

CS595: Applications of Programmable Networking

Fall 2023

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Description:

This course is an opportunity to learn about recent research and product trends in programmable networking. Students may also individually elect to work on a scoped project that builds on ESnet's open-source Smart NIC platform

(<https://github.com/esnet/esnet-smartnic-hw/>). The course blends tutorials on programmable networking with seminar discussions of research papers. After taking the course, students will be better equipped to exploit features of modern network equipment.

Prerequisites:

- Passed with an "A" grade one of: CS351 or CS455 or CS450 or CS542 or CS543 or CS544 or CS546

Learning goals:

- Knowledge of recent research on programmable networking.
- Identification of development trends in this area.
- Familiarity with techniques used in research and deployed systems.
- Developing skills to analyze and discuss research results.
- Optionally, students can work on a project to build an application for a smart network card.

Course format:

- In-person: yes
- Remote (synchronous): yes
- Remote (asynchronous): yes

Grade composition:

- 5% Participation
- 15% Assignments
- 40% Seminar presentations
- 40% Either (a) Project or (b) Further seminar presentations.
Each student can choose (a) or (b).
- (No exams)

Textbooks and learning material:

- Links to scientific papers will be provided.
- Computer Networks, 6th edition (Tanenbaum, Feamster, Wetherall)

Syllabus:

(Total class time: 45 hours)

- Week 1: Introduction

- Week 2: Programmable Networking
- Week 3: Tutorial
- Week 4: Routing
- Week 5: Network Acceleration
- Week 6: Tutorial
- Week 7: Network Monitoring (1)
- Week 8: Network Monitoring (2)
- Week 9: Tutorial
- Week 10: Load Balancing
- Week 11: Edge Computing (1)
- Week 12: Edge Computing (2)
- Week 13: Serverless Computing
- Week 14: High-Performance Computing
- Week 15: High-Performance Computing