



Department of Electrical and Computer Engineering
ECE 647: Algorithms for physical design of digital integrated circuits
Fall Term 2014

COURSE INSTRUCTORS:

Name	Class	Office	Ext	Email
Andrew Kennings	LEC001	EIT 4102	36909	akenning@uwaterloo.ca

LECTURE SCHEDULE

Type	Section	Day of Week				
		Mon	Tues	Wed	Thurs	Fri
Lectures	LEC 001					2:30-5:20PM EIT3151

COURSE DESCRIPTION:

An introduction to the problems and algorithms that arise during the Computer-Aided Design (CAD) of digital circuits. Course emphasis is on the backend of the CAD flow such as algorithms for solving problems including: technology mapping, partitioning, floorplanning, clustering, placement, routing and physical synthesis.

INTENDED AUDIENCE:

The course should be of interest to those students whose research or general interests fall in the area of computer-aided design and/or VLSI/FPGA architectures. The course would also be of interest to those students interested in algorithms, optimization and data structures for solving real problems. This is not a course on circuit layout or on the use of computer-aided design tools. If you are not a good programmer, then the course is not for you.

RECOMMENDED TEXTBOOKS:

There is no recommended textbook for the course. Suggested conference and journal papers will be provided for each topic discussed in class. There will also be a webpage for the course which will provide additional information.

COURSE CONTENTS:

- Partitioning;
- Technology mapping;
- Placement (simulated annealing, partitioning-based, quadratic and analytic placement);
- Legalization;

- Detailed placement;
- Routing (FPGA, global and detailed routing);
- Physical synthesis.

COURSE EVALUATION:

The final course grade will be based on term tests, programming assignments and a project.

Quiz	Value
Test #1	25%
Test #2	25%
Assignment #1	10%
Assignment #2	10%
Project	30%

Dates for the term tests will be announced in class. These tests will be 1.5 hours each and will be open book examinations.

You must complete all course work to receive a numerical grade in the course. Failure to complete any course work will result in a grade of INC.

ASSIGNMENTS:

The two assignments are programming assignments that will require you to devise an algorithm to solve a computer-aided design problem.

PROJECT:

This course requires you to complete a project. The project should be a topic either related to computer-aided design or the application of some idea from computer-aided design to a problem in another domain. A presentation is also required.

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS):

All students taking courses offered by the Faculty of Engineering must have appropriate instruction on issues of safety. The Workplace Hazardous Materials Information System (WHMIS) training satisfies this requirement. This requirement must be satisfied before students can be allowed to engage in lab work.

Academic Integrity, Grievance, Discipline, Appeals and Note for Students with Disabilities: see www.uwaterloo.ca/accountability/documents/courseoutlinestmts.pdf The text for this web site is listed below:

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: The Office for persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.