Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY2001	Classical Mechanics Ⅰ	Undergraduate (low graders)	Theory	3	6	3	Major	Newtonian mechanics, motion of one-body system, motion of a system of particles,rigid bodies, gravitation.
Physics	PHY2002	Exercise for Classical Mechanics1	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Classical Mechanics 1. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Classical Mechanics 1 are strongly recommended to take this course at the same time.
Physics	PHY2003	Classical Mechanics Ⅱ	Undergraduate (low graders)	Theory	3	6	3	Major	Moving coordinate systems, mechanics of continuous media, rotation of a rigid body, special theory of relativity.
Physics	PHY2004	Basic Physics Laboratory Ⅰ	Undergraduate (low graders)	Experiment	2	4	4	Major	Experimental studies in mechanics, optics, waves, thermodynamics and modern physics: linear motion, rotational motion, forced oscillation, coupled oscillation, interference, diffraction, polarization, geometrical optics, specific heat ratio, thermal conductivity, e/m, photo-electric effect, electron diffraction, Hall effect.
Physics	PHY2005	Basic Physics Laboratory Ⅱ	Undergraduate (low graders)	Experiment	2	4	4	Major	Experimental studies in mechanics, optics, waves, thermodynamics and modern physics: linear motion, rotational motion, forced oscillation, coupled oscillation, interference, diffraction, polarization, geometrical optics, specific heat ratio, thermal conductivity, e/m, photo-electric effect, electron diffraction, hall effect.
Physics	PHY2006	Mathematical Physics Ⅰ	Undergraduate (low graders)	Theory	3	6	3	Major	Vector and tensor analysis, coordinate system matrices, infinite series.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY2007	Mathematical Physics II	Undergraduate (low graders)	Theory	3	6	3	Major	Functions of a complex variable differential equations, Green's function, Fourier series and Fourier transform, special functions.
Physics	PHY2008	Modern Physics	Undergraduate (low graders)	Theory	3	6	3	Major	Wave nature of matter, introductory quantum mechanics, hydrogen atom, atomic physics, condensed matter, nuclear physics, particle physics.
Physics	PHY2010	Electromagnetism I	Undergraduate (low graders)	Theory	3	6	3	Major	Electrostatics, electrostatic field in dielectric media, electric current, magnetic field of steady currents electromagnetic induction.
Physics	PHY2011	Exercise for Electricity and Magnetism 1	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Electricity and Magnetism 1. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Electricity and Magnetism 1 are strongly recommended to take this course at the same time.
Physics	PHY2012	Electromagnetism II	Undergraduate (low graders)	Theory	3	6	3	Major	Magnetic properties of matter, slowly varying currents, Maxwell's equations and their applications, electrodynamics.
Physics	PHY2014	Quantum Mechanics I	Undergraduate (low graders)	Theory	3	6	3	Major	Limits of classical physics, wave packets, Schroedinger wave equation, one-dimensional potentials, many-particle system, angular momentum, radial equation, hydrogen atom.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY2015	Practice on Quantum Mechanics Ⅰ	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Quantum Mechanics 1. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Quantum Mechanics 1 are strongly recommended to take this course at the same time.
Physics	PHY2016	Electronic Physics Laboratory Ⅰ	Undergraduate (low graders)	Experiment	2	4	4	Major	Learn how to use electronic equipment such as multimeters and oscilloscopes and perform experiments with simple circuits to see how the basic principles of electromagnetism are applied to the circuits.
Physics	PHY2017	Exercise for Electricity and Magnetism 2	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Electricity and Magnetism 2. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Electricity and Magnetism 2 are strongly recommended to take this course at the same time.
Physics	PHY2018	Exercise for Mathematical Physics Ⅰ	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Mathematical Physics Ⅰ. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Mathematical Physics Ⅰ are strongly recommended to take this course at the same time.
