0302099  Remedial Physics
Credit hours: 3
Prerequisite : -


0302100  Science and the Society.
Credit hours: 3
Prerequisite : -


0302101  General Physics-1
Credit hours: 3
Prerequisite : (High School Physics or 0302099)

0302102  **General Physics-2**  

**Credit hours:** 3  
**Prerequisite:** (0302101)  

Electric Field, Gauss’s Law; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Direct Current Circuits, Magnetic Field, Sources of the Magnetic Field, Faraday’s Laws of Induction.

0342103  **General Physics for Biological Sciences Students**  

**Credit hours:** 3  
**Prerequisite:** (High School Physics or 0302099)  


0302104  **General Physics-3**  

**Credit hours:** 3  
**Prerequisite:** (0302102)  


0302105  **Physics for Dentistry Students**  

**Credit hours:** 4  
**Prerequisite:** (High School Physics or 0302099)  

Motion in a Straight Line, Motion in two Dimensions, Newton’s Laws of Motion, STATICS, Work, Energy and Power, Linear Momentum, Temperature and the Behavior of Gases, Thermodynamics, Thermal Properties of

0302111  Practical Physics - 1

Credit hours: 1
Prerequisite: (0302101 or simultaneously)

Students perform 11 experiments of 3 hr/week duration. These experiments are: Collection and Analysis of Data, Measurements and Uncertainties, Vectors: Force Table, Kinematics of Rectilinear Motion, Force and Motion, Collision in Two Dimensions, Rotational Motion, Simple Harmonic Motion: Simple Pendulum, The Behaviour of Gases with Changes in Temperature and Pressure, The Falling Sphere Viscometer, Specific Heat Capacity of Metals.

0302112  Practical Physics - 2

Credit hours: 1
Prerequisite: (0302102 or simultaneously)

Students perform 12 experiments of 3 hr/ week duration. These experiments are: Electric Field Mapping, Specific Charge of Copper Ions, Power Transfer, Potentiometer, Capacitors: RC Time Constant, Kirchhoff's Laws, Magnetic Field of a Current, Lenses, Young's Double Slit Experiment, Electromagnetic Induction, Ohm's Law.
0302113 Practical Physics for Biological Sciences Students
Credit hours: 1
Prerequisite: (0302103)

Students perform 12 experiments of 3 hr/week duration. These experiments are: Measurements and Uncertainties, Collection and Analysis of Data, Vectors: Force Table, Newton's 2nd Law of Motion, Simple Harmonic Motion: Simple Pendulum, The Falling Sphere Viscometer, The Laws of Gases, Measurement of Resistance, The Potentiometer, Specific Charge of Copper Ions, Introduction to the Oscilloscope, Joule Heat, Lenses.

0302115 Practical Physics for Dentistry Students
Credit hours: 1
Prerequisite: (0302105 or simultaneously)

Students perform 12 experiments of 3 hr/week duration. These experiments are: Measurements and Uncertainties, Collection and Analysis of Data, Vectors: Force Table, Newton's 2nd Law of Motion, Simple Harmonic Motion: Simple Pendulum, The Falling Sphere Viscometer, The Laws of Gases, Measurement of Resistance, The Potentiometer, Specific Charge of Copper Ions, Introduction to the Oscilloscope, Joule Heat, Electromagnetic Induction, Lenses.

0302199 Mechanical Workshop
Credit hours: 1
Prerequisite: -

Students perform exercises involving filing and shaping of metals, marking, drilling and tapping work pieces, and using the lathe.
0302211  **Practical Physics-3**  
**Credit hours:** 1  
**Prerequisite:** (0302221)

Students perform 12 experiments of 3 hr/week duration. Theses experiments are: Double Slit Diffraction, Single Slit Diffraction, RC Circuits, RLC Circuits, Diffraction Grating, e/m, Michelson Interferometer, Newton’s Rings, Black Body Radiation, Thermal Conductivity, Polarization of light, Thermo couple.

0302221  **Optics-1**  
**Credit hours:** 3  
**Prerequisite:** (0302112)

Nature of Light; Huygens's Principle; Fermat's Principle; Wave Equations; Superposition of Waves; Interference of Light; Optical interferometry; Production of Polarized Light; Fraunhofer Diffraction; Diffraction Grating.

