

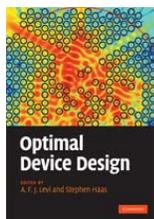
## EE 599 Optimal device design

A.F.J. Levi

Spring 2010

<http://www.usc.edu/alevi>

This course is designed as an introduction to the subject of optimal device design and its application to nanotechnology. The course is motivated by the fact that today nano-science provides an overwhelmingly large number of experimentally accessible ways to configure the spatial position of atoms, molecules, and other nanoscale components to form devices. The challenge this presents is to find the best, most practical, configuration that yields a useful device function. In the presence of what will typically be an enormous non-convex search space, it is reasonable to assume that traditional ad-hoc design methods will miss many possible solutions. One approach to solving this difficult problem is to employ machine-based searches of configuration space that discover user-defined objective functions. Such an optimal design methodology is the subject of this course. The goal is to identify the best broken-symmetry spatial configuration of metal, semiconductor, and dielectric that produce a desired response. By harnessing a combination of modern compute power, adaptive algorithms, and realistic multi-physics models, it is possible to seek robust, manufacturable designs that meet previously unobtainable system specifications. Applying this methodology to nano-science has the potential to create new devices with new functionality. It is a key design element contributing to transitioning nano-science to a viable technology.



The recommended book for this course is:

Optimal Device Design by A.F.J. Levi, Stephan Haas (Editor)

Publisher: Cambridge University Press, ISBN-13: 9780521116602

The grade for the class is weighted 20% on homework, 20% on the midterm exam, 20% on a class project, and 30% on the final exam. While not a prerequisite, it is expected that individuals participating in the class have access to and experience with MATLAB.

### Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

### Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

<http://www.usc.edu/dept/publications/SCAMPUS/gov/>

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at:

<http://www.usc.edu/student-affairs/SJACS/>