Physics	PHY2019	Exercise for Mathematical Physics 2	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Mathematical Physics Ⅱ. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Mathematical Physics Ⅱ are strongly recommended to take this course at the same time.
Physics	PHY2020	Practice on Quantum Mechanics 2	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Quantum Mechanics 2. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Quantum Mechanics 2 are strongly recommended to take this course at the same time.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY2021	Exercise for Classical Mechanics 2	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Classical Mechanics 2. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Classical Mechanics 2 are strongly recommended to take this course at the same time.
Physics	PHY2023	Thermal and Statistical Physics Ⅰ	Undergraduate (low graders)	Theory	3	6	3	Major	Thermodynamic laws and their applications, heat engines and refrigerators, equilibrium between phases, elementary kinetic theory.
Physics	PHY2024	Practice on Thermal and Statistical Physics Ⅰ	Undergraduate (low graders)	Theory	1	2	2	Major	This course is designed to strengthen students' ability to solve exercise problems with new concepts learned in Thermodynamics. They will learn mathematical techniques, methodologies of solving physics problems. Students who take Thermodynamics are strongly recommended to take this course at the same time.
Physics	PHY3001	Quantum Mechanics Ⅱ	Undergraduate (high graders)	Theory	3	6	3	Major	Perturbation theory, real hydrogen atom, electromagnetic field, collision theory.
Physics	PHY3002	Electronic Physics Laboratory Ⅱ	Undergraduate (high graders)	Experiment	2	4	4	Major	Acoustic free field experiment, X-ray diffraction (XRD) experiment, super-conductor AC susceptibility measurement, optics in solid, underwater sound propagation experiment.
Physics	PHY3005	Quantum Optics	Undergraduate (high graders)	Theory	3	3	3	Major	Black-body radiation, quantum nature of light, energy-momentum relation of photons (on-shell or off-shell), the spontaneous transition of atomic states in relation to LASER and non-linear optics will be discussed.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY3007	Advanced Physics Laboratory Ⅰ	Undergraduate (high graders)	Experiment	2	4	4	Major	Statistical data processing, waveguide experiment, magnetic moment measurement, physical properties of superconductor, Michelson interferometer.
Physics	PHY3008	Advanced Physics Laboratory Ⅱ	Undergraduate (high graders)	Experiment	2	4	4	Major	Acoustic free field experiment, X-ray diffraction (XRD) experiment, super-conductor AC susceptibility measurement, optics in solid, underwater sound propagation experiment.
Physics	PHY3009	Computational Physics	Undergraduate (high graders)	Theory	3	6	3	Major	The topics include numerical methods for solving differential equations, matrix equations, boundary value problems, and Monte Carlo simulation.
Physics	PHY3010	Solid State Physics	Undergraduate (high graders)	Theory	3	6	3	Major	Modern theories of crystalline structure, specific heat, dielectric properties, conduction, semiconductors, electron emission, and magnetism.
Physics	PHY3011	Semiconductors and displays	Undergraduate (high graders)	Theory	3	6	3	Major	In semiconductors and displays, after understanding basics physical properties of semiconductors, fundamentals of working principles of semiconductor devices are studied. In this course, working principles and current status of various modern displays such as CRT, LCD, PDP, and OLED are also studied.
Physics	PHY3012	Acoustics	Undergraduate (high graders)	Theory	3	6	3	Major	Acoustic wave equation, acoustic properties of fluids, plane, cylindrical and spherical waves, reflection and transmission at boundaries, propagation, transducer arrays.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY3013	Introduction of Nanophysics	Undergraduate (high graders)	Theory	3	6	3	Major	This lecture describes the basic physical and chemical properties which are prerequisite for understanding the new phenomena in nanoscience and nanotechnology. the details can be ⅰ)definition of nanoscience ⅱ) new physical properties in nanoscience ⅲ) nanomaterials ⅳ) measurement tools ⅴ) applications.