0320231  **Electronics**  
**Credit hours:** 3  
**Prerequisite:** (0302104)

Fundamental Concepts; Semiconductors; Diodes and Application; Bipolar Junction Transistor; Small Signal Bipolar Amplifier; Field-Effect Transistors; Operational Amplifier; Operational Amplifier Applications; Digital Electronics.
0302261  Modern Physics  
Credit hours: 3  
Prerequisite: (0302102)  
Special Theory of Relativity (Kinematics and Dynamics); Quantum Nature of Radiation; Wavelike Properties of Particles; Rutherford-Bohr Model; The Nucleus; Radioactivity; Nuclear Reactions; Elementary Particles.

0302265  Radiation Physics  
Credit hours: 3  
Prerequisite: (0302261)  

0302271  Polymer Physics  
Credit hours: 3  
Prerequisite: (0302104)  
Macromolecules, Molecular Weight, Molecular Conformation, Tactility, Molecular Elasticity, Crystalline and Amorphous Polymers, Crystal Orientation, Drawing, Structural Studies, Fibrillar and Lamella Structure, Commercial Polymers, Mechanical Properties and Mechanical Testing, Annealing and Heat Treatments, Melting and Glass Transition Temperatures.
0302281 Mathematical Physics –1
Credit hours: 3
Prerequisite : (0301102)

Complex Numbers, Linear Equations; Vectors Matrices and Determinants, Partial Differentiation, Multiple Integrals, Vector Analysis, Fourier Series, Ordinary Differential Equations.

0302282 Mathematical Physics-2
Credit hours: 3
Prerequisite : (0302281)


0302291 Software Packages in Physics -1
Credit hours: 2
Prerequisite : (0302261)

This course is an interdisciplinary course that requires the knowledge of basic Physics and Mathematics and utilization of computational and programming techniques to implement a solution. The course introduces a wide selection of computer-powered mathematical tools for doing physics and mathematics problems. It will introduce software packages starting with basic instructions and commands. Students are exposed to the following packages: ( Mathematica, Maple, Matlab, ...etc)
in real and complex algebra, trigonometry, linear algebra, differential equations, special functions, and graphics. Some applications to intermediate physics course problems will be addressed including: Optics, Waves and Vibrations, Modern Physics, Thermal Physics, ....etc.

Document preparation and programming is in the manner of a research paper.

0302300 **Environmental Physics**

Credit hours: 3
Prerequisite: (0302261)

The Essentials of Environmental Physics, Basic Environmental Spectroscopy, The Global Climate, Energy for Human Use, Transport of Pollutants, Noise, Spectra and Examples of Environmental Spectroscopy: Atomic Spectra; Molecular Spectra; Scattering; Spectroscopy of the Inner Electron of Atoms and Molecules; Examples of Environmental Analysis.

0302311 **Practical Physics-4**

Credit hours: 2
Prerequisite: (0302261)

Students perform 11 experiments of 6 hr/week duration. These experiments are: Frank-Hertz Experiment, Thermionic Emission, Statistical Nature of Nuclear Counting. The Geiger Counter and Propagation of Radiation Through Matter, Millikan’s Oil Drop Experiment, Mechanical Oscillations, e/h- Photoelectric Effect, e/k_B, Speed of Sound, Speed of Light, Reflection from Dielectric Mirror.
0302312  **Practical Electronics**

Credit hours: 1  
Prerequisite: (0302231)

Students perform 12 experiments of 3 hr/week duration. These experimental are: Measurements, Diode and Transistor Characteristics, Rectification and Filtering, Zener Diode and Regulation, Transistor Biasing, Transistor Amplifiers, Operational Amplifiers, Comparators, Oscillations (Sine Wave), Oscillations (Relaxation), Logic Gates.

