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**Yarmouk University**

**Faculty of Science**

**Physics Department**

**Bachelors Degree of Science in Physics**

**2023/2024**

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| Department: Physics | Program: Bachelor Degree in Physics | Official Stamp |
| The study plan was approved by Deans Council Resolution No. ..............  on the date ........ | |

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| **Overview** |
| The department of physics was established in 1976 with a B.Sc. program. At that time the department had three faculty members and forty students. The M.Sc. graduate program was established at the start of the academic year 1982/1983 and three students were admitted.  Since the department has witnessed an enormous growth, now there are 28 faculty members (24 holding PhD and 4 holding M.Sc. degree), 6 teaching assistants holding M.Sc. degree, and 5 technicians. Today the department has around 343 undergraduate students and 80 graduate students. The number of the graduated students since the inception of the department is about 2647 students with a B.Sc. and around 268 students with M.Sc. degree.    In addition to the effort made to raise the level of teaching and to supply the community at large with qualified personnel the department has established a number of specialized research laboratories in the following fields of physics Mössbauer Spectroscopy, Thin Films, X- ray Fluorescence Spectroscopy, Nuclear Techniques, (Gamma Ray Spectroscopy and Alpha Ray Spectroscopy), Environment Studies, Nano Biomedical, and Computational physics lab.  The aim of the above laboratories is to train the graduate student in fundamental scientific research promote and enrich scientific knowledge and contribute to the transfer of technology to the local community. Moreover, the department contain well-equipped mechanical workshop in addition to many modern and well- equipped teaching laboratories. |

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| **Vision and Mission of the Program** | |
| Vision | The program seeks to attain the mission of the university toward excellence in effective teaching and successful research to serve better the national and regional community in different aspects of life. |
| Mission | Providing high qualities physics education, producing well prepared graduates with technical expertise who are confident in their abilities and understanding of physics to serve and promote their national and regional communities. |

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| **Program** **Educational Objectives** | |
| 1 | Providing students with basic knowledge and skills in Physics. |
| 2 | Preparing graduate students in Physics in a distinctive manner to serve and develop the community. |
| 3 | Training students on scientific research methods and problem solving. |
| 4 | Providing the community with advisory and training services in relation to the various applications of physics. |
| **Program Learning** **Outcomes** | |
| PLO1 | An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to physics. |
| PLO2 | An ability to formulate or design a system, process, procedure or program to meet desired needs. |
| PLO3 | An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions. |
| PLO4 | An ability to communicate effectively with a range of audiences. |
| PLO5 | An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts. |
| PLO6 | An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty. |

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| **Credit Hours to Obtain a Bachelor’s Degree in Physics** | | | |
|  | **Credit Hours** | | |
| **Compulsory** | **Elective** | **Total** |
| University Requirements | 15 | 12 | 27 |
| Faculty Requirements | 21 | - | 21 |
| Department Requirements | 71 | 15 | 86 |
| **Total** | |  | 134 |

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| **First: University Compulsory Courses (15) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Number of Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| HUM | 120 | Communication Skills in English | 3 | 0 | 3 | - | Blended |
| HUM | 121 | Communication Skills in Arabic | 3 | 0 | 3 | - | Blended |
| HUM | 124 | National Education | 3 | 0 | 3 | - | Online |
| HUM | 146 | Leadership, entrepreneurship, and innovation skills | 3 | 0 | 3 | - | Online |
| MILT | 100A | Military Sciences | 3 | 0 | 3 | - | Online |
| EL | 099 | English Language - Remedial | 3 | 0 | 0 | - | Online |
| AL | 099 | Arabic Language - Remedial | 3 | 0 | 0 | - | Online |
| COMP | 099 | Computer skills - Remedial | 3 | 0 | 0 | - | Online |
| SA | 100 | Ethics and Volunteer Work | - | - | 0 | - | - |

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| **Second: University Elective Courses (12) Credit Hours**  The students study one course (3 credit hours) **from each** of the following three packages, and they choose the fourth course from any package. | | | | | | | |
| 1. **Humanities Courses Package** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Number of Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| HUM | 101 | Mass Communication Culture | 3 | 0 | 3 | - | Blended |
| HUM | 104 | Arts and behaviors | 3 | 0 | 3 | - | Blended |
| HUM | 105 | Jordan Contribution to the Human Civilization | 3 | 0 | 3 | - | Blended |
| HUM | 106 | Introduction to the Human cultural Studies | 3 | 0 | 3 | - | Blended |
| HUM | 107 | Human rights | 3 | 0 | 3 | - | Blended |
| HUM | 109 | Islamic Systems | 3 | 0 | 3 | - | Blended |
| HUM | 110 | The Culture of Tourism and Hospitality | 3 | 0 | 3 | - | Blended |
| HUM | 113 | Islamic Educational Thinking | 3 | 0 | 3 | - | Blended |
| HUM | 115 | Legal Education | 3 | 0 | 3 | - | Blended |
| HUM | 123 | Performing Arts | 3 | 0 | 3 | - | Blended |
| 1. **Social and Economic Sciences Courses Package** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Number of Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| HUM | 102 | Citizenship and Allegiance | 3 | 0 | 3 | - | Blended |
| HUM | 103 | Islamic Intellect and Civilization | 3 | 0 | 3 | - | Blended |
| HUM | 108 | Thinking Skills | 3 | 0 | 3 | - | Blended |
| HUM | 111 | History of Jerusalem | 3 | 0 | 3 | - | Blended |
| HUM | 112 | Geography of Jordan | 3 | 0 | 3 | - | Blended |
| HUM | 114 | Good governance and Integrity | 3 | 0 | 3 | - | Blended |
| HUM | 116 | Ancient Writings of Jordan | 3 | 0 | 3 | - | Blended |
| HUM | 122 | Economy and Society | 3 | 0 | 3 | - | Blended |
| SCI | 103 | Fitness for Everyone | 3 | 0 | 3 | - | Blended |
| SCI | 104 | Effective Communication Skills | 3 | 0 | 3 | - | Blended |
| SCI | 106 | Administration and Community Development | 3 | 0 | 3 | - | Blended |
| 1. **Scientific and Technological Courses Package** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Number of Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| SCI | 101 | Environment and Public Health | 3 | 0 | 3 | - | Blended |
| SCI | 102 | Information Technology and Society | 3 | 0 | 3 | - | Blended |
| SCI | 105 | Renewable Energy | 3 | 0 | 3 | - | Blended |
| SCI | 107 | Scientific Research | 3 | 0 | 3 | - | Blended |
| SCI | 109 | Digital Culture | 3 | 0 | 3 | - | Blended |
| SCI | 110 | Development and Environment | 3 | 0 | 3 | - | Blended |
| SCI | 111 | Principles of Epidemiology and Community Immunity | 3 | 0 | 3 | - | Blended |

