

ELEC 404

Radio Frequency Integrated Circuit INFORMATION SHEET

Day/Time/Location: Monday, 5:30 pm – 8:30 pm – MCLD 2002 (In-person)
Work-in-progress to provide parallel zoom sessions. However, provided that lecture materials are presented in a mixture of powerpoint slides/Board notes, attending online session/material is only recommended when in-person attendance is not possible, e.g. you are sick).

INSTRUCTOR: Reza Molavi
E-mail: reza@ece.ubc.ca (preferred communication tool)
Office hour: Thursday 12 – 1 pm

T.A.:
Office Hours/Location Omid
omdesm@ece.ubc.ca

Tutorials on Friday 11 am – 12 pm,
(join Piazza from Canvas!)
<https://piazza.com/ubc.ca/winterterm22023/elec4042012022w2>

Grading:
Assignment : 25% (Mini Projects and Assignments)
Projects: 35%
Final: 40%

Textbook:

- 1) (**Main**) *RF Microelectronics*, B. Razavi, 2nd Edition, Prentice Hall, 2011
- 2) *High-Frequency Integrated Circuits*, S. Voinigescu, 1st edition, Cambridge, 2013.
- 3) *The Design of CMOS Radio-Frequency Integrated Circuits*, T. H. Lee, 2nd edition, Cambridge, 2003.

Resources:
Journal of Solid State Circuits (JSSC)
International Solid State Circuit Conference (ISSCC)
Custom Integrated Circuit Conference (CICC)
Radio-Frequency Integrated Circuits Conference (RFIC)
Symposium of VLSI circuits
Transactions on Circuits and Systems (TCAS)
Transaction on Microwave Theory and Techniques (MTT)

Prerequisites: ELEC 221 / ELEC 401 – Also basic analog circuit design and analysis

knowledge and familiarity with CAD tools (Cadence/HSPICE) is assumed.

Assignments: Hand in partially done homework by the due date. Check late submission policy on the next page

Mini Projects: There are few projects in this course that would be handed out throughout the course (mostly during the second half of the course). You must hand in the projects by the due date (Canvas submission). We use EDA CAD tools such as Cadence to complete projects.

Tutorial Session: There will be a couple of tutorials to review CAD tools (Cadence, Virtuoso, HSPICE).

Main Topics:

- Radio Frequency (RF) Transceivers: Basics and Fundamentals, linearity, noise ...
- Two-port networks, RLC Matching
- Distortion and Noise
- Tuned amplifier design and analysis
- Low-noise amplifiers (LNA)
- Mixers
- Voltage-Controlled Oscillators
- Into to PLLs
- Power amplifiers (if time permits)

Make-Up Policies

Only students presenting medical or official university excuses to the instructor will be allowed to take a make-up exam or other missed assignments. Whenever possible, arrangements should be made with the instructor prior to the regularly scheduled exam or assignment due date. Making these arrangements is entirely the responsibility of the student. Make up exams or other assignments may differ from those given at the regularly scheduled time, and whether an absence is deemed to be excusable is at the discretion of the instructor.

Academic Honesty

Please read UBC statement on Academic Honesty :

<http://www.calendar.ubc.ca/vancouver/?tree=3,286,0,0>Links to an external site.

Cheating on classroom or outside assignments, including examinations is a violation of this code. Incidents of academic dishonesty will be kept on file by the instructor and may be reported to the dean of students. Such instances of academic dishonesty may warrant expulsion from the course and a failing grade. All students should be aware that even one incident of academic dishonesty may also merit expulsion from the University.

Policies

- Homework and exam scores become final one week after they are returned to the class.
- Late submissions of assignments and project reports are not encouraged; however, if you cannot finish in time and submit late before the solutions are available, a 25% per day compounding deduction will be applied on the final grade. (Ex.: 100 points assignment submitted 3 days late will be graded on 42 points, 1 day on 75, 2 days 56, 4 days 32, etc.).
- Submission will not be accepted if the solutions are distributed by any means.
- Assignments should be cleanly scanned and uploaded on Canvas (or digitally generated) - No paper / Hardcopy is needed

Additional Notes and suggestions:

Join Course Piazza page via the following direct link:

<https://piazza.com/ubc.ca/winterterm22023/elec4042012022w2>

For Projects look for a partner, you can work in groups of two! Collaboration makes design more interesting and generally more straightforward!

For Zoom sessions enabled during in-person classes

- Please mute your microphone as it may pick up on background noises which will be distracting during the lecture.
- Please be aware while your instructor may be making a Zoom session available, they may not be able to monitor the Zoom Chat or Raise Hand feature. Live-streaming is being provided to aid students in staying up to date with course material if they cannot attend class, but it is not the primary mode of instruction.
- information about academic concessions, see the UBC policy here:
<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0>
- Make a connection early in the term to another student or a group of students in the class so that you can ask what was missed if you are unable to attend lecture/tutorial.
- Consult the class resources on Canvas. We will post [all the slides, readings, recordings ...] for each class day.
- Attend tutorials to learn about CAD tools which greatly helps your project/assignment delivery

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