ASP - Abbe School of Photonics — **Friedrich Schiller University Jena**

M.Sc. Photonics — ECTS Σ 120

1. Semester Fundamentals & Adjustment — 30 ECTS

Fundamentals	16 ECTS
Opt. metrology & sensing	
Staude	Comp.
2 L+ 1 E	4 ECTS
Introduction to optical model.	
Zeitner/Wyrowski	Comp.
2 L+1 E	4 ECTS

Adjustment	16 ECTS
Fundamentals of modern optics	
Pertsch	Adv.
4 L+ 2 E	8 ECTS
Structure of matter	
Stenzel	Adv.
4 L+2 E	8 ECTS
Theoretic. solid state physics*	
Botti	Adv.
4 L+2 E	8 ECTS
Advanced quantum theory*	
Bernuzzi	Adv.
4 L+2 E	8 ECTS

2. Semester Fundamentals & Specialization I — 30 ECTS

Laser physics	
Limpert/Jauregui	Comp.
4 L+2 E	8 ECTS

Specialization I	12 ECTS
(each module: 2 L+1 E=4 ECTS)	
Analytical instrumentations	
Szeghalmi/Tünnermann	Elect.
Applied laser technology I	
Cizmar/Eggeling	Elect.
Biophotonics	
Täuber/Heintzmann/Ehricht	Elect.
Biomedical imaging - nonioniz. rad.	
Reichenbach/Förster	Elect.
Computational photonics	
Pertsch	Elect.
Design & corr. of opt. systems	
Gross	Elect.
Electronic structure theory	
Rödl	Elect.
Fiber optics	
Schmidt	Elect.
Image processing	
Denzler	Elect.
Innovation methods in photonics	
Pertsch	Elect.
Integrated quantum photonics	
Gräfe/Gili/Pertsch	Elect.
Introduction to nanooptics	
Pertsch/Staude	Elect.
Introducton to x-ray spectroscopy	
Röhlsberger	Elect.
Key experim. in accelerat.-based mod. phys.	
Bernitt/Weber/Stöhlker/Hahn	Elect.
Laser driven radiation sources	
Zepf	Elect.
Lens design I	
Gross	Elect.
Light source modeling	
Wyrowski	Elect.
Micro/nanotechnology	
Zeitner	Elect.
Microscopy	
Heintzmann/Eggeling	Elect.
Milestones in optics	
Mappes	Elect.
Modern methods of spectroscopy	
Spielmann	Elect.
Nonlinear optical properties of 2D materials	
Soavi	Elect.
Nuclear matter & formation of elements	
Forstner/Stöhlker	Elect.
Optical properties of solids in external fields	
H. Schmidt	
Optics for spectrosc.: Opt. waves in solids	
Mayerhöfer	Elect.
Optoelectronics	
Schmidl	Elect.
Particles in strong elm. Fields	
Zepf	Elect.
Physical optics modeling	
Wyrowski	Elect.
Physics of extreme elektromagnetic fields	
Volotka/Stöhlker	Elect.
Physics of free electron laser	
Schulze	Elect.
Physics solar cells	
Paulus	Elect.
Plasma physics	
Kaluza	Elect.
Quantum computing	
Eilenberger/Steinlechner/Pertsch	Elect.
Quantum optics	
Saravi/Setzpfandt/Eilenberger/Pe	Elect.
Selected topics in light-matter-interactions	
Stenzel	Elect.
Semiconductor nanomaterials	
Staude	Elect.
Strong-field laser physics	
Paulus	Elect.
Theory of nonlinear optics	
Peschel	Elect.
XUV optics	
Kartashov/Spielmann	Elect.

3. Semester Specialization II & Research — 30 ECTS

Specialization II	12 ECTS
(each module: 2 L+1 E=4 ECTS)	
Active photonic devices	
Schmidt	Elect.
Applied laser technology II	
Eggeling/Cizmar	Elect.
Biomedical imaging - ionizing radiation	
Förster/Reichenbach	Elect.
Computational imaging	
Lötgering/Heintzmann	Elect.
Diffractive optics	
Wyrowski	Elect.
Graphene: Electronic and optical propert.	
Soavi	Elect.
High-intensity/relativ. optics	
Kaluza	Elect.
Image processing	
Heintzmann	Elect.
Imaging and aberration theory	
Gross	Elect.
Interact. of high-energy radiat. with matter	
Stöhlker	Elect.
Introduction to accelerator physics	
Forstner/Stöhlker	Elect.
Introduction to modern x-ray science	
Röhlsberger	Elect.
Laser driven radiation sources	
Zepf	Elect.
Laser engineering	
Körner	Elect.
Lens design II	
Gross	Elect.
Light microscopy	
Heintzmann	Elect.
Nanoengineering	
Hoeppener/Schubert	Elect.
Nonlinear optics	
Paulus	Elect.
Optical propert. of solids in external fields	
H. Schmidt	
Physical optics	
Franke	Elect.
Physical optics design	
Wyrowski	Elect.
Phys. of ultrafast opt. discharge & filament.	
Kartashov/Spielmann	Elect.
Quantum communication	
Steinlechner/Eilenberger/Tünne	Elect.
Quantum imaging & sensing	
Gräfe/Setzpfandt/Tünnermann	Elect.
Thin film optics	
Tünnermann/Stenzel	Elect.
Ultrafast optics	
Alberucci/Nolte	Elect.

4. Semester Research — 30 ECTS

Version 03.10.2021

Module Experimental Optics	6 ECTS
Nolte	
Experimental Optics	
University	Comp.
6 Lab	6 ECTS

Module Internship	10 ECTS
Nolte	
Internship	
University/(Industry)	Comp.
10 Lab	10 ECTS

Module Research Lab	18 ECTS
Pertsch	
Research Lab	
University/Industry	Comp.
18 Lab	18 ECTS

Module Master's Thesis	30 ECTS
Pertsch	
Master's Thesis	
University/Industry	Comp.
30 Lab	30 ECTS

Extra Curricular Courses

Language course	
Language center	
4 h German/English	---

Language course	
Language center	
4 h German/English	---

Language course	
Language center	
4 h English/German	---

Language course	
Language center	
4 h English	---

Comp. - Compulsory course
Adv. - Advised course
Elect. - Elective course

ECTS - ECTS credits
L - Lecture (hours/week)
E - Exercise (hours/week)
Lab - Laboratory (hours/week)
G - Course given in German (maybe)
* - in consultation with Prof. Pertsch only