THE CHINESE UNIVERSITY OF HONG KONG

Materials Science and Engineering (CUHK(SZ)) & X Double Major Programme

Lists of Substitute / Equivalent / Alternative Courses between CUHK and CUHK(SZ)

(As of 14 July 2026)

(for students admitted by CUHK(SZ))

Note:

The substitute / equivalent / alternative coursers are not transitive. If Courses A and B are substitute / equivalent / alternative courses, and courses A and C are substitute / equivalent / alternative courses, it does not necessarily follow that B and C are also substitute /equivalent / alternative courses. Nonetheless, students should not take both courses B and C.

School Package

Courses offered by CUHK(SZ)		Courses offered by CUHK	
CSC1005	Introduction to Computer Engineering: Programming and Applications	ENGG1110	Problem Solving by Programming
MAT1001	Calculus I	ENGG1125	Single Variable Calculus for Engineers
MAT1001	Calculus I	MATH1010	University Mathematics
MAT1001	Calculus I	MATH1510	Calculus for Engineers
PHY1001	Mechanics	PHYS1110	Engineering Physics: Mechanics and Thermodynamics
PHY1001	Mechanics	PHYS1111	Introduction to Mechanics, Fluids, and Waves (University Physics I)

1st Major: Materials Science and Engineering (offered by CUHK(SZ)) - Required Courses

Courses offered by CUHK(SZ)		Courses offered by CUHK	
CHM1001	General Chemistry	CHEM1070	Principles of Modern Chemistry
MAT1002	Calculus II	MATH2010	Advanced Calculus I
MSE2001	Chemistry Foundation for Materials	CHEM2200	Organic Functional Groups: Structure and Reactivity
MSE2002	Physics Foundation for Materials	CHEM2300	Thermodynamics and Chemical Equilibrium
MSE2003	Materials Laboratory I	MASE1801	Materials Laboratory
MSE2012	Micro and Nano Structures of Materials	MASE1001	Introduction to Materials Science and Engineering I
MSE3005	Materials Characterization	CHEM2110	Fundamentals of Spectroscopic Analysis

MSE3005	Materials Characterization	MASE3002	Characterization of Materials
STA2001	Probability and Statistics I	ENGG2780	Statistics for Engineers
STA2001	Probability and Statistics I	STAT2001	Basic Concepts in Statistics and Probability I

1st Major: Materials Science and Engineering (offered by CUHK(SZ)) - Elective Courses (covering all areas)

Please refer to the study scheme for the elective specific to each area of study.

Courses offered by CUHK(SZ)		Courses offered by CUHK	
BIM3001	Bioinformatics	BMEG3102	Bioinformatics
BIM3006	Macromolecules and Molecular Pharmacology	BCHE3050	Molecular Biology
BIM3008	Machine Learning in Computational Biology	BMEG3105	Data Analytics for Personalized Genomics and Precision Medicine
BIO1001	General Biology	LSCI1002	Introduction to Biological Sciences
BME4011	Nanobiotechnology	BMEG4450	Bionanotechnology
CHM2210	Inorganic Chemistry	CHEM2120	Main Group Chemistry
CHM2210	Inorganic Chemistry	CHEM3130	Transition Metal Chemistry
CHM2210	Inorganic Chemistry	CHEM2400	Analytical Chemistry
CHM3210	Advanced Inorganic Chemistry	CHEM4100	Advanced Inorganic Chemistry
CHM3210	Advanced Inorganic Chemistry	CHEM3130	Transition Metal Chemistry
CHM3420	Advanced Physical Chemistry (Structural Chemistry)	CHEM4300	Advanced Physical Chemistry
CHM3520	Introduction to Materials Science and Engineering	MASE1001	Introduction to Materials Science and Engineering I
CHM4630	Medicinal Chemistry	CHEM4640	Pharmaceutical Chemistry
CSC3002	C/C++ Programming	CSCI1120	Introduction to Computing Using C++
CSC3180	Fundamentals of Artificial Intelligence	CSCI3230	Fundamentals of Artificial Intelligence
DDA3020	Machine Learning	CSCI3320	Fundamentals of Machine Learning
ECE2001	Basic Circuit Theory	ELEG2202	Fundamentals of Electric Circuits
ECE3001	Signals and Systems	ENGG2030	Signals and Systems
ECE3050	Principles of Communication Systems	ELEG2310	Principles of Communication Systems
ECE3201	Introduction to Microelectronic Circuits	ELEG3201	Microelectronic Devices and Circuits
ENE3001	Principles of Energy Engineering	EEEN2020	Renewable Energy Technologies

