

Particle and Nuclear Physics

Course Code	Course	Credit	Content of Subject
40COM001**	High Energy Accelerator Science Seminar 1	2	Active fields of accelerator related science, such as elementary particles, nuclear physics, materials science and life science etc., will be presented by front-line researchers.
40COM002**	High Energy Accelerator Science Seminar 2	2	Active fields of accelerator related science, such as elementary particles, nuclear physics, materials science and life science etc., will be presented by front-line researchers.
40PNP001**	Measurement and Control technology for Experimental Physics	2	Lectures on measurement and control techniques for radiation detectors at high-energy physics experiments. Lecturers cover a wide range of the related fields, such as semiconductor sensor, analog and digital signal processing, etc.
40PNP002**	Basic of Signal Processing for Sensors	1	The goal of this lecture is to learn the signal processing technologies and analog frontend circuits for highly integrated sensors such as imaging devices. A circuit simulator is used to effectively learn through interaction with instructor. The lecture also aims to acquire the basics of integrated circuit design.
40PNP003**	Theoretical Particle Physics 1	2	Lectures on the Standard Model of elementary particle physics based on experimental results.
40PNP004**	Theoretical Particle Physics 2	2	Lectures on the Standard Model of elementary particle physics based on experimental results.
40PNP005**	Theoretical Hadron and Nuclear Physics 1	2	Lectures on hadron and nuclear physics from a theoretical viewpoint at an introductory level. In particular, lectures will be focused on the static and dynamic properties of hadrons under vacuum and extreme conditions such as high temperature and high density.
40PNP006**	Theoretical Hadron and Nuclear Physics 2	2	Lectures on hadron and nuclear physics from a theoretical viewpoint at an introductory level. In particular, lectures will be focused on theoretical studies of quarks and hadronic many-body systems such as various types of nuclei and exotic hadrons.
40PNP007**	Theoretical Cosmophysics 1	2	Lectures on the structures and matter contents of the Universe and their origin from the standpoint of the evolutionary cosmology.
40PNP008**	Theoretical Cosmophysics 2	2	The goal of this lecture is to learn the basics of general relativity and cosmology. First we will study the basics of general relativity and subsequently the gauge invariant perturbation theory on which the modern cosmology is based. We also study various applications of the perturbation theory to observational cosmology. If time permits, we can also learn about quantum field theory in a curved spacetime and its applications.

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40PNP009**	Quantum Field Theory 1	2	Basic concepts in field theory which are indispensable for studying particle and nuclear physics.
40PNP010**	Quantum Field Theory 2	2	Basic concepts in field theory which are indispensable for studying particle and nuclear physics.
40PNP011**	Seminar on Quantum Field Theory 1	2	Seminars to learn basic knowledge and skills of quantum field theories required in theoretical investigations of particle and nuclear physics through exercises and reading important literature.
40PNP012**	Seminar on Quantum Field Theory 2	2	Seminars to learn basic knowledge and skills of quantum field theories required in theoretical investigations of particle and nuclear physics through exercises and reading important literature.
40PNP013**	Seminar on Elementary Theoretical Physics	2	Seminars to learn basic knowledge and skills of elementary physics required to start studies in theoretical particle and nuclear physics.
40PNP014**	Advanced Theoretical Cosmophysics	2	Lectures on theoretical cosmology related to the early Universe, high energy astrophysics and astro-particle physics.
40PNP015**	Seminar on Theoretical Cosmophysics	2	Seminars to learn basic knowledge and skills required in theoretical investigations of cosmophysics through exercises and reading important literature.
40PNP016**	Introduction to Elementary Particle Physics	2	Introductory lecture on Elementary Particle Physics focusing on Experimental Aspects.
40PNP017**	Introduction to Nuclear Physics	2	Introductory lecture on Nuclear Physics focusing on Experimental Aspects.
40PNP018**	Introduction to Experimental Cosmophysics	2	Lectures on cosmology focusing on observational/experimental aspects
40PNP019**	Colloquium I	1	Present your research, and through question-and-answer sessions and discussions, all participants will deepen their understanding of the research content. In parallel, acquire skills as an independent researcher, such as the ability to make presentations and the ability to communicate.
40PNP020**	Colloquium II	1	Present your research, and through question-and-answer sessions and discussions, all participants will deepen their understanding of the research content. In parallel, acquire skills as an independent researcher, such as the ability to make presentations and the ability to communicate.

