

ELEC5804 – Introductory VLSI Design

Professor: Dr. MacEachern, 7044MC, leonard.maceachern@carleton.ca

Course Description:

Integrated circuit design with a strong emphasis on design methodology. Design philosophies considered include Full Custom design, standard cells, gate-arrays and sea-of-gates using CMOS and BiCMOS technology.

Course Topics:

Suggested knowledge for this course: basics of MOSFET operation, some understanding of integrated circuit technology, understanding of circuit simulation, basics of logic, binary number systems, boolean algebra and expressions, binary number representation, digital design. The following topics will be covered during the course lectures.

- Processing technology
- MOSFET Analysis
- Performance Estimation Techniques and Theory
- Circuit and Logic Design
- Design Tools and Methods
- Testing and Verification
- Advanced Topics (varies year to year)

Course Website:

<http://elec5804.blogspot.com>

Course Instructor:

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Email Guidelines:

Don't be distressed if you don't get a reply right away, but if more than one "business day" goes by, then please follow up on the email.

Office Hours:

- Dr MacEachern is generally available, just book a time (e.g. via email) and we can chat via Zoom.

Course Marking Scheme:

- 40% Final Exam - Partial take home, partial timed on-line
- 20% Midterm - Partial take home, partial timed on-line
- 10% Assignment #1 - individual
- 10% Assignment #2 - individual
- 10% Assignment #3 - individual
- 10% Assignment #4 - individual

Official Class Hours:

- Mondays from 6:05pm until 8:55pm.

Assignment Hours and Location:

- Students can access CAD tools at their convenience.

Assignment Policies:

Assignments must be submitted by the time/date indicated in order to receive full marks. Late Assignments will be accepted according to a 20% per day penalty.

Midterm Policy:

In the event that the midterm is missed for a valid documented reason, a make-up midterm will be given.

Textbook:

There is no official textbook for this course. Data sheets, manuals, and other freely available resources will be provided as the course progresses, as required. Other sources of relevant information such as freely available on-line videos, blogs, and websites will be recommended as the term progresses. Some book recommendations will also be provided as we progress through the course, but any required material will be provided to the class.

Course Content Delivery:

The basic plan for course content delivery is a “blended” approach. The course slides and any related video material will be made available a few days prior to each lecture. The official lecture time will be used *as needed* to answer any questions related to the previously posted course contents. Material presented during the question and answer sessions will be recorded and posted following the sessions. Student anonymity will be respected if requested.

Required Facility:

Students are required to have internet speeds that allow them to access and use the CAD tools running on the server located on the Carleton campus. Students will login to the Carleton VPN, then access the server through Remote Desktop. If a student’s internet connection is too slow, it will not be possible to conduct the labs, midterm, or final exam. Students will need a computer running Windows, or MacOs, or Linux.

General Regulations

Attendance: Students are expected to attend all required lectures¹. The University requires students to have a conflict-free timetable. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 1.2, Course Selection and Registration and Section 1.5, De-registration.

Health and Safety: Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: <http://sce.carleton.ca/courses/health-and-safety.pdf>

Deferred Term Work: 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 (3.0) working 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. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 2.6, Deferred Term Work.

Appeal of Grades : The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the Undergraduate Calendar, Academic Regulations of the University, Section 2.7, Informal Appeal of Grade and Section 2.8, Formal Appeal of Grade.

Academic Integrity: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: <https://carleton.ca/registrar/academic-integrity/>. This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

Plagiarism: Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offence that will not be tolerated.

Academic Accommodation: You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://www.carleton.ca/equity/>

For an accommodation request, the processes are as follows:

- 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 more details see: <https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

- 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 see: <https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

- 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

¹ I'll let you know in advance if you must attend a video lecture. Most of the course will be conducted asynchronously, but occasionally we will have live sessions to catch up, answer questions, do tutorials, etc.

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 <https://carleton.ca/pmc/students/dates-and-deadlines/> 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/sexual-violence-support/>.

- 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 must be provided to students who compete or perform at the national or international level. Please contact your instructor 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, see:

<https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

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