

Doctoral studies in physics - Courses

for academic year 2019/2020

1. ELEMENTARY PARTICLE PHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
1.	A. Ilakovac	Advanced Field Theory	30	15
2.	K. Kumerički, B.Melić	Elementary Particles	30	15
3.	M. Planinić, D. Lelas	Experimental Methods in Particle Physics	30	15
4.	I. Doršner	Theoretical Tools in Elementary Particle Physics	30	15
5.	K. Kumerički	Seminar in Elementary Particle Physics	0	15
<i>Theory students enrol seminar and first two courses, while experimental students enroll seminar and second two courses.</i>				
<i>Elective courses:</i>				
6.	D. Klabučar	Hadronic Physics	15	15
7.	D.Jurman, A. Samsarov	Groups	15	15
8.	M. Cvitan	Gravitaton and Cosmology	15	15
9.	L. Bonora, A. Chatzistavrakidis	Superstring Theory and Branes	15	15
10.	V. Brigljević	Methods of Statistical Analysis and Pattern Recognition with Applications in Particle Physics	15	15
11.	I. Puljak	New Results with Experiments at Colliders	15	15
12.	N. Godinović, T. Surić	Experimental Astroparticle Physics	15	15
13.	N. Poljak	Experimental Physics of Hadronic Systems	15	15
<i>Students enrol any 2 elective courses, after consultations with mentor or module coordinator.</i>				

2. NUCLEAR PHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
14.	D. Vretenar	Theoretical Nuclear Structure	25	15

15.	D. Bosnar, M. Milin	Experimental Nuclear Physics	15	15+10
16.	D. Vretenar	Seminar in Nuclear Physics	0	15
<i>All students enrol same required courses.</i>				
<i>Elective courses:</i>				
17.	M. Planinić, D. Bosnar	Experimental Techniques in Nuclear Physics	10	15+10
18.	M. Jakšić	Nuclear Techniques and their Applications for Materials and Environment	10	30
19.	M. Makek	Radiation Detectors and Medical Applications of Nuclear Methods	15	15+10
20.	M. Milin	Nuclear Astrophysics	20	10
21.	T. Nikšić	The Nuclear Many-Body Problem	20	10
22.	N. Paar	Mathematical Modeling and Numerical Methods	20	10
23.	S. Szilner, N. Soić	Nuclear Reactions	20	10
<i>Students enrol any 3 elective courses, after consultations with mentor or module coordinator.</i>				

3. ASTROPHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars.	
<i>Required courses:</i>				
24.	K. Pavlovski	Physics of Stars and Stellar Populations	30	15
25.	V. Smolčić	Galaxies and Observational Cosmology	30	15
26.	V. Smolčić	Seminar in Astrophysics	0	15
<i>All students enrol same required courses.</i>				
<i>Elective courses:</i>				
27.	Ž. Ivezić, V. Smolčić	Astronomy with Massive Databases	20	10
28.	B. Vršnak	Solar Magnetohydrodynamics	15	15
29.	TBD	Relativistic Magnetohydrodynamics	15	10
30.	D. Vinković	Interstellar Matter	20	10
31.	V. Jelić	Observational Astrophysics	20	10
<i>Students enrol any 3 elective courses, after consultations with mentor or module coordinator..</i>				

4. ATOMIC, MOLECULAR AND OPTICAL PHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
32.	H. Buljan, T. Ban	Introduction to Modern Atomic, Molecular, and Optical Physics	40	15
33.	H. Buljan	Seminar in Atomic, Molecular, and Optical Physics	0	15
<i>All students enroll same required courses</i>				
<i>Elective Courses:</i>				
34.	H. Buljan	Nonlinear optics	15	15
35.	N. Demoli	Optics and Holography	15	30
36.	M. Jablan	Quantum Optics	15	15
37.	D. Veža	Nonconventional Techniques in Atomic Spectroscopy	15	15
38.	V. Mohaček Grošev	Methods of Molecular Spectroscopy in Studying Molecular Vibrations	15	15
39.	N. Vujičić	Femtosecond Laser Spectroscopy	15	15
40.	H. Buljan, D. Jukić	Ultracold Atomic Gases and Methods of Many-Body Physics	15	15
41.	D. Aumiler	Coherent Light-Atom Interaction	15	15
42.	T. Ban	Laser Cooling and Trapping	15	15
43.	S. Milošević	Low-temperature Plasmas and Applications	15	15
44.	B. Vršnak	Plasma Physics	15	15
45.	T. Tadić	Fusion Plasma and Nuclear Fusion Reactors	15	15
<i>Students enrol any 4 elective courses, after consultations with mentor or module coordinator..</i>				

5. CONDENSED MATTER PHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
46.	M. Požek, D. Radić	Condensed Matter Physics	56	36
47.	O. Barišić	Theoretical Condensed Matter Physics	36	18

