

# Proposal of ECE6xx: Emerging Topics of Optical Communications and Inter-networking

Instructor: Pin-Han Ho

The course is offered mainly based on the course lecture slides, a pool of research papers (to be determined during the term), and the following two reference books:

1. H. T. Mouftah, et. al., “Optical Networks: Architecture and Survivability”, Springer, 2002.
2. J. Tapolcai, et al., “Internet Optical Infrastructure, Issues on Monitoring and Failure Restoration”, Springer 2015.

Pre-requisite: ECE358 (computer networks) or equivalent

Marking scheme:

Midterm (20%)  
Final (50%)  
Course project and presentation (30%)

A pool of project topics and corresponding document/papers that are related to the course material will be provided in the 5<sup>th</sup> week of the term. The students are grouped and each group picks up a topic for the project including topic review/survey,

Course Outline:

- Issues of optical Internet control and management (2 weeks)
  - Evolution of the Internet.
  - Review of data communication networks and Internet
  - Multi-Protocol Label Switching (MPLS)
  - ITUT G.709: Multi-Service Optical Transport Network (MS-OTN)
  - Software-defined networks (SDN)
- Hardware aspects and implementations of optical communication systems (1 weeks)
- Passive optical networks (PON) (1 week)
- Visible light communication (VLC) (1 week)
- Datacenter networking (1 week)
- Wavelength division multiplexed (WDM) networking (1 week)
- Optical OFDM based elastic optical networking (EON) (1 week)
- Integration of wired and wireless communication systems (1 week)
- Optical communications in 5G and 5G beyond radio access network (RAN) (1 week)
- Optical network monitoring and failure localization (1 week)
- Applications of artificial intelligence (AI) and machine learning (ML) on the optical Internet design (1 week)

## Course Description:

The main objective of the course is to provide state-of-the-art progress of modern inter-networking technologies in the aspects of optical communications. The course covers the topics ranging from the issues related to generic computer networking, Internet backbone control and management, optical/wired access technologies, visible light communication (VLC), datacenter networking, optical OFDM networking, optical network failure monitoring, 5G and 5G beyond radio access network (RAN), optical-wireless integration, and artificial intelligence (AI) to the Internet backbone control and management. The students are required to complete a course project related to the topic and demonstrate insightful knowledge into the course material.