

# EE 6365 Advanced Fiber Optic Transmission Systems: WDM System Design

Fall Semester 2023

Monday / Wednesday, 5:30 pm–6:50 pm, ERB 129

Instructor: Michael Vasilyev, Professor

This course will take the students who are familiar with the basics of optics and bring them up to speed in state-of-the-art long-haul optical communication systems and networks based on wavelength-division-multiplexing (WDM) technology. We will review several modern commercial WDM systems and discuss the methods and rules of thumb for their design, including the use of advanced devices such as erbium-doped and Raman amplifiers, dynamic gain equalizers, optical add-drop multiplexers and cross-connects. The course will capitalize on instructor's extensive industrial experience in design and characterization of WDM systems.

The covered topics will include:

- Review of modern commercial WDM systems architecture
- Commonly used modulation formats
- System's signal-to-noise-ratio budget
- Rules-of-thumb in estimation of system impairments
- Direct and coherent detection
- Transmitter and receiver design issues
- Amplified spontaneous emission noise
- Erbium-doped fiber amplifiers and their design
- Lumped and distributed Raman amplifiers
- Nonlinear-optical impairments
- Choice of dispersion map
- Optical networking with add-drop multiplexers and cross-connects
- System characterization techniques (Q-factor estimation, recirculating-loop operation, etc.)

**Course format:** the course will consist of lectures (slides) (50%) and student's presentations/discussions reviewing recent progress in this field (50%).

**Prerequisites:** There is no formal pre-requisite, although some familiarity with optics is recommended (e.g., by taking previously or concurrently one or more of EE5380, 5384, 5385 courses or equivalent).

For more information, check instructor's website <https://nosplab.uta.edu> for syllabus updates.