48.	K. Zadro	Experimental Investigations in Condensed Matter Physics	0	60+15
49.	D. Sunko	Seminar in Condensed Matter Physics	0	15
<i>Theory students enrol seminar and first two courses, while experimental students enrol seminar, first and third course</i>				
<i>Elective courses:</i>				
50.	M. Šunjić	Physics of Surfaces and Nanostructures	15	7
51.	TBD	Theory of Phase Transitions	15	7
52.	I. Kupčić	High-temperature Superconductivity	15	7
53.	V. Despoja	Semiconductor Physics	15	7
54.	H. Buljan	Nonlinear Continua	15	7
55.	K. Zadro	Physics of Novel Materials	15	7
56.	I. Batistić	Selected Lectures on Theoretical Physics in Condensed Matter	20	0
<i>Students enrol any 2 elective courses, after consultations with mentor or module coordinator..</i>				

6. BIOPHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
57.	A. Šiber, N. Pavin, S. Dolanski Babić	General Biophysics	45	30
58.	N. Pavin	Seminar in Biophysics	0	15
<i>All students enrol same required courses.</i>				
<i>Elective courses 1:</i>				
59.	I. Weber	Light Microscopy	6	10
60.	M. Kralj	Scanning Probe Microscopy and Spectroscopy	6	10
61.	TBD	Macromolecular Crystallography	6	10
62.	S. Kazazić	Mass Spectrometry	6	10
63.	T. Vuletić	Dielectric Spectroscopy	6	10
64.	T. Vuletić	Small Angle X-ray Scattering	6	10
65.	Ž. Skoko	Electron Microscopy	6	10
<i>Students enroll any 3 elective courses from this list, after consultations with mentor or module coordinator.</i>				
<i>Elective courses 2:</i>				
66.	S. Tomić	Molecular modelling of	20	15

		biomacromolecules		
67.	D. Žilić	EPR Spectroscopy	10	30
68.	S. Supek	Neurodynamic Brain Imaging	30	15
69.	M. Glunčić, N. Pavin	Stochastic Processes in Biophysics	20	10
<i>Students enroll 1 elective course from this list, after consultations with mentor or module coordinator.</i>				

7. MEDICAL PHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
70.	T. Bokulić, D. Faj	Radiology and Radiotherapy Physics and Dosimetry	25	15+15
71.	M. Medvedec	Physics in Nuclear Medicine	20	15
72.	M. Majer	Seminar in Medical Physics	0	15
<i>All students enrol same required courses.</i>				
<i>Elective courses:</i>				
73.	G. Žauhar	Physics and Technology of Medical Ultrasound	14	14
74.	D. Grošev	Methods of Tomographic Reconstruction in Medicine	14	14
75.	I. Lacković, M. Medvedec	Biomedical Electronics and Instrumentation	14	14
76.	M. Medvedec, M. Majer, T. Bokulić	Radiation Protection in Medicine	15	15
77.	T. Ban	Lasers in Medicine	14	14
78.	N. Maltar Strmečki	Magnetic Tomography	14	14
79.	J. Popić	Radiologic Anatomy	10	20
80.	M. Gamulin	Selected Topics of Physiology and Pathophysiology	10	20
81.	A. Fröbe	Selected Topics of Oncology and Radiotherapy	10	20
<i>Students enrol any 2 elective courses, after consultations with mentor or module coordinator.</i>				

8. GEOPHYSICS				
Course no.	Lecturer(s)	Course title	Hours Lectures exercises/seminars	
<i>Required courses:</i>				
82.	Z. Pasarić	Data Analysis in Geophysics	30	15
83.	I. Herceg Bulić, J. Stipčević	Seminar in Geophysics	0	15

<i>All students enrol same required courses.</i>				
<i>Elective courses:</i>				
84.	D. Koračin, Z. Bencetić Klaić	Atmospheric Modeling	20	10
85.	Z. Bencetić Klaić	Selected Lectures in Atmospheric Physics	20	10
86.	B. Grisogono, Ž. Večenaj	Selected Chapters in Atmospheric Turbulence	20	10
87.	V. Grubišić, B. Grisogono	Mesoscale Meteorology	20	10
88.	K. Pandžić	Atmospheric Predictability and Climate System Modelling	20	10
89.	M. Telišman Prtenjak, A. Jeričević	Coastal Meteorology	20	10
90.	M. Orlić	Dynamical Oceanography	20	10
91.	G. Beg Paklar	Selected Topics in Physical Oceanography	20	10
92.	Z. Pasarić	Bayesian Statistics	20	10
93.	S. Markušić	Physics of the Earth's Interior	20	10
94.	M. Herak	Physics of the Earthquake Source	20	10
95.	M. Herak	Selected Chapters of Seismology	20	10
96.	B. Tomljenović	Seismotectonic Parameters and Earthquake Magnitude	20	10
97.	F. Šumanovac	Selected Chapters of Geophysical Exploration	20	10
<i>Students enrol any 3 elective courses, after consultations with mentor or module coordinator.</i>				