

CS 798: Advanced Network Architectures
(Short title: **Advanced Network Architectures**)

Objectives:

This course is one of two companion courses on network softwarization offered simultaneously in the Winter 2020, the first course (this one) introduces concepts and principles of network softwarization while the second course focuses on hands on experience with technology enablers. The courses will be offered simultaneously in 4 Universities, namely University of Waterloo, University of Toronto, University Laval and Ecole des Technologies Superieures (ETS).

Students must successfully complete both courses in order to qualify for CREATE industry internships in the area of network softwarization.

Schedule:

The course will be offered in flip mode. Pre-recorded video lectures will be provided prior to class and weekly interactive sessions (remotely attended by students in other universities) will provide an opportunity to discuss lecture material and answer students' questions.

Day/time of classes: Monday 12:00 PM – 2:50 PM

Outline:

Part 1: Software-Defined Networking Principles and Design

- Introduction to SDN (Week 1)
- SDN Data, Control Planes, and APIs (Week 2)
- Network Virtualization (Week 3)

Part 2: Software-Defined Optical WAN and Radio Access

- 5G Fronthaul requirements (Week 4)
- Trends in multicarrier optical physical layer (Week 5)
- Spatial Multiplexing (Week 6)

Part 3: Sustainable Management of Clouds and Networks

- Introduction to Cloud Computing (Week 7)
- Data Analytics (Week 8)
- Energy efficient and sustainable management (Week 9)

Part 4: Network Function Virtualization and Orchestration

- Programmable Networks (Week 10)
- Network Function Virtualization (Week 11)
- IoT, Smart Cities, and 5G Use Cases (Week 12)

Grading scheme:

- Class Participation: 10%
- Quizzes: 40%
- Course Project: 50%

CS 798: Network Softwarization
(Short title: **Network Softwarization**)

Objectives:

This course is one of two companion courses on network softwarization offered simultaneously in the Winter 2020, the first course introduces concepts and principles of network softwarization while the second course (this one) focuses on hands on experience with softwarization technologies and enablers. The courses will be offered simultaneously in 4 Universities, namely University of Waterloo, University of Toronto, University Laval and Ecole des Technologies Superieures (ETS).

Students must successfully complete both courses in order to qualify for CREATE industry internships in the area of network softwarization.

Schedule:

Friday 10:00 PM – 12:50 PM

Outline:

Part 1: Software-Defined Networking

- SDN data plane – Open vswitch & Mininet tutorial and lab. (Week 1)
- SDN control plane – ONOS tutorial and lab. (Week 2)
- SDN network virtualization – FlowVisor & OVX tutorial and lab. (Week 3)

Part 2: Software-Defined Optical WAN and Radio Access

- 5G Fronthaul – capacity of various optical network solutions (Week 4)
- OFDM – flex grid and dynamic allocation of bandwidth (Week 5)
- Spatial Multiplexing – commutation of WDM/SDM (Week 6)

Part 3: Sustainable Management of Clouds and Networks

- Cloud Computing – OpenStack tutorial and lab. (Week 7)
- Data Analytics – Cloud workload classification/prediction lab. (Week 8)
- Energy efficient and sustainable management – Green ICT tutorial (Week 9)

Part 4: Network Function Virtualization and Orchestration

- Programmable Networks – Service orchestration & chaining lab. (Week 10)
- Network Function Virtualization – Federation tutorial and lab. (Week 11)
- IoT, Smart Cities, and 5G Use Cases – IoT applications lab. (Week 12)

Grading scheme:

- Class Participation: 10%
- Lab Exercises: 40%
- Course Project: 50%