

USCViterbi

EE 454L - Introduction to System-on-Chip

Units: 4

Term—Day—Time:

Fall 2024

Lecture:

Discussion:

Location:

[Classes Offered · USC Schedule of Classes](#)

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Office: EEB 340, **Office Hours:** TBA

Note: This syllabus will be updated by the first day of the semester.

Catalogue Course Description

This is an introductory 4-unit course on design flow, tools, concepts, challenges and issues related to System-on-Chip (SoC), which is the core part of real-time embedded systems with applications in mobile communications, cloud computing, aerospace and medical electronics. Part of this course is dedicated to Network-on-Chip (NoC), that is the communication backbone of large scale SoCs.

Learning Objectives

The main goal of this class is to practice at least part of the ASIC full-custom design flow, from specification down to layout, and develop the necessary hardware and software skills for it. In addition to design steps, the flow includes optimization and verification steps and they are partly practiced in this course. We will also cover the basic concepts of the CMOS technologies.

Prerequisite(s): Prerequisite: EE 354.

Co-Requisite(s): none

Concurrent Enrollment: none

Recommended Preparation: none

Required Readings and Supplementary Materials

Class notes

Grading Breakdown

Assignment	Points
Home Works	6
Labs	12
Final Project	22
Mid Term Exam	30
Final Exam	30
TOTAL	100



Assignment Submission Policy

Assignments are assigned weekly and due in class the following week. Programming projects and mininet exercises are explained and assigned in discussion section.

Course Topics

- FPGA design
- High level synthesis
- Logic synthesis
- RTL design using Verilog
- Network-on-chip
- C-style embedded design
- Interconnect standards
- Verification
- SoC architectures

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://adminopsnet.usc.edu/department/department-public-safety>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international

graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.