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40PNP021**	Colloquium III	1	Present your research, and through question-and-answer sessions and discussions, all participants will deepen their understanding of the research content. In parallel, acquire skills as an independent researcher, such as the ability to make presentations and the ability to communicate.
40PNP022**	Colloquium IV	1	Present your research, and through question-and-answer sessions and discussions, all participants will deepen their understanding of the research content. In parallel, acquire skills as an independent researcher, such as the ability to make presentations and the ability to communicate.
40PNP023**	Advanced Course for Physics of Collider Experiments 1	2	Advanced lecture on Physics of Collider Experiments.
40PNP024**	Advanced Course for Physics of Collider Experiments 2	2	Advanced lecture on Physics of Collider Experiments.
40PNP025**	Seminar on Physics of Collider Experiments I	2	Advanced exercise for Physics of Collider Experiments.
40PNP026**	Seminar on Physics of Collider Experiments II	2	Advanced exercise for Physics of Collider Experiments.
40PNP027**	Advanced Course for Experimental Lepton Physics 1	2	Advanced lecture on Experimental Lepton Physics.
40PNP028**	Advanced Course for Experimental Lepton Physics 2	2	Advanced lecture on Experimental Lepton Physics.
40PNP029**	Seminar on Experimental Lepton Physics I	2	Advanced exercise for Experimental Lepton Physics.
40PNP030**	Seminar on Experimental Lepton Physics II	2	Advanced exercise for Experimental Lepton Physics.
40PNP031**	Advanced Course for Experimental Hadron & Nuclear Physics 1	2	Advanced lecture on Experimental Hadron & Nuclear Physics.
40PNP032**	Advanced Course for Experimental Hadron & Nuclear Physics 2	2	Advanced lecture on Experimental Hadron & Nuclear Physics.
40PNP033**	Seminar on Experimental Hadron & Nuclear Physics I	2	Advanced exercise for Experimental Hadron & Nuclear Physics.
40PNP034**	Seminar on Experimental Hadron & Nuclear Physics II	2	Advanced exercise for Experimental Hadron & Nuclear Physics.
40PNP035**	Advanced Course for Kaon and Neutron Physics 1	2	Advanced lecture on Kaon and Neutron Physics.
40PNP036**	Advanced Course for Kaon and Neutron Physics 2	2	Advanced lecture on Kaon and Neutron Physics.
40PNP037**	Seminar on Kaon and Neutron Physics I	2	Advanced exercise for Kaon and Neutron Physics.
40PNP038**	Seminar on Kaon and Neutron Physics II	2	Advanced exercise for Kaon and Neutron Physics.

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Course Code	Course	Credit	Content of Subject
40PNP039**	Advanced Course for Experimental Cosmophysics 1	2	Advanced lecture on Experimental Cosmophysics.
40PNP040**	Advanced Course for Experimental Cosmophysics 2	2	Advanced lecture on Experimental Cosmophysics.
40PNP041**	Seminar on Experimental Cosmophysics I	2	Advanced exercise for Experimental Cosmophysics.
40PNP042**	Seminar on Experimental Cosmophysics II	2	Advanced exercise for Experimental Cosmophysics.
40PNP043**	Advanced Course for Instrumentations of High Energy Physics 1	2	Advanced lecture on Experimental Cosmophysics.
40PNP044**	Advanced Course for Instrumentations of High Energy Physics 2	2	Advanced lecture on Experimental Cosmophysics.
40PNP045**	Seminar on Instrumentations of High Energy Physics I	2	Advanced exercise for Experimental Cosmophysics.
40PNP046**	Seminar on Instrumentations of High Energy Physics II	2	Advanced exercise for Experimental Cosmophysics.
40PNP047**	Advanced Digital Circuit Design and Development for Measurement and Control Systems	1	Lecture and exercise on the structure of Xilinx's FPGA and the characteristics of dedicated functional blocks. Aim to reach the level of knowledge required in actual development.
40PNP048**	Advanced Contemporary Physics 1	2	Not offered in AY 2025
40PNP049**	Advanced Contemporary Physics 2	2	Lectures on lattice field theories and numerical simulations thereof.
40PNP050**	Superstring Theory 1	2	Lectures on superstring theory or related particle theory, quantum mechanics, field theory, etc. will be given.
40PNP051**	Superstring Theory 2	2	Lectures on modern methods for obtaining non-perturbative effects (string duality, algebro-geometric methods, etc.) necessary for applying string theory to realistic model building.
40PNP052**	Exercise for Physics of Collider Experiments 1	2	Advanced exercise for Physics of Collider Experiments.
40PNP053**	Exercise for Physics of Collider Experiments 2	2	Advanced exercise for Physics of Collider Experiments.
40PNP054**	Exercise for Experimental Lepton Physics 1	2	Advanced exercise for Experimental Lepton Physics.
40PNP055**	Exercise for Experimental Lepton Physics 2	2	Advanced exercise for Experimental Lepton Physics.
40PNP056**	Exercise for Experimental Hadron & Nuclear Physics 1	2	Advanced exercise for Experimental Hadron & Nuclear Physics.

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Course Code	Course	Credit	Content of Subject
40PNP057**	Exercise for Experimental Hadron & Nuclear Physics 2	2	Advanced exercise for Experimental Hadron & Nuclear Physics.
40PNP058**	Exercise for Kaon and Neutron Physics 1	2	Advanced exercise for Kaon and Neutron Physics.
40PNP059**	Exercise for Kaon and Neutron Physics 2	2	Advanced exercise for Kaon and Neutron Physics.
40PNP060**	Exercise for Experimental Cosmophysics 1	2	Advanced exercise for Experimental Cosmophysics.
40PNP061**	Exercise for Experimental Cosmophysics 2	2	Advanced exercise for Experimental Cosmophysics.
40PNP062**	Exercise for Instrumentations of High Energy Physics 1	2	Advanced exercise for Experimental Cosmophysics.
40PNP063**	Exercise for Instrumentations of High Energy Physics 2	2	Advanced exercise for Experimental Cosmophysics.
80PNP001**	Qualifying Research in Particle, Nuclear and Cosmo Physics IIA	2	Students are required to perform a research on an advanced subject in accelerator science.
80PNP002**	Qualifying Research in Particle, Nuclear and Cosmo Physics IIB	2	Students are required to perform a research on an advanced subject in accelerator science.