Design Automation of VLSI Systems

Office Hours: M-W 1-2:15 PM

References
Bhatia D. Collection of Important PDA papers.
Published papers and reports will be provided in the class.

Goals and Course Objectives: This course is designed to introduce students with Physical Design Automation (DA) of VLSI systems. DA related issues for the current state of the art will familiarize students with existing techniques in VLSI design. Data structures and algorithms related to DA will provide insight into design of CAD tools. The material will be presented in technology independent style and will prepare students for design and development of DA tools. One of the key goals is to prepare students for research in physical design automation of VLSI systems. After finishing this course, students will have,

- Understood the relationships between DA algorithms and various constraints posed by VLSI fabrication and design technology.
- Critical performance related parameters and their importance in DA tools will be introduced.
- Implemented a prototype DA tool and tested it using real life benchmark examples.
- Documented a well-analyzed report for communicating the results of the DA tool design project.

Key Topics
- An introduction to Design Automation and CAD tools
- Some Basic Data Structures and Algorithms
- Logic and Circuit Partitioning
- Placement, Assignment, and Floorplanning
- Routing - Global and Detailed
- Layout Optimizations

Homework Assignments: There will be assignments related to important topics in DA. Programming assignments will constitute major share. One can expect two to three extensive programming tasks related to developing a part of or a complete DA tool. Assignments (programs or otherwise) will be graded by the teaching assistant. Normally there will be deadlines associated with most of the assignments. In any case, students will be encouraged to complete the task. After all, the goal here is to learn as much as possible and a deadline should not imply that assignment is no longer due and the grade is lost.

Class Participation: Classroom participation is an important aspect of learning. It is a learning process for both the students and the instructor. Questions, even if they seem simple, should be asked. Some questions will generate new ideas or start a discussion. I welcome those. In past I have had some of the best questions from students who have co-op experience from industries using DA tools and from students who are new to the field. By questioning you do a favor to instructor and classmates.

EE 3320 course will be conducted in a professional manner and students and instructor have shared responsibility of making it an enjoyable learning experience. All classes and exams will be conducted as per the rules of UT-Dallas. Students are encouraged to discuss problems, issues, and current trends in digital circuit design. However cheating and academic dishonesty is to be avoided. University of Texas at Dallas has good description of related issues on its website and students are encouraged to read them at: http://www.utdallas.edu/deanofstudents/
Grading Policy: Final grades in this course will be based on several homework assignments and two examinations given throughout the semester and a final examination. No makeup examinations will be offered in this course. Any graded work can be disputed in writing within one week of the return of that work. Complete work will be re-graded.

The grading policy is:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Projects</td>
<td>40%</td>
</tr>
<tr>
<td>Group Survey Paper</td>
<td>10%</td>
</tr>
<tr>
<td>Examination</td>
<td>30%</td>
</tr>
</tbody>
</table>

Homeworks and projects will be done in groups of size at most two (2). For each homework, each student MUST attempt all questions ALONE and then discuss with his/her group member. Then the group will submit one combined solution for grading purpose. Both the group members must sign assignment. Both group members will get same grade for the homework assignment. It is possible that the TA or instructor will call one of the group members to explain the work. In such cases, the grade will depend on a combination of the quality of the submission and the explanation of the selected member. Each assignment, report, and exam will get correctness as well as quality grades.

Important Dates: Following dates for examinations are firm dates. There will be no make up examination.

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>November 18, 2015</td>
</tr>
</tbody>
</table>

Student Conduct and Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations that govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part I, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university’s *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents’ Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity: The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrates a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one’s own work or material that is not one’s own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university’s policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use: The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student’s U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel.
Withdrawal from Class: The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Incomplete Grade Policy: As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester’s end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services: The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student’s responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days: The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.