

FALL 2021

ECE 7440-T45 – RF Devices and Wireless Systems

COURSE DESCRIPTION:

Techniques for the design, simulation, fabrication and testing of RF and microwave circuits at the device and system level. Design of RF amplifier, oscillator, frequency mixing and frequency synthesis subsystem components. The design of microwave communication, Radar and RFID systems.

COURSE OBJECTIVE:

Gain an understanding of RF systems and gain knowledge on how to design, fabricate and test system components.

PRE-REQUISITES:

A firm grasp of undergraduate level electromagnetic theory and introductory undergraduate level transmission line theory. A background in microwave network theory would also be beneficial.

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

1. Introduction to wireless system architectures.
2. Review of transmission line fundamentals and microwave network theory.
3. Noise and distortion in microwave systems.
4. Antennas and propagation for the wireless environment.
5. RF and microwave electronic circuits: passives, filters, amplifiers, mixers, oscillators.
6. Frequency synthesis.
7. Transceiver design and microwave wireless system examples.
8. Radar and RFIC.
9. Microwave CAD tools will be used throughout the course.

HOMEWORK:

Homework will consist of assignments, evaluation of measured lab results, and a design project and preparation of a seminar on the project.

REFERENCE MATERIALS:

1. D. Pozar, Microwave Engineering, Wiley, 4th ed., 2012
2. Keysight Application Notes

GRADE ANNOUNCEMENTS:

Grades for this course will typically be announced before February 2021

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (assignments, project, and a final examination. Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.

Each component is weighted as follows:

| COMPONENT | NO | VALUE % | TOTAL VALUE | DETAILS / ADDITIONAL INFO |
|----------------------|----|---------|-------------|---------------------------|
| Labs | 5 | 3% | 15 | |
| Quizzes | X | X | 5 | |
| Project/presentation | 1 | 10% | 10 | |
| Mid-Term Exam | 1 | 20 | 20 | |
| Final Examination | 1 | 50% | 50 | |
| TOTAL | | | 100 | |

GRADE SCALE:

| LETTER | MARK | LETTER | MARK | LETTER | MARK | LETTER | MARK |
|--------|--------|--------|-------|--------|-------|--------|-------|
| A+ | 95-100 | B+ | 80-84 | C+ | 65-69 | D | 45-54 |
| A | 85-94 | B | 70-79 | C | 55-64 | F | <45 |

INSTRUCTOR INFO:

Name: Greg Bridges
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Office Hours:..... By appointment

VOLUNTARY WITHDRAW:

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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 his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

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

Please refer any questions regarding Academic Integrity to your course instructor.

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