Physics	PHY3015	Particle Physics	Undergraduate (high graders)	Theory	3	6	3	Major	A survey of elementary particles which make up matter(or anti-matter) in the universe and interactions between them will be given. The trend of researches in the field of particle physics will be discussed.
Physics	PHY3016	Nuclear Physics	Undergraduate (high graders)	Theory	3	6	3	Major	Nuclear force, deuteron, nucleon-nucleon scattering, nuclear shape and mass, shell model, and collective motion will be discussed.
Physics	PHY3021	Theory of Science Education	Undergraduate (high graders)	Theory	3	6	3	Major	In this lecture, fundamental theories on education of science and various methods on science curriculums for secondary school will be treated.
Physics	PHY3024	Theory of Relativity	Undergraduate (high graders)	Theory	3	6	3	Major	The subject `Theory of Relativity' deals mainly with Special Relativity and then partly with General Relativity. Topics in Special Relativity include basic concepts of Principles of Relativity, Simultaneity, Covariance in the beginning, and then explain Time Dilation, Length Contraction, and Mass-Energy Equivalence. We apply those to various mechanical and electromagnetic systems. In General Relativity, we firstly teach from Equivalence Principle to Einstein equation, and then explain briefly a few topics, e.g., Black Hole and Big Bang Cosmology.

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Physics	PHY3025	Astrophysics	Undergraduate (high graders)	Theory	3	6	3	Major	early universe, matter composition of the universe, big bang nucleosynthesis, gravitation contraction, star formation, nuclear reactions in stars, mass of stars, stellar evolution, neutron stars, supernovae, black holes, galaxy formation, cosmic rays, observatory cosmology
Physics	PHY3029	Quantum Mechanics Ⅲ	Undergraduate (high graders)	Theory	3	6	3	Major	By applying physical ideas and methods of quantum mechanics, we understand and solve fundamental problems in various fields of physics.
Physics	PHY3030	Senior Thesis	Undergraduate (high graders)	Independent Research	2	4	0	Major	This is an individual study course for bachelor's degree students who have finished the course requirements. This course is designed for giving credits to the students for their research works and writing their thesis.
Physics	PHY3031	Thermal and Statistical Physics Ⅱ	Undergraduate (high graders)	Theory	3	6	3	Major	Statical description of systems; statistical thermodynamics, micro canonical, canonical and grand canonical ensembles, quantum statistics, blackbody radiation, electronics in metals, transport processes.
Physics	PHY3032	Practice on Thermal and Statistical Physics Ⅱ	Undergraduate (high graders)	Theory	1	2	2	Major	Staticaldescriptionofsystems;statisticalthermodynamics,microcanonical, canonical and grand canonical ensembles, quantum statistics, blackbody radiation, electronics in metals, transport processes.
Physics	PHY3033	Biophysics	Undergraduate (high graders)	Theory	3	6	3	Major	In this course, students learn about various physical phenomena of bio systems and how to understand them using basic principles of physics.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY3034	Applied Physics	Undergraduate (high graders)	Theory	3	6	3	Major	Learn physics of semiconductors, superconductors, dielectric materials and magnetic materials and study principles of electronic devices made of these materials.
Physics	PHY4001	Classical Mechanics	Graduate (Bachelor/Master)	Theory	3	6	3	Major	This lesson considers the advanced course of Newtonian mechanics which describes the macroscopic objects. Main subjects are Newton's laws, dynamics of Lagrangian and Hamiltonian, Accelerated coordinate systems, scattering, rigid bodies, oscillations, perturbation theory and the classical field theory.
Physics	PHY4002	Quantum Mechanics	Graduate (Bachelor/Master)	Theory	3	6	3	Major	This subject studies mathematical introduction, the postulates, simple problems in one dimension, the classical limit, the harmonic oscillator, the Heisenberg uncertainty principle, rotational invariance and angular momentum, the hydrogen atom, spin, the addition of angular momenta.