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| **Third: Faculty Compulsory courses (21) Credit Hours** | | | | | | |  |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| MATH | 101 | Calculus (1) | 3 | - | 3 | - | Blended |
| PHYS | 101 | General Physics (1) | 3 | - | 3 | - | Blended |
| CHEM | 101 | General Chemistry (1) | 3 | - | 3 | - | Blended |
| BIO | 101 | General Biology (1) | 3 | - | 3 | - | Blended |
| STAT | 101 | Principles of statistics (1) | 3 | - | 3 | - | Blended |
| EES | 101 | General Geology (1) | 3 | - | 3 | - | Blended |
| CS | 110 | Programming in a Selected Language | 3 | - | 3 | - | Online |

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| **Fourth: Faculty Elective Requirements (0 Credit Hours)** | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** |
| **Theoretical** | **Practical** | **Total** |
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| **Fifth: Department Compulsory Courses (71) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| MATH | 102 | Calculus 2 | 3 | - | 3 | MATH 101 | Face- Face |
| PHYS | 102 | General Physics 2 | 3 | - | 3 | PHYS 101 | Face- Face |
| PHYS | 105 | General physics Lab. 1 | - | 2 | 1 | PHYS 101 | Face- Face |
| PHYS | 106 | General physics Lab. 2 | - | 2 | 1 | PHYS 102 | Face- Face |
| PHYS | 109 | General Physics 3 | 3 | - | 3 | PHYS 102 | Face- Face |
| PHYS | 200 | Introduction to Mathematical physics | 3 | - | 3 | MATH 102 | Face- Face |
| PHYS | 201 | Theoretical Physics 1 | 3 | - | 3 | PHYS 200, PHYS 109 | Face- Face |
| PHYS | 221 | Geometrical Optics Lab. | - | 3 | 1 | PHYS 281 | Face- Face |
| PHYS | 224 | General physics Lab. 3 | - | 3 | 1 | PHYS 109 | Face- Face |
| PHYS | 227 | Electronics Lab. | - | 3 | 1 | PHYS 235 | Face- Face |
| PHYS | 235 | Electronics 1 | 3 | - | 3 | PHYS 102, PHYS 106 | Face- Face |
| PHYS | 251 | Modern Physics 1 | 3 | - | 3 | PHYS 109 | Face- Face |
| PHYS | 253 | Modern Physics 2 | 3 | - | 3 | PHYS 251 | Online |
| PHYS | 261 | Thermodynamics | 3 | - | 3 | PHYS 101, MATH 101 | Face- Face |
| PHYS | 281 | Geometrical Optics | 3 | - | 3 | PHYS 109 | Face- Face |
| PHYS | 301 | Theoretical Physics 2 | 3 | - | 3 | PHYS 201 | Face- Face |
| PHYS | 311 | Classical Mechanics 1 | 3 | - | 3 | PHYS 201 | Face- Face |
| PHYS | 312 | Classical Mechanics 2 | 3 | - | 3 | PHYS 311 | Face- Face |
| PHYS | 323 | Modern Physics Lab. | - | 3 | 2 | PHYS 221, PHYS 253 | Face- Face |
| PHYS | 332 | Electromagnetic Theory 1 | 3 | - | 3 | PHYS 301 | Face- Face |
| PHYS | 334 | Introduction to Computational Physics | 3 | - | 3 | PHYS 253, CS 110 | Online |
| PHYS | 352 | Quantum Mechanics 1 | 3 | - | 3 | PHYS 201, PHYS 251 | Face- Face |
| PHYS | 423 | Advanced Physic Lab. | 1 | 3 | 3 | PHYS 323, PHYS 352 | Face- Face |
| PHYS | 431 | Electromagnetic Theory 2 | 3 | - | 3 | PHYS 332 | Face- Face |
| PHYS | 452 | Quantum Mechanics 2 | 3 | - | 3 | PHYS 301  PHYS 352 | Blended |
| PHYS | 462 | Statistical Mechanics | 3 | - | 3 | PHYS 261, PHYS 352 | Face- Face |
| PHYS | 471 | Solid State Physics 1 | 3 | - | 3 | PHYS 352 | Online |
| PHYS | 491 | Seminar | 1 |  | 1 | Department acceptance | Blended |

