Department of Electrical Engineering  
University of Southern California  
EE 599 — Network Processor Programming and Design

**Instructor:** Young H. Cho, Research Assistant Professor  
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Office hours: Tuesdays, Thursdays 2-3pm

**TA:** Siddharth Bhargav  
Office hours: TBA

**Course Web Page:** [https://education.deterlab.net/course/view.php?id=14](https://education.deterlab.net/course/view.php?id=14)  
The web page will contain course announcements, laboratory assignment and relevant handouts.

**Lecture times and dates:** 12:30-1:50pm Tuesdays, Thursdays

**Classroom Location:** SGM (Seeley G. Mudd) 226

**Course Objectives:** Understand network processor architecture, applications, and other relevant issues. Program network processor and test under realistic network environment. Design and deploy custom network processor.

**Pre-requisite:** None.  
**Recommended Courses:** EE450 and EE457  
**Other Requirements:** experience in C programming and some understanding of hardware description languages

**Grading:**  
5% Class participation  
15% Reading assignments  
40% Laboratory assignments  
10% Final Presentation  
30% Final Project  
Final grades will be assigned by a combination of student score and the discretion of the instructor.

**Preparation for classes:**  
- Students will be using Linux based system through the course. It is strongly recommended that the students become familiar with its navigation and use.  
- Some of the laboratory assignments will require the use of C/C++ under Linux environment. It is recommended that students become familiar with the language and typical development environment.  
- It is recommended that the students become familiar with some form of hardware description languages.

**Grading policies:**  
- **Late Policy:** No late assignments will be accepted unless the instructor extends the due date. A late assignment results in a zero grade.
• **Grade Adjustment:** If you dispute any scoring of a problem on an exam or homework set, you have one week from the date that the graded paper is returned to request a change in the grade. After this time, no further alterations will be considered. All requests for a change in grade must be submitted in writing to me.

• **Changes/Information:** The student is responsible for all assignments, changes of assignments, announcements, lecture notes etc. All such changes should be posted on the course web-site.

• **Other:** As per university guidelines published in SCampus, the academic integrity policy will be upheld.

**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/.
**Syllabus:**

The course will be driven mainly by the lecture materials and assigned reading materials (key publications in the field).

**Lecture Week Topic**

1. Introduction to Network Processing
2. Networking Basics
3. Network Appliances
4. Programmable Network Appliances
5. Hardware Accelerated Networking
6. Introduction to Network Processors
7. NetThreads Network Processor
8. FPGA/NetFPGA Architecture
9. NetFPGA Programming
10. Digital Logic and System Design Review
11. Computer Architecture Review
12. Extended Instruction Set Architecture
13. Integration of Network Controller with Processor
14. Application Specific Hardware Acceleration
15. Application: Network Intrusion Detection Systems

**Laboratory # Topic**

1. DETER Tutorial (week 1)
2. Advanced DETER Tutorial (week 1)
3. Network performance measurement and tuning (week 2)
4. Xilinx ISE/Verilog Tutorials (week 2-3)
5. Mini Network Intrusion Detection System (week 4-5)
6. Custom Processor Design (week 6-7)
7. Special Network FIFO Design (week 8)
8. Single Core Network Processor Integration (week 9-10)
9. Final Project (week 10-15)

**Course Reading List**

2. T. Narten, "Internet Routing", ACM SigCom 89.