

### 3.1.3 Optical Data Transmission

#### Module title: Optical Data Transmission

Module summary
Module code: EITM 130I
Module coordinator: Prof. Dr. Manfred Litzenburger
Credits (ECTS): 5 CP
workload: in lecture/lab 60 h, independent study time 90 h
Semester: 1 <sup>st</sup> or 2 <sup>nd</sup> semester
Pre-requisites with regard to content: Communication Theory, Optics, Solid State Physics
Pre-requisites according to the examination regulations: none
<p>Competencies: Upon successful completion,</p> <ul style="list-style-type: none"> <li>the students know the most important components of optical data transmission systems</li> <li>the students are able to design optical data transmission systems for various fields of application</li> <li>the students can calculate the theoretical behavior of optical data transmission systems</li> <li>the students know how to measure all relevant parameters of optical data transmission systems</li> </ul> <p>the students are able to optimize optical communication links regarding optimum performance and cost</p>
<p>Assessment:</p> <p>Assessment is done by either a written exam (90 minutes) or an oral examination (20 minutes). The form of examination will be announced at the beginning of the semester</p>
<p>Usability:</p> <p><i>General:</i> The module imparts knowledge of optoelectronics, communications and solid state physics. Optoelectronic components and their relevant features are discussed and based on that the realization of state of the art optical data transmission systems with an analysis of their characteristic problems and potentials follows.</p> <p><i>Connection with other modules:</i> Optical data transmission requires a comprehensive background in communications, signal theory and solid state physics which is provided by corresponding modules of this master's program. However, the module Communication Systems of this master's program is complemented by this module and the practical experience in optical data transmission systems and components which the students gain during their lab projects.</p>

Course: Lecture Optical Data Transmission
Module code: EITM 131I
Lecturer: Prof. Dr. Ulrich Grünhaupt
Contact hours: by arrangement
Semester of delivery: yearly, winter semester
Type/mode: lecture 2h/week; mandatory in the study field Information technology, optional in the other study fields of the program
Language of instruction: English or German; the course language will be announced at the beginning of the semester
<p>Content:</p> <ul style="list-style-type: none"> <li>Optical Fiber Basics</li> </ul>

<ul style="list-style-type: none"> <li>• Optical Emitters, modulators, detectors and amplifiers (EDFA)</li> <li>• Fiber Optic Measurement Techniques</li> <li>• WDM technology and coherent transmission</li> <li>• Noise, dispersion penalty and bit error rate in optical links</li> <li>• Nonlinearities and impairments in fiber systems</li> </ul>
Recommended reading: Course manuscript Brückner, Volkmar: <i>Elemente optischer Netze: Grundlagen und Praxis der optischen Datenübertragung</i> , Vieweg+Teubner, 2011 Reider, G. A.: <i>Photonik</i> , Springer, 2013 Keiser, Gerd: <i>Optical Fiber Communications</i> , McGraw Hill, 2010 Agrawal, Govind P.: <i>Fiber-Optic Communication Systems</i> , John Wiley, 2010 Kaminow, Ivan P.; Li, Tingye; Willner, Alan E.: <i>Optical Fiber Telecommunications V1b: Systems and Networks (Optics and Photonics)</i> , Academic Press, 2013
Comments: -

<b>Course: Lab Optical Data Transmission</b>
Module code: EITM 132I
Lecturer: Prof. Dr. Ulrich Grünhaupt
Contact hours: by arrangement
Semester of delivery: yearly, winter semester
Type/mode: lab 2h/week; mandatory in the study field Information technology, optional in the other study fields of the program
Language of instruction: English or German; the course language will be announced at the beginning of the semester
Content: Practical experiments on the topics of the corresponding lecture
Recommended reading: see corresponding lecture
Comments: -