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| **Sixth: Department Elective Requirements (15 ) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| PHYS | 202 | Astronomy 1 | 3 | - | 3 | PHYS 101 | Face-Face |
| PHYS | 236 | Electronics 2 | 2 | 3 | 3 | PHYS 235 | Face-Face |
| PHYS | 304 | Astrophysics | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 305 | Meteorology | 3 | - | 3 | PHYS 201, PHYS 261 | Face-Face |
| MPHY | 306 | Introduction to Medical and Biophysics | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| MPHY | 341 | Radiation Physics | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| PHYS | 401 | Theoretical Physics 3 | 3 | - | 3 | PHYS 301 | Face-Face |
| PHYS | 441 | Nuclear Physics 1 | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 443 | Atomic and Molecular Physics | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 444 | Physics of Elementary Particles | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 446 | Plasma Physics | 3 | - | 3 | PHYS 311, PHYS 332 | Face-Face |
| PHYS | 449 | Physics of nuclear accelerators | 3 | - | 3 | PHYS 352, PHYS 332 | Face-Face |
| PHYS | 451 | Special theory of relativity | 3 | - | 3 | PHYS 332, PHYS 311 | Face-Face |
| PHYS | 481 | Physical optics | 3 | - | 3 | PHYS 281 | Face-Face |
| PHYS | 492 | Special topics | 3 | - | 3 | Department Acceptance | Face-Face |

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| **Seventh: Specialization Courses (0) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
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1. **Single Major (for physics students who do not have a minor)**

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| **Fifth: Department Compulsory Courses (71) Credit Hours** | | | | | | |  |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| MATH | 102 | Calculus (2) | 3 | - | 3 | MATH 101 | Face-Face |
| PHYS | 102 | General Physics (2) | 3 | - | 3 | PHYS 101 | Face-Face |
| PHYS | 105 | General physics Lab. 1 | - | 2 | 1 | PHYS 101 | Face-Face |
| PHYS | 106 | General physics Lab. 2 | - | 2 | 1 | PHYS 102 | Face-Face |
| PHYS | 109 | General Physics (3) | 3 | - | 3 | PHYS 102 | Face-Face |
| PHYS | 200 | Introduction to mathematical physics | 3 | - | 3 | MATH 102 | Face-Face |
| PHYS | 201 | Theoretical Physics 1 | 3 | - | 3 | PHYS 200, PHYS 109 | Face-Face |
| PHYS | 221 | Geometrical Optics Lab. | - | 3 | 1 | PHYS 281 | Face-Face |
| PHYS | 224 | General physics Lab. 3 | - | 3 | 1 | PHYS 109 | Face-Face |
| PHYS | 227 | Electronics Lab. | - | 3 | 1 | PHYS 235 | Face-Face |
| PHYS | 235 | Electronics 1 | 3 | - | 3 | PHYS 102, PHYS 106 | Face- Face |
| PHYS | 251 | Modern Physics 1 | 3 | - | 3 | PHYS 109 | Face-Face |
| PHYS | 253 | Modern Physics 2 | 3 | - | 3 | PHYS 251 | Online |
| PHYS | 261 | Thermodynamics | 3 | - | 3 | PHYS 101, MATH 101 | Face-Face |
| PHYS | 281 | Geometrical Optics | 3 | - | 3 | PHYS 109 | Face-Face |
| PHYS | 301 | Theoretical Physics 2 | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 311 | Classical Mechanics 1 | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 312 | Classical Mechanics 2 | 3 | - | 3 | PHYS 311 | Face-Face |
| PHYS | 323 | Modern Physics Lab. | - | 3 | 2 | PHYS 221, PHYS 253 | Face-Face |
| PHYS | 332 | Electromagnetic theory 1 | 3 | - | 3 | PHYS 301 | Face-Face |
| PHYS | 334 | Introduction to computational physics | 3 | - | 3 | PHYS 253, CS 110 | Online |
| PHYS | 352 | Quantum Mechanics 1 | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| PHYS | 423 | Advanced Physic Lab. | 1 | 3 | 3 | PHYS 323, PHYS 352 | Face-Face |
| PHYS | 431 | Electromagnetic theory 2 | 3 | - | 3 | PHYS 332 | Face-Face |
| PHYS | 452 | Quantum Mechanics 2 | 3 | - | 3 | PHYS 301  PHYS 352 | Blended |
| PHYS | 462 | Statistical Mechanics | 3 | - | 3 | PHYS 261, PHYS 352 | Face-Face |
| PHYS | 471 | Solid State Physics 1 | 3 | - | 3 | PHYS 352 | Online |
| PHYS | 491 | Seminar | 1 |  | 1 | Department acceptance | Blended |