Physics	PHY4004	Statistical Mechanics	Graduate (Bachelor/Master)	Theory	3	6	3	Major	Statistical mechanics deals thermodynamics and statistical physics at the level of graduate course. This lesson considers the following subjects: the laws of thermodynamics, transport phenomena, classical statistical mechanics, canonical ensemble, quantum statistical mechanics, fermion systems, boson systems, superfluidity, the Ising model, and phase transition.
Physics	PHY4005	Physics Co-op I	Graduate (Bachelor/Master)	Internship	1	2	0	Major	By experiencing how physics is applied in industries through the co-op for about two weeks, understanding of Physics is increased and students' preparation for getting jobs will be improved.
Physics	PHY4006	Physics Co-op II	Graduate (Bachelor/Master)	Internship	2	4	0	Major	By experiencing how physics is applied in industries through the co-op for about four weeks, understanding of Physics is increased and students' preparation for getting jobs will be improved.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY4007	Physics Co-op III	Graduate (Bachelor/Master)	Internship	3	6	0	Major	By experiencing how physics is applied in industries through the co-op for about six weeks, understanding of Physics is increased and students' preparation for getting jobs will be improved.
Physics	PHY4008	Physics Co-op IV	Graduate (Bachelor/Master)	Internship	4	8	0	Major	By experiencing how physics is applied in industries through the co-op for about eight weeks, understanding of Physics is increased and students' preparation for getting jobs will be improved.
Physics	PHY4010	Computer control of systems	Graduate (Bachelor/Master)	Theory	3	6	3	Major	We will overview the virtual instruments and data flow programming and introduce the LabVIEW environment, it’s tools and it’s features. Topics to be covered will be: The critical difference between dataflow and procedural languages, timing and sequencing in LabVIEW, the three techniques for sequencing: dataflow, the sequence structure, and artificial dataflow, the power of the WAIT function Local and global variables: the good, the bad, and the ugly Recognizing a race condition LabVIEW data structures, using loops effectively, Sub-VIs standard approaches to structuring LabVIEW code The student will learn to use the Lab VI
Physics	PHY4011	Seminar in Physics Ⅰ	Graduate (Bachelor/Master)	Theory	1	2	1	Major	This course is for our undergraduate students to attend departmental seminars and colloquia so that they can be exposed to the current topics in physics.
Physics	PHY4012	Seminar in Physics Ⅱ	Graduate (Bachelor/Master)	Theory	1	2	1	Major	This course is for our undergraduate students to attend departmental seminars and colloquia so that they can be exposed to the current topics in physics.

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Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY4013	Electromagnetism	Graduate (Bachelor/Master)	Theory	3	6	3	Major	In electromagnetism 1, students learn mainly about static electromagnetism, which contains basics of electrostatics, electrostatics with boundary conditions, electrostatics in matters, basics of magneto statics, magneto statics with boundary conditions, magneto statics in matters, and Maxwell's equations.
Physics	PHY4014	Applied Physics	Graduate (Bachelor/Master)	Theory	3	6	3	Major	In this course, students learn physics of semiconductors, superconductors, dielectric materials and magnetic materials and study principles of electronic devices made of these materials.
Physics	PHY4015	Special Topics in Physics II	Graduate (Bachelor/Master)	Theory	3	6	3	Major	The students are introduced to the current and frontier topics in various subfields of physics.
Physics	PHY5001	Quantum Mechanics II	Graduate (Master/PhD)	Theory	3	6	3	Major	This subject studies variational method and WKB methods, time-independent perturbation theory, time-dependent perturbation theory, scattering theory, the Dirac equation, path integrals.
Physics	PHY5007	Quantum Field Theory I	Graduate (Master/PhD)	Theory	3	6	3	Major	Quantum field theory is a basic ingredient for studying particle physics, and, at the same time, is an effective method to describe medium energy physics and condensed matter physics. This subject includes functional integral formulation of quantum mechanics, Poincare group and particle spin, classical field theory, Feynman rules, regularization, renormalization, renormalization group, effective potential, and solitons and intantons.
