CSC 5991 ST: In-network Computing

Instructor: Rhongho Jang **Location:** 1206 State Hall

Time: TT 4:00 PM~ 5:15 PM **Office Hours:** TT 1:00 PM~2:00 PM

Course Description

The Intel® Tofino™ series of P4-programmable Ethernet switch ASICs deliver more flexibility for data centers. Monitor and control packet processing and update protocols in software to deliver customized performance for specific workloads at scale. More control and visibility in the network open a variety of opportunities including easy network optimization, cost efficiency, and rich visibility. This class will cover the foundations and advanced topics in network programmability, helping students understand a variety of real-world challenges that future networking encounters and state-of-the-art solutions.

Course Objectives

- Learn up-to-date knowledge about networking: data center and wild.
- Understand the principle of network programmability and opportunity.
- Practice a new emerging and industry-oriented network programming language.
- Identify real-world challenges of current and future networks.
- Address network issues from diverse perspectives: algorithms and systems.

Prerequisites

- Basic knowledge of computer networks and algorithm
- Entry-level programming skills in C/C++

Textbook

This course is based on up-to-date research and industrial material; thus, a textbook is not required.

Schedule and Contents

1. Introduction
2. Network in the Wild and Advanced Network Systems
3. Protocol-independent Packet Processing (P4) I - PISA and RMT
4. Protocol-independent Packet Processing (P4) II - P4 Language
5. Protocol-independent Packet Processing (P4) III - P4 Runtime
6. Data Structure and Algorithm for Networking
7. Midterm Exam
8. Routing
9. Buffer Scheduling
10. Load Balancing
11. Network Measurement
12. Security
13. AI for Networking
14. Data Center
15. Special Topics
16. Final Exam

Scaling

A	90-100%	C	70 - 73%
A-	87-89%	C-	67 - 69%
B+	84 - 86%	D+	64 - 66%
B	80 - 83%	D	60 - 63%
B-	77 - 79%	D-	57 - 59%
C+	74 - 76%	F	0 - 56%

Grading

Participation: 10%

Mid-term: 40%

Reading and Presentation: 30%

Project: 20%

Academic Dishonesty: Plagiarism and Cheating

All forms of academic misbehavior are prohibited at Wayne State University. Refer to the Student Code of Conduct.

Student Disability Services

If you have a documented disability that requires accommodations, you should register with Student Disability Services (SDS) to coordinate your academic accommodations.

Link: https://studentdisability.wayne.edu/.

Phone: (313) 577-1851 | Videophone: (313) 202-4216 | Fax: (313) 577-4898

Other Issues

Should you have any questions or issues, please contact the instructor in advance.