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| **Sixth: Department Elective Courses (15) Credit Hours, Divided into two categories:**  **A. First group (6) Credit Hours from the following courses:** | | | | | | |  |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| PHYS | 202 | Astronomy (1) | 3 | - | 3 | PHYS 101 | Face-Face |
| PHYS | 236 | Electronics 2 | 2 | 3 | 3 | PHYS 235 | Face-Face |
| PHYS | 304 | Astrophysics | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 305 | Meteorology | 3 | - | 3 | PHYS 201, PHYS 261 | Face-Face |
| MPHY | 306 | Introduction to Medical and Biophysics | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| MPHY | 341 | Radiation Physics | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| **B. Second group (9 Credit Hours) from the following courses:** | | | | | | |  |
| PHYS | 401 | Theoretical Physics 3 | 3 | - | 3 | PHYS 301 | Face-Face |
| PHYS | 441 | Nuclear Physics 1 | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 443 | Atomic and Molecular Physics | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 444 | Physics of Elementary Particles | 3 | - | 3 | PHYS 352 | Face-Face |
| PHYS | 446 | Plasma Physics | 3 | - | 3 | PHYS 311, PHYS 332 | Face-Face |
| PHYS | 449 | Physics of nuclear accelerators | 3 | - | 3 | PHYS 352, PHYS 332 | Face-Face |
| PHYS | 451 | Special theory of relativity | 3 | - | 3 | PHYS 332, PHYS 311 | Face-Face |
| PHYS | 481 | Physical optics | 3 | - | 3 | PHYS 281 | Face-Face |
| PHYS | 492 | Special topics | 3 | - | 3 | Department acceptance | Face-Face |

1. **Major/minor major (for physics students who have a minor with the main major)**

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| **Fifth: Department Comulsory Courses (65) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| MATH | 102 | Calculus (2) | 3 | - | 3 | MATH 101 | Face-Face |
| PHYS | 102 | General Physics (2) | 3 | - | 3 | PHYS 101 | Face-Face |
| PHYS | 105 | General physics Lab. 1 | - | 2 | 1 | PHYS 101 | Face-Face |
| PHYS | 106 | General physics Lab. 2 | - | 2 | 1 | PHYS 102 | Face-Face |
| PHYS | 109 | General Physics (3) | 3 | - | 3 | PHYS 102 | Face-Face |
| PHYS | 200 | Introduction to mathematical physics | 3 | - | 3 | MATH 102 | Face-Face |
| PHYS | 201 | Theoretical Physics 1 | 3 | - | 3 | PHYS 200, PHYS 109 | Face-Face |
| PHYS | 221 | Geometrical Optics Lab. | - | 3 | 1 | PHYS 281 | Face-Face |
| PHYS | 224 | General physics Lab. 3 | - | 3 | 1 | PHYS 109 | Face-Face |
| PHYS | 227 | Electronics Lab. | - | 3 | 1 | PHYS 235 | Face-Face |
| PHYS | 235 | Electronics 1 | 3 | - | 3 | PHYS 102, PHYS 106 | Face-Face |
| PHYS | 251 | Modern Physics 1 | 3 | - | 3 | PHYS 109 | Face-Face |
| PHYS | 253 | Modern Physics 2 | 3 | - | 3 | PHYS 251 | Online |
| PHYS | 261 | Thermodynamics | 3 | - | 3 | PHYS 101, MATH 101 | Face-Face |
| PHYS | 281 | Geometrical Optics | 3 | - | 3 | PHYS 109 | Face-Face |
| PHYS | 301 | Theoretical Physics 2 | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 311 | Classical Mechanics 1 | 3 | - | 3 | PHYS 201 | Face-Face |
| PHYS | 312 | Classical Mechanics 2 | 3 | - | 3 | PHYS 311 | Face-Face |
| PHYS | 323 | Modern Physics Lab. | - | 3 | 2 | PHYS 221, PHYS 253 | Face-Face |
| PHYS | 332 | Electromagnetic theory 1 | 3 | - | 3 | PHYS 301 | Face-Face |
| PHYS | 334 | Introduction to computational physics | 3 | - | 3 | PHYS 253, CS 110 | Online |
| PHYS | 352 | Quantum Mechanics 1 | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |
| PHYS | 423 | Advanced Physic Lab. | 1 | 3 | 3 | PHYS 323, PHYS 352 | Face-Face |
| PHYS | 431 | Electromagnetic theory 2 | 3 | - | 3 | PHYS 332 | Face-Face |
| PHYS | 452 | Quantum Mechanics 2 | 3 | - | 3 | PHYS 301  PHYS 352 | Blended |
| PHYS | 491 | Seminar | 1 |  | 1 | Department acceptance | Blended |

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| **Sixth: Department Elective Courses (0) Credit Hours** | | | | | | | |
| **Course Code** | **Course Number** | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
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1. **Minor for the departments of the science College and the College of Information Technology and Computer Science (for student from other majors who want to have a minor in physics)**

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| **Fifth: Department Compulsory Requirements (15) Credit Hours** | | | | | | | | |
| **Course Code** | **Course Number** | | **Course Name** | **Credit Hours** | | | **Pre-requisite** | **Teaching Mode** |
| **Theoretical** | **Practical** | **Total** |
| PHYS | 102 | | General Physics (2) | 3 | - | 3 | PHYS 101 | Face-Face |
| PHYS | 105 | | General physics Lab. 1 | - | 2 | 1 | PHYS 101 | Face-Face |
| PHYS | 106 | | General physics Lab. 2 | - | 2 | 1 | PHYS 102 | Face-Face |
| PHYS | 109 | | General Physics (3) | 3 | - | 3 | PHYS 102 | Face-Face |
| PHYS | 224 | | General physics Lab. 3 | - | 3 | 1 | PHYS 109 | Face-Face |
| PHYS | 251 | | Modern Physics 1 | 3 | - | 3 | PHYS 109 | Face-Face |
| PHYS | 281 | | Geometrical Optics | 3 | - | 3 | PHYS 109 | Face-Face |
| **Sixth: Department Elective Requirements (6) Credit Hours** | | | | | | | | |
| **Course Code** | | **Course Number** | **Course Name** | **Number of Credit hours** | | | **Pre-requisite** |  |
| **Theoretical** | **Practical** | **Total** |  |
| PHYS | | 202 | Astronomy (1) | 3 | - | 3 | PHYS 101 | Face- Face |
| PHYS | | 235 | Electronics 1 | 3 | - | 3 | PHYS 102, PHYS 106 | Face- Face |
| PHYS | | 253 | Modern Physics 2 | 3 | - | 3 | PHYS 251 | Online |
| PHYS | | 261 | Thermodynamics | 3 | - | 3 | MATH 101, PHYS 101 | Face-Face |
| PHYS | | 334 | Introduction to computational physics | 3 | - | 3 | PHYS 253, CS 110 | Online |
| MPHY | | 306 | Introduction to Medical and Biophysics | 3 | - | 3 | PHYS 201, PHYS 251 | Face-Face |