Physics	PHY5008	Quantum Field Theory II	Graduate (Master/PhD)	Theory	3	6	3	Major	Quantum field theory is a basic ingredient for studying particle physics, and, at the same time, is an effective method to describe medium energy physics and condensed matter physics. This subject includes functional integral formulation of quantum mechanics, Poincare group and particle spin, classical field theory, Feynman rules, regularization, renormalization, renormalization group, effective potential, and solitons and intantons.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY5042	Nuclear Structure	Graduate (Master/PhD)	Theory	3	6	3	Major	This course introduces the models for nuclear structure and their successes and shortfalls. The models include the independent particle shell model; the rotational and vibrational collective model; and microscopic models such as Hartree-Fock, TDA, and RPA theories.
Physics	PHY5043	Nuclear Reactions	Graduate (Master/PhD)	Theory	3	6	3	Major	This course lectures Multiple scattering; Formal theory of nuclear reactions; Elastic and Inelastic scattering; Transfer reactions; Multistep reactions; Heavy ions; High-energy nuclear phenomena.
Physics	PHY5055	Theory of Solid State Electronic Structures	Graduate (Master/PhD)	Theory	3	6	3	Major	In theory of solid state electronic structures, students learn about a variety of electronic structures of solid states and study relations between electronic structures and physical properties of solid states.
Physics	PHY5081	Solid State Spectroscopy	Graduate (Master/PhD)	Theory	3	6	3	Major	This lesson discusses the basic theory of macroscopic and microscopic phenomena arising from the interaction between light and solid. Main subjects are reflectance and absorption in metal, semiconductor, insulator, superconductor, magnetic material and dielectric material.
Physics	PHY5110	Fundamentals of Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	Development of, and solutions to, the acoustic wave equation in extended media including strings, membranes and bars. Topics include propagation of plane and spherical waves in fluids, normal and oblique reflection and transmission from plane boundaries, surface interference, and sound absorption and dispersion for classical and relaxing fluids.
Physics	PHY5113	Underwater Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	Sound propagation, reflection, refraction, attenuation and scattering in water. Topics include the wave equation, acoustic properties of fluids, plane and spherical and cylindrical waves, behavior of sources and arrays, reflection and transmission at boundaries, elementary properties of transducers, image theory, layers and the shallow water channel, propagation in waveguide.

Course Description

Department/Major	Code	Course Title	Target Attendee	Course Type	Credit	Self-study Hour(s)	Contact Hour(s) Require	Requirement Type	Description
Physics	PHY5115	Nonlinear Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	Development of, and solutions to, the nonlinear acoustic wave equation in extended media such as inhomogeneous bubbly water and solids. Topics include nonlinear interaction of sound waves and physics of shock waves in air and in water.
Physics	PHY5116	Medical Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	Quantitative physical principles of medical acoustics for human bodies. Topics include sound propagation and interaction in human bodies for diagnostic and therapeutic medical applications of acoustics.
Physics	PHY5118	Theoretical Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	General methods of theoretical acoustics. Topics include specific problems of sound generation, transmission, attenuation, scattering, and reception. The emphasis is on fundamental principles of physical acoustics.
Physics	PHY5142	Research I	Graduate (Master/PhD)	Independent Research	3	0	0	Major	This is an individual study course for Master's degree students who have finished the course requirements. This course is designed for giving credits to the students for their research works.
Physics	PHY5143	Research II	Graduate (Master/PhD)	Independent Research	3	0	0	Major	This is an individual study course for Master's degree students who have finished the course requirements. This course is designed for giving credits to the students for their research works and writing their thesis.
Physics	PHY5146	Solid State Physics I	Graduate (Master/PhD)	Theory	3	6	3	Major	This lesson discusses the basic theory of macroscopic and microscopic phenomena in solid. Main subjects are the structures, interatomic forces, lattice vibration, dynamics of electron and band structure in solid.

