

**Bachelor of Science in Physics**

Year 1: Fall Semester (1st Semester)		Year 1: Spring Semester (2nd Semester)	
Course	ECTS credits	Course	ECTS credits
<b>UG Core Curriculum</b>		<b>Physics Core</b>	
PHYS 161 Physics for Scientists and Engineers I with Laboratory	8	PHYS 162 Physics for Scientists and Engineers II with Laboratory	8
MATH 161 Calculus I	8	MATH 162 Calculus II	8
CSCI 151 Programming for Scientists and Engineers	8	MATH 273 Linear Algebra with Applications	8
HST 100 History of Kazakhstan	6	<b>UG Core Curriculum</b>	
		WCS 150 Rhetoric and Composition	6
<b>SEMESTER SUBTOTAL:</b>	<b>30</b>	<b>SEMESTER SUBTOTAL:</b>	<b>30</b>

Year 2: Fall Semester (3rd Semester)		Year 2: Spring (4th Semester)	
Course	ECTS credits	Course	ECTS credits
<b>Physics Core</b>		<b>Physics Core</b>	
PHYS 221 Classical Mechanics I	6	PHYS 222 Classical Mechanics II	6
PHYS 261 Modern Physics with Laboratory	8	PHYS 280 Thermodynamics and Statistical Physics	6
MATH 263 Calculus III	8	PHYS 270 Computational Physics with Laboratory	6
MATH 274 Introduction to Differential Equations	6	<b>UG Core Curriculum</b>	
		200 – level Writing course	6
		<b>Electives</b>	
		General Elective 1	6
<b>SEMESTER SUBTOTAL:</b>	<b>28</b>	<b>SEMESTER SUBTOTAL:</b>	<b>30</b>

Year 3: Fall (5th Semester)		Year 3: Spring (6th Semester)	
Course	ECTS credits	Course	ECTS credits
<b>Physics Core</b>		<b>Physics Core</b>	
PHYS 361 Classical Electrodynamics I	6	PHYS 362 Classical Electrodynamics II	6
PHYS 315 Mathematical Method in Physics	6	PHYS 451 Quantum Mechanics I	6
<b>UG Core Curriculum</b>		PHYS 370 Optics with Laboratory	8
Kazakh Language 1	6	<b>UG Core Curriculum</b>	
PHYS 395 Research Methods in Physics	6	Social Science Elective (SOC, PLS, ANT, or ECON)	6
<b>Electives</b>		<b>Electives</b>	
Major Elective 1, Level 400	6	Major Elective 2, Level 400	6
<b>SEMESTER SUBTOTAL:</b>	<b>30</b>	<b>SEMESTER SUBTOTAL:</b>	<b>32</b>

Year 3: Summer Semester	
Course	ECTS credits
<b>Honors Track</b>	
PHYS 498 Honors Thesis Research	0
<b>SEMESTER SUBTOTAL:</b>	<b>0</b>

Year 4: Fall (7th Semester)		Year 4: Spring (8th Semester)	
Course	ECTS credits	Course	ECTS credits
<b>Physics Core</b>		<b>UG Core Curriculum</b>	
PHYS 452 Quantum Mechanics II	6	Ethics	6
<b>UG Core Curriculum</b>		Business fundamentals and Entrepreneurship	6
Kazakh Language 2	6	<b>Electives</b>	
<b>Electives</b>		Major Elective 4	6
Major Elective 3	6	Technical Elective 3	6
Technical Elective 1	6	General Elective 2	6
Technical Elective 2	6	<b>Honors Track</b>	
<b>Honors Track</b>		PHYS 499 Honors Thesis	6*
PHYS 498 Honors Thesis Research	0	<b>SEMESTER SUBTOTAL:</b>	<b>30</b>
<b>SEMESTER SUBTOTAL:</b>	<b>30</b>		

\* not counted in the total

### **BSc in Physics**

- UG Core Curriculum Framework Courses, total 78 ECTS credits;
- Physics Core Courses, including PHYS (78 ECTS) and MATH (30 ECTS) courses Major Electives, including at least three PHYS courses of 400 level and at least two designated research courses (399, 465, 474, 491), total 24 ECTS credits;
- Technical Electives, courses taken in the following: BIOL, ECON, CHEM, MATH, SEDS, SMG, including at least one course at the 300-level, total 18 ECTS credits;
- General electives, total 12 ECTS credits.

### **The Minor in Physics track requires to complete**

- five Minor-required (36 ECTS) - Physics I (PHYS161, 8 ECTS), Physics II (PHYS162, 8 ECTS), Classical Mechanics I (PHYS 221, 6 ECTS), Modern Physics with Laboratory (PHYS 261, 8 ECTS), and Thermodynamics and Statistical Physics (PHYS 280, 6 ECTS)
- two Minor-elective courses (12 ECTS).

### **Elective Courses offered by Physics Department**

- Introductory Astronomy I (PHYS 201)
- Introductory Astrophysics (PHYS 202)
- Introduction to Quantum Technologies (PHYS 291)
- Research project and internship (PHYS 299)
- Physics Research Project (PHYS 399, designated research course)
- Advanced Mathematical Physics (PHYS 411)
- Introduction to Biophysics (PHYS 433)
- Introduction to Chemical Physics (PHYS 443)
- Introduction to Particle Physics (PHYS 453)
- Astrophysics and General Relativity (PHYS 463)
- Advanced Experimental Physics (PHYS 465, designated research course)
- Introduction to Solid State Physics (PHYS 473)
- Lasers and Photonics (PHYS 474, designated research course)
- Topics in Material Science (PHYS 476)
- Statistical Mechanics (PHYS 483)
- Directed Study of Advanced Physics Topics (PHYS 491, designated research course)
- Physics Colloquium (PHYS 495)