**Advisory Plan**

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| **Official Stamp** | **Program: Bachelor in Physics** | **Department: Physics** |

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| |  |  |  |  | | --- | --- | --- | --- | | **First Academic Year – Second Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS101 | 3 | General Physics 2 | PHYS102 | | MATH101 | 3 | Calculus 2 | MATH102 | | PHYS101 | 1 | General Physics Lab. 1 | PHYS105 | | - | 3 | Programming in a Selected Language | Faculty Req./CS110 | | - | 3 | - | Faculty Req. | | - | 3 | - | Faculty Req. | | 16 | | **Total** | | | |  |  |  |  | | --- | --- | --- | --- | | **First Academic Year – First Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | - | 3 | General Physics 1 | PHYS101 | | - | 3 | Calculus 1 | MATH101 | | - | 3 | - | University Req. | | - | 3 | - | University Req. | | - | 3 | - | Faculty Req. | | - | 3 | - | Faculty Req. | | 18 | | **Total** | | |
| |  |  |  |  | | --- | --- | --- | --- | | **Second Academic Year – Second Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS109 | 1 | General Physics Lab. 3 | PHYS224 | | PHYS109 | 3 | Modern Physics 1 | PHYS251 | | PHYS109 | 3 | Geometrical Optics | PHYS281 | | PHYS109, PHYS200 | 3 | Theoretical Physics 1 | PHYS201 | | PHYS102, PHYS106 | 3 | Electronics 1 | PHYS235 | | - | 3 | - | University Req. | | 16 | | **Total** | | | |  |  |  |  | | --- | --- | --- | --- | | **Second Academic Year – First Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS102 | 3 | General Physics 3 | PHYS109 | | PHYS102 | 1 | General Physics Lab. 2 | PHYS106 | | MATH102 | 3 | Introduction to Mathematical Physics | PHYS200 | | PHYS101, MATH101 | 3 | Thermodynamics | PHYS261 | | - | 3 | - | University Req. | | - | 3 | - | University Req. | | 16 | | **Total** | | |
| |  |  |  |  | | --- | --- | --- | --- | | **Third Academic Year – Second Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS221, PHYS253 | 2 | Modern Physics Lab. | PHYS323 | | PHYS301 | 3 | Electromagnetic Theory 1 | PHYS332 | | PHYS201, PHYS251 | 3 | Quantum Mechanics 1 | PHYS352 | | CS110, PHYS253 | 3 | Introduction to Computational Physics | PHYS334 | | - | 3 | - | Department Elective | | - | 3 | - | University Elective | | 17 | | **Total** | | | |  |  |  |  | | --- | --- | --- | --- | | **Third Academic Year – First Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS201 | 3 | Theoretical Physics 2 | PHYS301 | | PHYS201 | 3 | Classical Mechanics 1 | PHYS311 | | PHYS251 | 3 | Modern Physics 2 | PHYS253 | | PHYS281 | 1 | Geometrical Optics Lab. | PHYS221 | | PHYS235 | 1 | Electronics Lab. | PHYS227 | | - | 3 | - | University Elective | | - | 3 | - | University Elective | | 17 | | **Total** | | |
| |  |  |  |  | | --- | --- | --- | --- | | **Fourth Academic Year – Second Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS261, PHYS352 | **3** | Statistical Mechanics | PHYS462 | | PHYS352 | 3 | Solid State Physics I | PHYS471 | | Department approval | 1 | Seminar | PHYS491 | | - | 3 | - | Department Elective | | - | 3 | - | Department Elective | | - | 3 | - | University Elective | | 16 | | **Total** | | | |  |  |  |  | | --- | --- | --- | --- | | **Fourth Academic Year – First Semester** | | | | | **Pre-requisite** | **Credit Hours** | **Course Name** | **Code and Number** | | PHYS332 | **3** | Electromagnetic Theory 2 | PHYS431 | | PHYS 301  PHYS352 | 3 | Quantum Mechanics 2 | PHYS452 | | PHYS323, PHYS352 | 3 | Advanced Physics Lab. | PHYS423 | | PHYS311 | 3 | Classical Mechanics 2 | PHYS312 | | - | 3 | - | Department Elective | | - | 3 | - | Department Elective | | 18 | | **Total** | | |