ENE3003	Heat and Mass Transfer for Energy Systems	EEEN2040	Heating, Ventilation, and Air-Conditioning (HVAC) I
ENE3003	Heat and Mass Transfer for Energy Systems	MAEG4030	Heat Transfer
ENE3004	Fundamentals of Photovoltaic Materials and Devices	EEEN4020	Solar Energy and Photovoltaic Technology
ENE3006	Energy Materials and Carbon Neutralization	EEEN3030	Engineering Materials
ENE4003	Fundamentals of Thermal Energy Systems	EEEN2020	Renewable Energy Technologies
ENE4003	Fundamentals of Thermal Energy Systems	EEEN4050	Energy Storage Devices and Systems
ENE4005	Energy Resources and the Environment	EEEN2020	Renewable Energy Technologies
ENE4005	Energy Resources and the Environment	EEEN3020	Energy Utilization and Human Behaviour
ENE4007	Energy Economics	EEEN2030	Energy and Environment Economics and Management
ENE4009	Power System Stability and Control	EEEN4060	Energy Distribution
MAT2002	Ordinary Differential Equation	MATH3270	Ordinary Differential Equations
MAT2002	Ordinary Differential Equation	ENGG2740	Differential Equations for Engineers
MAT2040	Linear Algebra	ENGG1120	Linear Algebra for Engineers
MAT2040	Linear Algebra	MATH1030	Linear Algebra I
MAT3007	Optimization	MAEG4070	Engineering Optimization
MAT3007	Optimization	MATH4230	Optimization
MSE2021	Materials Mechanics	MASE1002	Introduction to Materials Science and Engineering II
MSE3007	Electronic, Optical, and Magnetic Properties of Materials	PHYS4050	Solid-State Physics
MSE3009	Advanced Ceramics	MASE2202	Introduction to Ceramics
MSE3022	Polymer Materials	MASE2002	Introduction to Polymer Science
MSE4005	Nanoscale Materials	CHEM4303	Introduction to Nanoscience and Nanotechnology
PHY1010	Principles of Physics II (thermodynamics and EM)	PHYS2041	University Physics III – Introduction to Heat and Electromagnetism
PHY2010	Fluid Mechanics	MAEG3030	Fluid Mechanics
PHY2020	Principles of Physics III (Optics and Modern Physics)	PHYS1122	University Physics II – Introduction to Optics and Modern Physics

PHY2610	Mathematical Methods in Physics I	PHYS3051	Methods in Theoretical Physics I
PHY2610	Mathematical Methods in Physics I	PHYS2051	Quantitative Methods for Basic Physics
PHY2650	Computational Physics I with AI Tools	PHYS2061	Basic Computational Physics
PHY2650	Computational Physics I with AI Tools	MAEG1020	Computational Design and Fabrication
PHY3420	Quantum Mechanics and its Applications II	PHYS3022	Applied Quantum Mechanics
PHY3820	Introduction to Astronomy & Astrophysics	PHYS4430	Astrophysics
PHY3820	Introduction to Astronomy & Astrophysics	PHYS2401	Introduction to Astronomy and Astrophysics
PHY4001	Solid-State Physics	PHYS4050	Solid-State Physics
PHY4510	Statistical Mechanics and its Applications	PHYS4031	Statistical Mechanics

2nd Major: Chemistry (offered by CUHK(SZ))

Courses offered by CUHK(SZ)		Courses offered by CUHK	
CHM2110	Analytical Chemistry	CHEM2400	Analytical Chemistry
CHM2210	Inorganic Chemistry	CHEM2120	Main Group Chemistry
CHM2210	Inorganic Chemistry	CHEM3130	Transition Metal Chemistry
CHM2310	Organic Chemistry I	CHEM2200	Organic Functional Groups: Structure and Reactivity
CHM2338	Organic Chemistry Laboratory	CHEM2868	Basic Integrated Chemistry Laboratory
CHM3110	Advanced Analytic Chemistry and Experiments	CHEM4400	Advanced Analytical Chemistry
CHM3130	Fundamentals of Spectroscopy, Microscopy and Chromatography	CHEM2110	Fundamentals of Spectroscopic Analysis
CHM3210	Advanced Inorganic Chemistry	CHEM4100	Advanced Inorganic Chemistry
CHM3210	Advanced Inorganic Chemistry	CHEM3130	Transition Metal Chemistry
CHM3320	Advanced Organic Chemistry: Reactivity, Structures, Mechanisms and Experiments	CHEM3220	Organic Reactions: Reactivity and Selectivity
CHM3530	Polymer Chemistry	MASE2002	Introduction to Polymer Science
CHM4210	Transition Metals and Coordination Chemistry	CHEM3130	Transition Metal Chemistry

CHM4330	Organometallic Chemistry and Catalysis	CHEM4110	Frontier Organometallic Catalysis
CHM4340	Modern Organic Synthesis	CHEM4730	Special Topics in Chemistry
CHM4410	Solid State Chemistry	CHEM4300	Advanced Physical Chemistry
PHY2002	Thermodynamics	PHYS3031	Thermodynamics and Statistical Physics
PHY2002	Thermodynamics	MAEG2030	Thermodynamics

