

**Name of programme:** International Semester Information Technology / System Engineering

<b>Title of Module</b>	<b>Access networks and technologies</b>
Responsible person	Prof. Dr. Joachim Habermann, Prof. Dr. Karl-Friedrich Klein
Teacher	Prof. Dr. Joachim Habermann, Prof. Dr. Karl-Friedrich Klein
Module Code	E2F254
Type of Module	O obligatory module (Pflichtmodul), x elective module (Wahlpflichtmodul)
Level (BA / MA)	Bachelor
Language	English (German on demand)
Related Degree Programme/s	Communications Engineering and Computer Networks
Department	IEM
Location	O Gießen, x Friedberg
Availability/frequency of module	O every semester, O annually in the Winter Semester, x annually in the Summer Semester,
Hours per Week / Workload	4 HpW, contact hours per week 150 H in total
Number of CrP/ECTS	5 ECTS/CrP
Forms of instruction	x lecture O seminar x supervised training O Laboratory Practical Course
Qualifications and Goals	Learning outcomes:  Knowledge: basic knowledge of optics and wireless communications; EM waves , fundamentals of the transmitter and receiver (opto-electronic) components of the transmission links; knowledge of wireless technologies and networks. Skills: Ability to design modern access technologies, realize, operate, optimize and adapt to the demands in e.g. industrial communication. Competences: Design and evaluation of simple optical transmission links and wireless access networks.
Short Description of Contents	Optical access technologies: Optical fiber , Transmitter , optical amplifiers , optoelectronic receiver , Components , Transmission lines  Wireless access networks and technologies: wireless communication, cellular concept , radio channel , LTE , WLAN , Bluetooth , WiMAX , etc.
Description of Contents	Content:  Optical access technologies: Fundamentals of optics ; Optical fiber : structure , modes , characteristics ; Fundamentals of transmitter : LED and laser diodes , optical amplifiers : resonator , laser condition ; Fundamentals of optoelectronic receiver ; Diode structure , replacement model , noise , SNR ; Components : connectors, modulators , switches , MUX ; Transmission lines , power budget , dispersion  Wireless access networks and technologies: Principle of wireless communication, cellular concept , radio channel , current wireless access technologies : LTE , WLAN , Bluetooth , WiMAX , etc.
Prerequisites	English level B2, basics of digital communication.
Assessment	O oral (O examination of xx minutes, O presentation), x written (x examination of xx minutes, O term paper), other:

Literature/Textbooks	<p>Keiser, G.: Optical communications (3rd edition), Wiley, 2002</p> <p>Brückner, V.: Elemente optischer Netze (2. ed.), Vieweg&amp;Täubner, 2011</p> <p>Wrobel, C.P.: Optische Übertragungstechnik in der Praxis , VDE-Verlag, 2004</p> <p>Bludau, W.: Lichtwellenleiter in Sensorik und optischer Nachrichtentechnik, Springer, 1998</p> <p>Hering,E., Martin, R.: Photonik: Grundlagen, Technologien und Anwendungen, Springer, 2005</p> <p>Glaser, W.: Photonik für Ingenieure, Verlag Technik GmbH, 1997</p> <p>LTE - The UMTS Long Term Evolution: From Theory to Practice, Stefania Sesia et al.Wiley &amp; Sons (22. July 2011)</p> <p>Wireless LANs: 802.11-WLAN-Technologie und praktische Umsetzung im Detail, Jörg Rech, Heise Zeitschriften Verlag, 2012</p> <p>Wireless Communications, Theodore S. Rappaport, Prentice-Hall 2002</p>
Other	