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**Course Description**

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| **Course Name: General Physics 1** | **Course Code and Number: PHYS 101** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: ----------** | | |
| **Course Description** | The course includes the following topics:  Measurement and system of units, vectors, motion in one and two dimensions, particle dynamics and Newton's laws of motion, work and energy, conservation of energy, dynamics of a system of particles, the center of mass, conservation of linear momentum, collisions, impulse, rotational kinematics, rotational dynamics, conservation of angular momentum. | |
| **Course Name: General Physics 2** | **Course Code and Number: PHYS 102** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 101** | | |
| **Course Description** | The course includes the following topics:  Charge and matter, electric field, gauss's law, electric potential, capacitors and dielectrics, current and resistance, electromotive force and circuits, the magnetic field, ampere's law, faraday's law of induction. | |
| **Course Name: General Physics Laboratory (1)** | **Course Code and Number: PHYS 105** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 101** | | |
| **Course Description** | The course includes the following topics:  Experiments on static, motion, free fall and projectiles, forces and motion, Newton's laws, friction, rotational motion, work, conservation of energy, linear momentum, moment of inertia and Hook's law. | |
| **Course Name: General Physics Laboratory (2)** | **Course Code and Number: PHYS 106** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 102** | | |
| **Course Description** | The course includes the following topics:  Experiments on Galvanometer and its uses, Ohm's law, electric field, electric potential, capacitor, Wheatstone bridge, potentiometer, electromotive force, Kirchhoff's laws, RC circuits and Induction. | |
| **Course Name: General Physics 3** | **Course Code and Number: PHYS 109** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 102** | | |
| **Course Description** | The course includes the following topics:  Equilibrium and Elasticity, Gravitation, Fluid mechanics, Oscillations in mechanical and electrical systems and waves (wave on a string and sound waves). | |
| **Course Name: Introduction to Mathematical Physics** | **Course Code and Number: PHYS 200** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: MATH 102** | | |
| **Course Description** | The course includes the following topics:  Complex numbers and Complex- valued functions. Determinants and Matrices. First-order ordinary differential equations: Separable, Homogeneous, Linear, Exact, Bernoulli equations. ‎ Homogeneous and inhomogeneous second-order ordinary differential equations: equations of constant coefficients and Euler type. Fourier series expansion and‎ Fourier transformation. | |
| **Course Name: Methods of Theoretical Physics 1** | **Course Code and Number: PHYS 201** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 200, PHYS 109** | | |
| **Course Description** | Functions of several variables: partial derivatives, extrema of functions of several variables, Lagrange multipliers. Multiple integrals: double and triple integrals, Jacobian determinant, and surface integrals. Vector-valued functions: tangent and normal vectors, arc length, and curvature, directional derivative, gradient, and divergence and Stokes theorems. Curvilinear and Orthogonal Coordinate Systems. | |
| **Course Name: Astronomy 1** | **Course Code and Number: PHYS 202** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 101** | | |
| **Course Description** | Nature of astronomy, historical background, light and electromagnetic radiation, telescopes and observatories, the solar system (the Sun, the earth and its moon, other planets). | |
| **Course Name: Geometrical Optics Laboratory** | **Course Code and Number: PHYS 221** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 281** | | |
| **Course Description** | The course includes the following topics:  Experiments related to focal length measurements of thin lenses and spherical mirrors, the telescope, prisms, transmission and reception using fiber optics, irradiation measurements, velocity of light, fabrication of simple optical devices. | |
| **Course Name: General Physics Laboratory (3)** | **Course Code and Number: PHYS 224** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 109** | | |
| **Course Description** | The course includes the following topics:  Experiments related to Archimedes principle, water anomaly, surface tension, coefficient of viscosity, linear and volume expansions, mechanical vibrations and speed of mechanical waves, speed of sound, gas laws, elastic modulus, internal energy and work, specific heat capacity and Bernoulli principle. | |
| **Course Name: Electronics Laboratory** | **Course Code and Number: PHYS 227** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 235** | | |
| **Course Description** | The course includes the following topics:  Experiments related to semi-conductors, transistors, voltage regulators and filters, rectifiers, amplifiers, timers, and wave form generators. | |
| **Course Name: Electronics 1** | **Course Code and Number: PHYS 235** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 102, PHYS 106** | | |
| **Course Description** | The course includes the following topics:  D.C Circuits, A.C circuits, Semiconductors, Diode Theory, Diode Circuits and Special Purpose diodes. Bipolar Transistors, Transistor Fundamentals and Transistor Biasing, Voltage amplifier, Power Amplifiers, Field Effect Transistors and Circuits. | |
| **Course Name: Electronics 2** | **Course Code and Number: PHYS 236** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 235** | | |
| **Course Description** | The course includes the following topics:  Number systems, introduction, digital logic, combinational logic, applications of combinational logic, integrated circuits, technologies, sequential logic, synchronous logic, memory and storage, interfacing. | |
| **Course Name: Modern Physics 1** | **Course Code and Number: PHYS 251** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 109** | | |
| **Course Description** | The course includes the following topics:  Theory of special relativity, black body radiation, photoelectric effect, Compton scattering, the particle nature of light, the wave nature of particles, Heisenberg uncertainty principle, dual property of light and particles, atomic structure, Bohr model, Schrödinger equation in one dimension. | |
| **Course Name: Modern Physics 2** | **Course Code and Number: PHYS 253** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 251** | | |
| **Course Description** | The course includes the following topics:  Quantum theory of Hydrogen atom, spin, molecules, basics of solid-state, statistical mechanics, nuclear structure and decay, elementary particles.. | |
