Course Description and requirements

1) Course description
Fundamentals: decibel, thermal noise, intermodulation, 1dB compression, dynamic range, SNR, noise figure, noise temperature, AM to PM conversion, Differential Gain and Differential Phase, antenna gain, EIRP, G/T, C/T. Line-of-sight links: frequency assignment, Earth’s bulge, Fresnel clearance, free space path loss, rainfall attenuation, receiver threshold, multipath fading, diversity combining, fade margin. Fiber links: Fiber types, dispersion, loss, bandwidth-distance product, Laser Sources, fiber amplifiers PIN diode and APD detectors, Systems. Satellite links: frequency windows, GEO and LEO orbits, link calculations, illumination levels, station margin, frequency division and time division multiple accessing, earth station antennas, satellite tracking systems, Spherical Trigonometry and antenna pointing, LEO constellations.

2) Precluded courses
None

3) Prerequisites (and recommended knowledge)
4th year status in Engineering

5) Accreditation Units / Graduate Attributes
ELEC 4509 is an elective course and is not included in AU counts and does not include GA assessments

6) Texts

7) Evaluation and Marking Scheme
Two midterm exams  40%
Final Exam  60%

Final exams are for evaluation purpose and will not be returned to students.

Students who are unable to write the final examination because of a serious illness/emergency or other circumstances beyond their control may apply for accommodation by contact the Registrar’s office. Consult the Section 4.3 of the University Calendar (https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/examinations/)

Please consult Section 5 of the undergraduate regulations (https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/grading/)

Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule.

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**Advising and Counselling services**

**a) Engineering Academic Advising**

The Engineering Academic Support Service : [https://carleton.ca/engineering-design/current-students/undergrad-academic-support/](https://carleton.ca/engineering-design/current-students/undergrad-academic-support/) assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.

Academic Advisors Contact : [https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/](https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/)
b) Student Mental Health Service

As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. Carleton’s Wellness Services Navigator https://wellness.carleton.ca/navigator/ is designed to help students connect with mental health and wellness resources. If you need to talk to someone, please reach out for assistance: https://carleton.ca/health/emergencies-and-crisis/.

Learning and Working Environment

The University and all members of the University community share responsibility for ensuring that the University’s educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca

We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone’s personal beliefs, choices, and opinions.

Academic Integrity and Plagiarism

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: https://carleton.ca/engineering-design/current-students/fed-academic-integrity Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that the work you submit is your own. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using another’s data or research findings without appropriate acknowledgement;
· submitting a computer program developed in whole or in part by someone else, with
or without modifications, as one’s own; and
· failing to acknowledge sources of information through the use of proper citations
when using another’s work and/or failing to use quotations marks.

Academic Accommodations

**Pregnancy obligation**: write to me with any requests for academic accommodation
during the first two weeks of class, or as soon as possible after the need for
accommodation is known to exist. For accommodation regarding a formally-scheduled
final exam, you must complete the Pregnancy Accommodation Form (click here).

**Religious obligation**: write to me with any requests for academic accommodation
during the first two weeks of class, or as soon as possible after the need for
accommodation is known to exist. For more details click here.

**Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for
Students with Disabilities (PMC) provides services to students with Learning Disabilities
(LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder
(ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments
in mobility, hearing, and vision. If you have a disability requiring academic
accommodations in this course, please contact PMC at 613-520-6608 or
pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC,
contact your PMC coordinator to send me your Letter of Accommodation at the
beginning of the term, and no later than two weeks before the first in-class scheduled
test or exam requiring accommodation (if applicable). After requesting accommodation
from PMC, meet with me to ensure accommodation arrangements are made. Please
consult the PMC website for the deadline to request accommodations for the formally-
scheduled exam (if applicable).

**Survivors of Sexual Violence**: As a community, Carleton University is committed to
maintaining a positive learning, working and living environment where sexual violence
will not be tolerated, and where survivors are supported through academic
accommodations as per Carleton’s Sexual Violence Policy. For more information about
the services available at the university and to obtain information about sexual violence
and/or support, visit: https://carleton.ca/equity/sexual-assault-support-services

**Accommodation for Student Activities**: Carleton University recognizes the substantial
benefits, both to the individual student and for the university, that result from a student
participating in activities beyond the classroom experience. Reasonable accommodation
will be provided to students who compete or perform at the national or international
level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf