

<b>Department</b>	SciTec
<b>Degree programme</b>	SI
<b>Module name</b>	Introduction Laser Technologies
<b>Module number</b>	SciTec.2.296
<b>Study and Examination Regulations</b>	ER-version 2026 (of 13/08/2025)
<b>module type</b>	compulsory module
<b>Module coordinator</b>	Prof. Dr. Maria Dienerowitz
<b>Module content</b>	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
<b>Learning objectives</b>	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.
<b>Course type (lecture, seminar, exercises, practical course)</b>	2 L – 0 S – 1 E – 0 P
<b>Method(s) of instruction/ media used</b>	lectures, exercises
<b>Learning materials</b>	Power-Point presentation, Handouts, Problem Sets
<b>Recommended literature</b>	<ul style="list-style-type: none"> <li>▪ K. F. Renk, Basics of Laser Physics, Springer 2017</li> <li>▪ J. Eichler, H.-J. Eichler, Laser - Bauformen, Strahlführung, Anwendungen, Springer-Verlag, 2015</li> <li>▪ R. Dohlus, Lasertechnik, Walter de Gruyter 2015</li> </ul>
<b>Level/ category</b>	Master (category: 2)
<b>Which semester (winter/ summer term)</b>	winter term
<b>Which semester during the programme</b>	1
<b>Requirements for attendance/ knowledge</b>	optics and physics, basic knowledge of mathematics
<b>Requirements for award of credit points (type, scope, duration of examination)</b>	written examination (90 minutes)
<b>ECTS credits</b>	3
<b>Work load in:</b>	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
<b>Usability of this module</b>	Applied Laser Technologies, Quantum Technologies
<b>Frequency of offer</b>	Every study year
<b>Duration of module</b>	1 semester
<b>Location</b>	Ernst-Abbe-Hochschule Jena - University of Applied Sciences Jena
<b>Course Time</b>	According to schedule
<b>Language(s)</b>	English
<b>Latest change</b>	15/09/2025