| **Course Name: Thermodynamics** | **Course Code and Number: PHYS 261** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 101, MATH 101** | | |
| **Course Description** | The course includes the following topics:  Fundamental concepts, equations of state, the First Law of thermodynamics, entropy and the Second Law of thermodynamics, thermodynamic potentials. | |
| **Course Name: Geometrical Optics** | **Course Code and Number: PHYS 281** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 109** | | |
| **Course Description** | The course includes the following topics:  Reflection and refraction at plane surfaces, mirrors and Lenses, image formation applications, aberrations, (types of aberrations), matrix algebra in optics, prisms (types of prisms) & dispersion of light by prisms, optical fibers (definition and types, applications), Radiometry, photometry, radiance and irradiance, luminescence instrumentation, speed of light measurement by astronomical and terrestrial methods. | |
| **Course Name: Methods of Theoretical Physics (2)** | **Course Code and Number: PHYS 301** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201** | | |
| **Course Description** | The course includes the following topics:  Introduction: Separation of variables technique and infinite series, Gamma, Beta, and Dirac-Delta Functions, Series solution of ordinary differential equations, Sturm-Liouville problem, special functions; Bessel, Legendre, Hermite, and Laguerre functions. | |
| **Course Name: Astrophysics** | **Course Code and Number: PHYS 304** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201** | | |
| **Course Description** | The course includes the following topics:  Atomic and nuclear spectra, gas laws, radiation laws, stellar luminosity, line profiles, spectral classes, stellar interior, stellar structure, star formation, stellar evolution, transport process in star. | |
| **Course Name: Meteorology** | **Course Code and Number: PHYS 305** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201, PHYS 261** | | |
| **Course Description** | The course includes the following topics:  Fundamental concepts of Meteorology, the fundamental equations of meteorology, simple manipulation with the fundamental equation, the method of perturbations, dynamic forecasting. | |
| **Course Name: Classical Mechanics (1)** | **Course Code and Number: PHYS 311** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201** | | |
| **Course Description** | The course includes the following topics:  Elements of Newtonian mechanics, motion in one, two and three dimensions, vibrations (simple, damped and forced), motion of a system of particles including collisions and motion under central forces, rotation of rigid bodies around fixed axes (angular momenta and moment of inertia), gravitation force and Kepler problem. | |
| **Course Name: Classical Mechanics (2)** | **Course Code and Number: PHYS 312** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 311** | | |
| **Course Description** | The course includes the following topics:  Moving coordinate systems, Lagrange equations, Hamilton equations, tensor algebra, rotational dynamics of rigid bodies, theory of small oscillations. | |
| **Course Name: Modern Physics Laboratory** | **Course Code and Number: PHYS 323** | **Number of Credit Hours: 2** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 221. PHYS 253** | | |
| **Course Description** | The course includes the following topics:  Experiments related to Frank – Hertz experiment, black body radiation, Geiger–Muller tube, Milliken oil drop, electron diffraction, e/m, diffraction grating, Hall effect, photoelectric effect, x-ray diffraction. | |
| **Course Name: Electromagnetic Theory (1)** | **Course Code and Number: PHYS 332** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 301** | | |
| **Course Description** | The course includes the following topics:  A quick review of electrostatics, solution of electrostatic problems in a vacuum and dielectric media which includes the method of images and separation of variables, solutions to Laplace equation, electrostatic energy, the magnetic field of steady currents. | |
| **Course Name: Introduction to Computational Physics** | **Course Code and Number: PHYS 334** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 253, CS 110** | | |
| **Course Description** | The course includes the following topics:  Numerical libraries and their interfaces, numerical analysis: roots of a function, interpolation and extrapolation, data fitting, numerical integration and differentiation, solution of a system of linear equations, solution of differential equations and partial differential equations, boundary value problems, special functions used frequently in Physics, matrices, and linear algebra. Application in various branches of Physics: quantum, atomic, classical mechanics, classical electrodynamics, and statistical mechanics. | |
| **Course Name: Quantum Mechanics (1)** | **Course Code and Number: PHYS 352** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201, PHYS 251** | | |
| **Course Description** | The course includes the following topics:  Wave packets and the uncertainty relations, Schrödinger equation, eigenfunctions and eigenvalues, potentials in one-dimension, the general structure of quantum mechanics and Hilbert space, operator methods and commutation algebra in Q.M., spin, matrix representation. | |
| **Course Name: Methods of Theoretical Physics (3)** | **Course Code and Number: PHYS 401** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 301** | | |
| **Course Description** | The course includes the following topics:  Tensors, Complex variables, Integral transforms, Initial Value Problems, Boundary Value Problems, Initial Boundary Value Problems. | |
| **Course Name: Advanced Physics Laboratory (1)** | **Course Code and Number: PHYS 423** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 323, PHYS 352** | | |
| **Course Description** | The course includes the following topics:  Experiments related to optical activity, measurement of index of refraction of air and the wavelength of a light source using Michelson interferometer, Zeeman effect, nuclear magnetic resonance, reflection and refraction (using microwave) Bragg law (using microwave), measurement of the length of a wave from a microwave source (using Michelson's interferometer), Rutherford Scattering, band gap of Germanium, Gamma ray spectroscopy and statistics of radiation. | |
| **Course Name: Electromagnetic Theory (2)** | **Course Code and Number: PHYS 431** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 332** | | |
| **Course Description** | The course includes the following topics:  Magnetic properties of matter, electromagnetic induction, magnetic energy, Maxwell's equations, propagation of electromagnetic waves, polarization, reflection and refraction of EM waves, waveguide structures. | |
