

Department	SciTec
Degree programme	SI
Module name	Introduction Laser Technologies
Module number	SciTec.2.296
Study and Examination Regulations	ER-version 2026 (of 13/08/2025)
module type	compulsory module
Module coordinator	Prof. Dr. Maria Dienerowitz
Module content	Absorption and emission processes; line broadening; generation of population inversion; three- and four-level systems; laser resonators; mode structure; Gaussian beams; operating modes; types of lasers; biological effects of laser radiation (eye, skin); classification of lasers according to hazard potential; measures for radiation protection; responsibilities of the laser safety officer
Learning objectives	Upon completion of the module, students will be able to explain the interaction of laser radiation with matter and understand the basic structure of a laser. Additionally, students will be able to calculate beam propagation and name the basic properties of various lasers. Along with the knowledge acquired about laser safety, students will be able to assess the functionality and properties of a laser in practical applications in terms of required power and laser safety.
Course type (lecture, seminar, exercises, practical course)	2 L – 0 S – 1 E – 0 P
Method(s) of instruction/ media used	lectures, exercises
Learning materials	Power-Point presentation, Handouts, Problem Sets
Recommended literature	<ul style="list-style-type: none"> ▪ K. F. Renk, Basics of Laser Physics, Springer 2017 ▪ J. Eichler, H.-J. Eichler, Laser - Bauformen, Strahlführung, Anwendungen, Springer-Verlag, 2015 ▪ R. Dohlus, Lasertechnik, Walter de Gruyter 2015
Level/ category	Master (category: 2)
Which semester (winter/ summer term)	winter term
Which semester during the programme	1
Requirements for attendance/ knowledge	optics and physics, basic knowledge of mathematics
Requirements for award of credit points (type, scope, duration of examination)	written examination (90 minutes)
ECTS credits	3
Work load in:	90 h of total work load, therefrom 45 of presence at university 22,5 h of self-study 22,5 h of preparation for exams
Usability of this module	Applied Laser Technologies, Quantum Technologies
Frequency of offer	Every study year
Duration of module	1 semester
Location	Ernst-Abbe-Hochschule Jena - University of Applied Sciences Jena
Course Time	According to schedule
Language(s)	English
Latest change	15/09/2025