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Physics	PHY5147	Solid State Physics II	Graduate (Master/PhD)	Theory	3	6	3	Major	This lesson discusses the quantum theory of microscopic phenomena in solid. Main subjects are phonon, photon, magnon, polariton, polaron and exciton.
Physics	PHY5148	Superconductivity	Graduate (Master/PhD)	Theory	3	6	3	Major	In this course, we learn the basic theory and key concepts of superconductivity to understand and carry out research on the physical properties of superconductivity.
Physics	PHY5149	Semiconductor Physics	Graduate (Master/PhD)	Theory	3	6	3	Major	In semiconductor physics, students learn basic physical properties of semiconductors and how to characterize them. On these bases, they study operation principles of semiconductor devices and physical phenomena in semiconductor devices.
Physics	PHY5151	Physical Acoustics	Graduate (Master/PhD)	Theory	3	6	3	Major	Advanced topics on current physical acoustics research, and study of recent research literature in conjunction with the master program student thesis.
Physics	PHY5152	Particle Physics I	Graduate (Master/PhD)	Theory	3	6	3	Major	In particle physics 1, the basics of particle physics are introduced. This lesson considers quark models, chiral symmetry of the strong interaction, and the Parton model and scaling.
Physics	PHY5153	Particle Physics II	Graduate (Master/PhD)	Theory	3	6	3	Major	In particle physics 2, more advanced topics are conveyed in order to advance the research ability of graduate course students who major in particle physics. This subject considers mainly the standard model including electroweak theory and their phenomenological implications, and quantum flavor dynamics.

Course Description

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Physics	PHY5154	Nuclear Physics I	Graduate (Master/PhD)	Theory	3	6	3	Major	Nuclei are basically made of quarks and gluons. Thus, we first deal with the elementary particles. From the point of view of the standard model, quarks and leptons are discussed together with their quantum numbers and related symmetries. There are many models to describe baryons. We will discuss some of them. All four fundamental interactions in nature play roles in the laboratory of nuclei. We will discuss the strong, weak, and electromagnetic interactions in nuclei. The interactions between baryons and mesons are extensively studied by nuclear physicists. We will discuss some of them in connection with the experimental observations. The deuteron which is the most simple nuclei will be studied.
Physics	PHY5155	Nuclear Physics II	Graduate (Master/PhD)	Theory	3	6	3	Major	We will deal with atomic nuclei in this course. The structures, shapes, and properties of nuclei will be first discussed. When a nucleus in its ground state becomes excited, various quantum states can be formed. We will discuss these unique phenomena in terms of nuclear interactions and many-body properties. Most common decay processes such as -decay, -decay, and -decay will be discussed together with fission process. Many-body properties of nuclei are very interesting. They will be discussed by using nuclear shell model, nuclear collective motions, Tamm-Dandoff Approximation, and Random Phase Approximation. To understand the stellar evolution, it is essential to know the nuclear reaction rates in stars. We will discuss the nuclear reactions taking place in stars and supernovae. The interactions of neutrinos with nuclei are novel phenomena, which are related to the cooling of the neutron star. We will discuss how nuclear physics is useful in the study of these astrophysics problems. Most nuclei on the earth are radioactive. Thus, it is impossible to avoid radiation in our daily lives. The nuclear physics related to our daily life and nuclear applications including nuclear medicine will be discussed.
Physics	PHY5156	Elementary Particle & Nuclear Physics Experiment I	Graduate (Master/PhD)	Theory	3	6	3	Major	This subject studies introduction to particle physics, electromagnetic and nuclear interactions of particles with matter, particle accelerators and particle beams, fast electronics device, scintillation counters. This subject also covers basic nuclear processes in radiation sources, passage of radiation through matter, statistics and the treatment of experimental data, general characteristics of detectors, ionization detectors, scintillation detectors, photomultiplier.