| **Course Name: Nuclear Physics (1)** | **Course Code and Number: PHYS 441** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 352** | | |
| **Course Description** | The course includes the following topics:  Nuclear Properties, nuclear force, nuclear models, nuclear radioactivity, alpha-decay, beta-decay, gamma-decay, nuclear reactions (fission and fusion), and nuclear applications. | |
| **Course Name: Atomic and Molecular Physics** | **Course Code and Number: PHYS 443** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 352** | | |
| **Course Description** | The course includes the following topics:  The hydrogen atom, angular momentum theory, complex atoms, effects of spin, the Wigner-Eckart theorem, selection rules, external fields, molecular spectra, Hund's coupling cases, Wigner-Witmer correlation rule. | |
| **Course Name: Elementary Particle Physics** | **Course Code and Number: PHYS 444** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 352** | | |
| **Course Description** | The course includes the following topics:  Standard Model (particles and forces), symmetries, conservation laws, kinematics, decay, Scattering, Feynman diagrams, Quark model, strong interaction, electromagnetic interactions, Weak and electroweak interactions, experimental techniques, accelerator, detectors, beyond the Standard Model. | |
| **Course Name: Plasma Physics** | **Course Code and Number: PHYS 446** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 332, PHYS 311** | | |
| **Course Description** | The course includes the following topics:  Basic treatment of the equilibrium plasma state via Boltzmann statistics, Debye shielding, single-particle theory of plasma, oscillations and waves in cold and warm plasmas, diffusion and transport properties of one component magneto-hydrodynamic plasma. | |
| **Course Name: Physics of Nuclear Accelerators** | **Course Code and Number: PHYS 449** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 332, PHYS 352** | | |
| **Course Description** | The course will cover the following topics:  History of accelerators, basic principles, Radio Frequency cavities, linacs, circular accelerators, magnets, transverse motion, strong focusing, simple lattices, circulating beams, longitudinal dynamics, Synchrotron radiation, applications of accelerators, light sources, medical uses. | |
| **Course Name: Theory of Special Relativity** | **Course Code and Number: PHYS 451** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 332, PHYS 311** | | |
| **Course Description** | The course includes the following topics:  Historical review of the failure of Newtonian mechanics, Newton`s law of gravitation and Maxwell equations. The postulates of Einstein and the development of Einstein theory. The Minkowski space (space-time). Writing Maxwell's equations in four-vector forms. Relativistic mechanics of charged particles. Relativistic Doppler effect and optical applications. | |
| **Course Name: Quantum Mechanics (2)** | **Course Code and Number: PHYS 452** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 301, PHYS 352** | | |
| **Course Description** | The course includes the following topics:  The ideal hydrogen atom, angular momentum, the Interaction of electrons with magnetic fields, the addition of angular momentum and spin, theories of time-independent approximation methods, the real hydrogen atom (hyperfine interaction, Zeeman effect), helium atom, theories of time-dependent approximation methods. | |
| **Course Name: Statistical Mechanics** | **Course Code and Number: PHYS 462** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 261, PHYS 352** | | |
| **Course Description** | The course includes the following topics:  Maxwell-Boltzmann statistics and its applications, Bose-Einstein statistics, Fermi-Dirac statistics, statistical concepts of temperature and entropy, thermodynamics of gases, application of statistical thermodynamics, the canonical ensemble, the grand canonical ensemble. | |
| **Course Name: Solid State Physics I** | **Course Code and Number: PHYS 471** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 352** | | |
| **Course Description** | The course includes the following topics:  Crystal structure and binding, diffraction in crystals, reciprocal lattice and vibrations, phonons and specific heat, free electron model. | |
| **Course Name: Physical Optics** | **Course Code and Number: PHYS 481** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 281** | | |
| **Course Description** | The course includes the following topics:  Brief history of optics, mathematics of wave motion, electromagnetic theory of light, Fresnel coefficients, optics of thin films, polarization, nature of polarized light, polarizer's, diachronism, birefringence, retarders, faraday rotation, Kerr effect, optical activity, john matrices, interference of two beams, interference of more than two beams, Mich. interferometer, Fabry-Perot interferometer, diffraction, theory of diffraction, diffraction from slits and apertures, diffraction gratings. | |
| **Course Name: Seminar** | **Course Code and Number: PHYS 491** | **Number of Credit Hours: 1** |
| **Teaching Language: English** | | |
| **Pre-requisite: Department Approval** | | |
| **Course Description** | The course includes the following topics:  A physical problem is chosen with the approval and mutual agreement with the course instructor. | |
| **Course Name: Special Topics** | **Course Code and Number: PHYS 492** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: Department Approval** | | |
| **Course Description** | The course includes the following topics:  Any new physical sciences, discoveries, and theories at a global level. | |
| **Course Name: Introduction to Biomedical Physics** | **Course Code and Number: MPHY 306** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201, PHYS 251** | | |
| **Course Description** | The course includes the following topics:  Biomechanics including static equilibrium, fluids, diffusion, heat and temperature in the body, energy requirements for various human activities, the transmission of electric signals through nerves, Introduction to x-rays and their use in diagnostic and therapy, Introduction to nuclear medicine. | |
| **Course Name: Radiation Physics** | **Course Code and Number: MPHY 341** | **Number of Credit Hours: 3** |
| **Teaching Language: English** | | |
| **Pre-requisite: PHYS 201, PHYS 251** | | |
| **Course Description** | The course includes the following topics:  Fundamentals of radiation Physics: radioactivity and decay kinetics; sources of ionizing radiation, natural decay series; production and properties of ionizing radiation; interactions of photons, charged particles, and neutrons with matter; radiation detectors; concepts of radiation dosimetry (theoretical and experimental, cavity theory and ionization chambers). | |