SEMESTER 3 (winter), total **340 hours = 160 O**[*)] **+ 180 F**[**)], ECTS: **34 (17 O + 17 F)**

[*)] **O – Obligatory courses (in yellow)**

[**)] **F – Facultative courses (in pink)**

no.	courses	type	hours	ECTS	credit
1.	**Photonics – selected trends of modern photonics** • Interaction of light with dielectrics and metals • Surface plasmon • Metallic nanoparticles • Physical fundamentals and basic properties • Manufacturing • Applications • Metamaterials • Physical basis • Structure-determined properties • Left-handed materials • Fabrication & properties • Selected applications	lecture&classes	45 O (30l+15c)	**5**	exam
2	**Thermodynamics and atomistic modelling of structural transformations in crystalline materials** • Foundations of Statistical Thermodynamics (compendium). • Equilibrium Statistical Thermodynamics of multicomponent phases: ideal and regular solutions, Cluster Variation Method (CVM), hierarchy of analytical approximations, Static Concentration Wave (SCW) approach • Non-equilibrium thermodynamics of multicomponent phases (kinetics): Path Probability Method (extension of CVM); Static Concentration Wave (SCW) approach (spinodal decomposition and spinodal ordering); Master Equation approach. • Monte Carlo techniques in equilibrium and non-equilibrium thermodynamics of multicomponent phases	lecture&classes	45 O (30l+15c)	**5**	exam
3	**Intellectual Property**	lecture	10 O	**1**	exam
4	**Master thesis seminar I**	seminar	30 O	**2**	assessment
5	**X-ray optics** • X-ray sources nano&micro focus, laser driven, synchrotrons • X-ray interaction with matter • X-ray optical elements for micro&nanoscale imaging • Detectors (1D and 2D - CCD,sCMOS, hybrid pixel) • X-ray microscopy and micro & nanotomography • X-ray micro & nanospectroscopy • X-ray diffraction and the phase problems • Coherent X-ray imaging and ptychography	lecture	30O	**4**	exam
6	**Master work laboratory I**	laboratory	120 F	**10**	assessment
7	**Polymers** • Basic features: hierarchical structure, physical states, molar mass; • Random walks and stimuli-responsive properties: • -ideal and real chains, globule-coil transitions; • Molecular origins of visco-elasticity: • - chain dynamics and diffusion mechanisms; • Self-assembling nanostructured materials: • - macro-phase separation of blends, • - micro-phase separation of block copolymers.	lecture	30 F	**4**	exam
8	**Photonic materials**	seminar	30 F	**3**	assessment
9	**Memristive materials**	seminar	30 F	**3**	assessment