0332321  **Optics-2**

Credit hours: 3  
Prerequisite: (0302221)


0302330  **Digital Electronics**

Credit hours: 3  
Prerequisite: (0302231)

0302331  Electricity and Magnetism-1  
Credit hours: 3  
Prerequisite: (0302282 or 0301321)


0302332  Electricity and Magnetism-2  
Credit hours: 3  
Prerequisite: (0302331)


0302341  Thermal Physics  
Credit hours: 3  
Prerequisite: (0302261)

0302351  **Classical Mechanics-1**  
Credit hours: 3  
Prerequisite: (0302281)

Newtonian Mechanics, Oscillations, Gravitation, Lagrangian Dynamics, Central Force Motion

0302352  **Classical Mechanics-2**  
Credit hours: 3  
Prerequisite: (0302351)

Lagrangian and Hamiltonian Dynamics, Dynamics of System of Particles, Motion in a Nonlinear Frame, Dynamics of Rigid Bodies, Coupled Oscillations.

0302361  **Quantum Mechanics**  
Credit hours: 3  
Prerequisite: (0302282)

0302371  **Physics of Materials**  
Credit hours: 3  
Prerequisite:  
(0302261)

Classification of Materials: Metals, Ceramics, Polymers, Composites; Crystallography, Phase Transformation, Material Deformation, Mechanical Properties of Materials; Heat Treatment; Smart Materials.

0302411  **Practical Physics-5**  
Credit hours: 2  
Prerequisite:  
(0302311)

Students perform 12 experiments of 6 hr/week duration. These experiments are: -Ray Spectrometry, - Ray Spectrometry, - Ray Spectroscopy, Faraday Effect, Kerr Effect, Hall Effect, Zemman Effect, Electron Spin Resonance, Nuclear Magnetic Resonance, Measurement of Dielectric Constant, Magnetic Susceptibility, X-rays.

0302421  **Optical Networks : Components**  
Credit hours: 3  
Prerequisite:  
(0302321)

Fundamentals of Light " Interaction with Matter"; Optical Component: Optical Waveguides, Filters and Gratings, Multiplexers and Demultiplexers, Sources of Light, Photodetectors, Light Amplifiers and Switches.
0302462  **Atomic and Molecular Physics**  
Credit hours: 3  
Prerequisite:  
(0302361)  


0302463  **Nuclear Physics**  
Credit hours: 3  
Prerequisite:  
(0302361)  


0302464  **Astrophysics**  
Credit hours: 3  
Prerequisite:  
(0302341)  

0302466  **Elementary Particles.**  
Credit hours: 3  
Prerequisite:  
(0302361)


0302471  **Solid State Physics**  
Credit hours: 3  
Prerequisite :  
(0302361)


0302472  **Physics of Semiconductors**  
Credit hours: 3  
Prerequisite :(  
0302471)

0302481  **Software Packages in Physics -2**  

Credit hours: 2  
Prerequisite:  
(0302291)

Students will tackle in this course advanced computational tools applied to more involved problems in physics. Topics represent implementations to what students have taken in advanced courses such as: Quantum Mechanics, Electricity and Magnetism, Atomic Physics Nuclear Physics and Solid State Physics. Simulation of real physical systems will be another part of the course.

0302499  **Research Project and Methods of Teaching Physics**  

Credit hours : 2  
Prerequisite:  
(0302261)

Research projects as suggested by staff members; discussing different teaching methods and introducing how to use computer for teaching purposes. Some demonstration experiments to explore certain basic physical concepts such as: Speed of Sound, Prism Spectrometer, Hook's Law.

0302490  **Scientific Research Methodologies**  

Credit hours : 1  
Prerequisite: -

Every student completes a culminating undergraduate experience during his/her senior year by conducting a comprehensive project. Each project is carried out in one semester under the supervision of a faculty member of the Physics Department in one of the following topics:

- Theoretical and experimental solid state physics
- Materials physics and nanoscience
• Theoretical condensed matter physics
• Theoretical nuclear physics
• Mathematical and computational physics
• Theoretical high energy physics
• Experimental nuclear physics
• Atomic and molecular physics
• Medical physics
• Environmental physics
• Synchrotron radiation
• Any other topic agreed upon by the student and the advisor.

The project is culminated in a project thesis and a formal presentation in front of panel comprised of the advisor and some faculty members at the end of the semester.