Course Description

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Physics	PHY5160	Computational physics	Graduate (Master/PhD)	Theory	3	6	3	Major	In this course, students learn numerical analysis and write computer programs to solve several physical examples using C++, Mathematica, Matlab.
Physics	PHY5170	Biophysics	Graduate (Master/PhD)	Theory	3	6	3	Major	In this course, students learn about various physical phenomena of bio systems and how to understand them using basic principles of physics.
Physics	PHY5177	Special Topics on Advanced Physics I	Graduate (Master/PhD)	Theory	3	6	3	Major	Students learn in-depth knowledges of topics, which are selected from diverse research fields of physics.
Physics	PHY5178	Special Topics on Advanced Physics II	Graduate (Master/PhD)	Theory	3	6	3	Major	Students learn in-depth knowledges of topics, which are selected from diverse research fields of physics.
Physics	PHY5179	Special Topics on Advanced Physics III	Graduate (Master/PhD)	Theory	3	6	3	Major	Students learn in-depth knowledges of topics, which are selected from diverse research fields of physics.
Physics	PHY5181	Special Topics on Advanced Physics V	Graduate (Master/PhD)	Theory	3	6	3	Major	Students learn in-depth knowledges of topics, which are selected from diverse research fields of physics.
Physics	PHY5182	Special Topics on Advanced Physics VI	Graduate (Master/PhD)	Theory	3	6	3	Major	Students learn in-depth knowledges of topics, which are selected from diverse research fields of physics.
Physics	PHY5183	Electromagnetism Ⅱ	Graduate (Master/PhD)	Theory	3	6	3	Major	In electromagnetism 2, students learn mainly about dynamic electromagnetism, which contains electric and magnetic fields by accelerated charges, and the generation and propagation of electromagnetic waves by them.
Physics	PHY6001	Research I	Graduate (PhD)	Independent Research	3	6	0	Major	This is an individual study course for Ph. D. students who have finished the course requirements. This course is designed for giving credits to the students for their research works.

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Physics	PHY6002	Research II	Graduate (PhD)	Independent Research	3	6	0	Major	This is an individual study course for Ph. D. students who have finished the course requirements. This course is designed for giving credits to the students for their research works.
Physics	PHY6003	Research III	Graduate (PhD)	Independent Research	3	6	0	Major	This is an individual study course for Ph. D. students who have finished the course requirements. This course is designed for giving credits to the students for their research works and for writing their dissertation.
Physics	PHY7001	Classical Mechanics	Graduate (Bachelor/Master/PhD)	Theory	3	6	3	Major	This lesson considers the advanced course of Newtonian mechanics which describes the macroscopic objects. Main subjects are Newton's laws, dynamics of Lagrangian and Hamiltonian, Accelerated coordinate systems, scattering, rigid bodies, oscillations, perturbation theory and the classical field theory.
Physics	PHY7002	Quantum Mechanics	Graduate (Bachelor/Master/PhD)	Theory	3	6	3	Major	This subject studies mathematical introduction, the postulates, simple problems in one dimension, the classical limit, the harmonic oscillator, the Heisenberg uncertainty principle, rotational invariance and angular momentum, the hydrogen atom, spin, the addition of angular momenta.
Physics	PHY7003	Electromagnetism	Graduate (Bachelor/Master/PhD)	Theory	3	6	3	Major	In electromagnetism 1, students learn mainly about static electromagnetism, which contains basics of electrostatics, electrostatics with boundary conditions, electrostatic in matters, basics of magneto statics, magneto statics with boundary conditions, magneto statics in matters, and Maxwell's equations.
Physics	PHY7004	Statistical Mechanics	Graduate (Bachelor/Master/PhD)	Theory	3	6	3	Major	Statistical mechanics deals thermodynamics and statistical physics at the level of graduate course. This lesson considers the following subjects: the laws of thermodynamics, transport phenomena, classical statistical mechanics, canonical ensemble, quantum statistical mechanics, fermion systems, boson systems, superfluidity, the Ising model, and phase transition.