

■ Quantum beam application courses (Compulsory Elective Courses 2)

Course Group	Course Affiliation	Course Name	Code	Credit
Quantum beam informatics courses	Department of Information Systems Engineering, Graduate School of Information Science and Technology	Embedded System Design	331420	2
		Introduction to VLSI Design	331428	2
		Advanced Information Systems	331429	2
		Machine Learning Systems Theory	331431	2
		Machine Learning for Dynamical Systems	331432	2
Quantum beam medical courses	Medical School, Faculty of Medicine	Introduction for Medicine	051122	2
		Medicine Humanities	050149	1
		Radiation Biology	051114	2
		Cell Biology	05A015	2
	Graduate School of Medicine	Orientation for Instrument	25D007	1
	Division of Health Sciences, Graduate School of Medicine	Radiation Control Biology I	329997	1
		Radiation Control Biology II	329996	1
		Biomedical optics and Medical imaging technology, Special Lecture I	255178	1
		Biomedical optics and Medical imaging technology, Special Lecture II	255179	1
		Advanced Medical Physics and Engineering	255044	2
		Biomedical Optoelectronics, Special Lecture	255540	2
		Biomedical Optoelectronics, Special Practice	255541	2
		Special lecture for applied image processing	255612	2
		Seminar in applied image processing	255613	2
		Radiation Oncology, Special Lecture	255546	2
		Radiation Oncology, Special Practice	255547	2
		High Precision Particle Therapy Physics	255715	2
		High Precision Particle Therapy Physics, Practice	255716	2
		High Precision Particle Therapy	255705	2
		High LET Radiation Therapy	255712	2
Quantum beam application courses	Department of Physics, Graduate school of Science	Laser Physics	241427	2
		Accelerator Physics	240751	2
		Radiation Detection and Measurement 1	241871	2
		Radiation Detection and Measurement 2	241872	2
		Advanced Optics in Physics	240174	2
		Synchrotron Radiation Spectroscopy	24P035	2
		Synchrotron Radiation Spectroscopy	241453	2
Quantum beam physics application courses	Department of Physics, Graduate school of Science	Nuclear Reaction Theories	241346	2
		Quantum Field Theory I (English)	24P033	2
		Quantum Field Theory II (English)	24P026	2
		Introduction to Theoretical Nuclear Physics (English)	24P032	2
	Department of Physics, Graduate school of Science, Course A	Introduction to Field Theory	240161	2
		Theoretical Nuclear Physics	240802	2
		Topics in Elementary Particle Theory I	240193	2
		Topics in Elementary Particle Theory II	240194	2
		Topics in Theoretical Nuclear Physics I	240195	2
		Topics in Theoretical Nuclear Physics II	240196	2
	Department of Physics, Graduate school of Science, Course B	High Energy Physics I	240201	2
		High Energy Physics II	240202	2
		Topics in High Energy Physics I	240207	2
		Topics in High Energy Physics II	240208	2
		Nuclear Structure	240205	2
		Topics in Particle and Nuclear Spectroscopy	240209	2
		Topics in Nuclear Physics I	240210	2
		Topics in Nuclear Physics II	240211	2
		Topics in Many-Body Hadron Systems	240212	2
		High Energy Physics (English)	24P039	2
		Nuclear Physics in the Universe (English)	24P031	2
		Introduction to Nuclear and Particle Physics	241887	2
		Introduction to Particle Physics	241888	2
		Introduction to Nuclear Physics	241889	2
		Introduction to Particles and Nuclei in Astrophysics	241890	2
		Current Topics B I	240444	1
		Current Topics B II	240445	1
	Department of Physics, Graduate school of Science	Optical Properties of Matter	24P029	2

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Quantum beam physics application courses	Department of Physics, Graduate School of Science, Course C	Optical Properties of Matter	240172	2
		Semiconductor Physics	241124	2
		Superconductivity	240216	2
		Charged Particle Optics	240218	2
		Physics of Isolated Atomic and Molecular Ions	241347	2
		Introduction to Materials Science	241854	2
		High-Field Magnetism	240219	2
		Strongly-Correlated Electron Systems	240222	2
		Interface Physics	241743	2
		Current Topics C I	240283	1
		Current Topics C II	240284	1
	Department of Physics, Graduate school of Science, Course A	Condensed Matter Theory I	240188	2
		Condensed Matter Theory II	240189	2
		Solid State Theory I	240190	2
		Solid State Theory II	240191	2
		Quantum Many-body Systems	240192	2
		Topics in Condensed Matter Theory I	240197	2
		Topics in Condensed Matter Theory II	240198	2
	Department of Physics, Graduate school of Science	Nonlinear Physics	240181	2
	Department of Physics, Graduate school of Science, Course A	Computational Physics	241715	2
		High Energy Density Plasma Science	241870	2
		Topics in Elementary Particle Theory II	240194	2
	Department of Physics, Graduate school of Science	*Condensed Matter Theory	24P037	2
		*Solid State Theory	24P038	2
		*Quantum Many-body Systems	24P028	2
		*Computational Physics	24P040	2
Quantum beam chemistry courses	Department of Chemistry, Graduate School of Science	Advanced Inorganic Chemistry	241156	2
		Advanced Physical Chemistry	241157	2
		Advanced Organic Chemistry II	241853	2
		Solid State Chemistry(I)	241173	1
		Physical Chemistry of Condensed Matter (I)	241170	1
		Analytical Chemistry for Interface(I) (English)	241844	1
		Nuclear Chemistry2 (I)	241165	1
		Molecular Reaction Dynamics (I)	241746	1
		Quantum Chemistry (I)	241845	1
		Biophysical Chemistry(I)	241169	1
		Beam Chemistry (I)	241766	1
	School of Science	Solid State Physical Chemistry	040193	2
		Chemical Kinetics and Dynamics 3	040431	2
		Advanced Inorganic and Radiochemistry	040477	2
		Radiochemistry(I)	040476	2
Quantum beam functional molecule creation courses	Department of Chemistry, Graduate School of Science	Bioinorganic Chemistry (I)	241159	1
		Physical Coordination Chemistry 1(I)	241259	1
		Structural Coordination Chemistry (I)	241163	1
		Natural Product Chemistry (I)	241319	1
		Organic Biochemistry (I)	241190	1
		Genome Chemistry (I)	241846	1
		Protein Chemistry (I)	241847	1
		Structural Organic Chemistry (I)	241191	1
		Introduction to Organometallic Chemistry	241215	2
		Quantum Chemistry (English)	24S085	1
		Analytical Chemistry for Interface (English)	24S078	1
		Structual Thermodynamics (English)	24S058	1
		Genome Chemistry (English)	24S081	1
		Protein Chemistry (English)	24S084	1
		Thermal and Entropic Science (English)	24S087	1
		Natural Product Chemistry	24S082	1
		Organic Biochemistry	24S083	1
		Structural Organic Chemistry	24S086	1

Course Group	Course Affiliation	Course Name	Code	Credit
Quantum beam macromolecular science courses	Department of Macromolecular Science, Graduate School of Science	Organic Chemistry of Macromolecules	240600	2
		Physical Chemistry of Macromolecules A	241704	1
		Physical Chemistry of Macromolecules B	241705	1
		Macromolecular Assemblies	240601	2
		Informational Polymer Sciences	240960	2
		Current Topics XI (English Intensive course)	24S065	1
		Current Topics (1)	240921	1
Comprehensive Quantum Beam fundamentals Courses	All Majors	Comprehensive Quantum Beam Fundamentals 1	24Q019	2
		Comprehensive Quantum Beam Fundamentals 2	24Q020	2