

---

**Modulbezeichnung:** **Advanced Optical Communication Systems (AOC)** **5 ECTS**  
 (Advanced Optical Communication Systems)

Modulverantwortliche/r: Bernhard Schmauss  
 Lehrende: Bernhard Schmauss

---

Startsemester: WS 2021/2022	Dauer: 1 Semester	Turnus: jährlich (WS)
Präsenzzeit: 60 Std.	Eigenstudium: 90 Std.	Sprache: Englisch

---

**Lehrveranstaltungen:**

Advanced Optical Communication Systems (WS 2021/2022, Vorlesung, 2 SWS, Bernhard Schmauss)  
 Advanced Optical Communication Systems Exercises (WS 2021/2022, Übung, 2 SWS, Lisa Härteis)

---

**Empfohlene Voraussetzungen:**

**Prerequisites:**

- Fundamentals in signals and systems.
- Basic knowledge of fiber optics and optoelectronic components recommended.

---

**Inhalt:**

- Multiplex Techniques: electrical / optical time division multiplexing, wavelength division multiplexing
- Dispersion Management: dispersion and bitrate, dispersion compensation, dispersion in WDM systems
- Noise and Power Management: power budget, OSNR management, OSNR calculation
- Management of Nonlinearities: self & cross phase modulation (SPM / XPM), four wave mixing (FWM), Raman scattering, solitons
- Spectral Efficiency: definition, increase of spectral efficiency
- Modulation Formats: intensity modulation, multilevel transmission, CS-RZ, SSB Transmission, DPSK, DQPSK, Coherent Transmission
- Optical Regeneration: 2R-Regeneration by nonlinearities, distributed regeneration, 3R-Regeneration

**Lernziele und Kompetenzen:**

Students

- gain detailed Knowledge on concepts and structure of various optical transmission systems.
- are able to analyze, to compare and evaluate the quality of optical data signals with respect to different system concepts.
- are able to develop and to optimize link designs of optical transmission systems.
- are able to systematically improve the performance of optical links taking into account state of the art and leading edge scientific results.

**Literatur:**

Agrawal, G.P.: Fiber-Optic Communication Systems, John Wiley & Sons, 1997  
 Agrawal, G.P.: Nonlinear Fiber Optics, John Wiley & Sons, 3. Auflage, 2001.  
 Kaminow, I, Koch, T.: Optical Fiber Telecommunications IVA, Academic Press, 2002.  
 Kaminow, I, Li, T., Willner, A.: Optical Fiber Telecommunications VA, Academic Press, 2008.  
 Lecture notes.

---

**Studien-/Prüfungsleistungen:**

Advanced Optical Communication Systems (Prüfungsnummer: 621649)

(englische Bezeichnung: Advanced Optical Communication Systems)

Prüfungsleistung, mehrteilige Prüfung, Dauer (in Minuten): 30

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

The exam will usually be an oral exam. Date and time to be determined.

Erstablesung: WS 2021/2022, 1. Wdh.: SS 2022

1. Prüfer: Bernhard Schmauss