able to rephrase information)
3 - Application (Able to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships)
5 - Synthesis (Able to combine separate elements into whole)
6 - Evaluation (Able to judge of the worth of something)

Student Contact Time (Hrs)

Lectures: 3 hrs lecture/week × 13 weeks/term = 39 hrs
Laboratories: 3 hrs laboratory × 5 weeks = 15 hrs
Tutorials: 0 hr tutorial × 0 weeks = 0 hrs

Evaluation

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<th>Component</th>
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<th>Methods of Feedback *</th>
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* Methods of Feedback: F - formative (written comments and/or oral discussion), S - summative (number grades)