2nd Major: New Energy Science and Engineering (offered by CUHK(SZ))

Courses offered by CUHK(SZ)		Courses offered by CUHK	
CSC3100	Data Structures	CSCI2100	Data Structures
ECE2001	Basic Circuit Theory	ELEG2202	Fundamentals of Electric Circuits
ECE3250	System and Control	MAEG3050	Introduction to Control Systems
ECE4010	Machine Intelligence and Applications	MAEG3080	Fundamentals of Machine Intelligence
ECE4010	Machine Intelligence and Applications	CSCI3230	Fundamentals of Artificial Intelligence
ENE3001	Principles of Energy Engineering	EEEN2020	Renewable Energy Technologies
ENE3003	Heat and Mass Transfer for Energy Systems	EEEN2040	Heating, Ventilation, and Air-Conditioning (HVAC) I
ENE3003	Heat and Mass Transfer for Energy Systems	MAEG4030	Heat Transfer
ENE3004	Fundamentals of Photovoltaic Materials and Devices	EEEN4020	Solar Energy and Photovoltaic Technology
ENE3006	Energy Materials and Carbon Neutralization	EEEN3030	Engineering Materials
ENE3050	Electrical Power Systems	ELEG3601	Introduction to Electric Power Systems
ENE4001	Green Engineering and Environmental Compliance	EEEN4070	Green Building and Sustainable Technologies
ENE4007	Energy Economics	EEEN2030	Energy and Environment Economics and Management
ENE4008	Power Electronics	ELEG3207	Introduction to Power Electronics
ENE4011	Smart Grid	EEEN4060	Energy Distribution
MAT2040	Linear Algebra	ENGG1120	Linear Algebra for Engineers
MAT2040	Linear Algebra	MATH1030	Linear Algebra I
PHY2002	Thermodynamics	PHYS3031	Thermodynamics and Statistical Physics
PHY2002	Thermodynamics	MAEG2030	Thermodynamics
PHY2010	Fluid Mechanics	MAEG3030	Fluid Mechanics

2nd Major: Physics (offered by CUHK(SZ))

Courses offered by CUHK(SZ)		Courses offered by CUHK	
PHY1010	Principles of Physics II (thermodynamics and EM)	PHYS2041	University Physics III – Introduction to Heat and Electromagnetism
PHY1910	Physics Laboratory I	PHYS1712	Physics Laboratory I
PHY1920	Physics Laboratory II	PHYS2711	Physics Laboratory II
PHY2002	Thermodynamics	PHYS3031	Thermodynamics and Statistical Physics
PHY2002	Thermodynamics	MAEG2030	Thermodynamics
PHY2020	Principles of Physics III (Optics and Modern Physics)	PHYS1122	University Physics II – Introduction to Optics and Modern Physics
PHY2610	Mathematical Methods in Physics I	PHYS3051	Methods in Theoretical Physics I
PHY2610	Mathematical Methods in Physics I	PHYS2051	Quantitative Methods for Basic Physics
PHY3110	Classical Mechanics I	MAEG2020	Engineering Mechanics
PHY3110	Classical Mechanics I	PHYS3011	Classical Mechanics I
PHY3120	Classical Mechanics II	PHYS4011	Classical Mechanics II
PHY3310	Electromagnetic Theory I	PHYS3041	Electromagnetic Theory I
PHY3320	Electromagnetic Theory II	PHYS4041	Electromagnetic Theory II
PHY3410	Quantum Mechanics and its Applications I	PHYS3021	Quantum Mechanics I
PHY3421	Introduction to Quantum Information	PHYS3023	Introduction to Quantum Information Physics
PHY3650	Computer Simulation of Physical Systems	PHYS3061	Introduction to Computer Simulation of Physical Systems
PHY3710	Physics of Material Science	/	
PHY3950	Basic Electronics	PHYS3410	Practical Electronics
PHY4002	Electrodynamics II	PHYS4041	Electromagnetic Theory II
PHY4650	Computational Physics II	PHYS4061	Computational Physics
PHY4720	Topics in Nanoscience and Technology	CHEM4303	Introduction to Nanoscience and Nanotechnology
PHY4810	Relativity	PHYS4460	Relativity

2nd Major: Biomedical Science and Engineering (offered by CUHK(SZ))

Courses offered by CUHK(SZ)		Courses offered by CUHK	
BIO2002	Cell and Molecular Biology	BIOL2120	Cell Biology
BIO2101	Comprehensive Biology Laboratory	LSCI2002	Basic Lab Techniques in Life Sciences
BIO2101	Comprehensive Biology Laboratory	BIOL3012	Biodiversity Laboratory I

BIO3213	Protein Structure Analysis and Proteomics	CMBI4203	Proteomics
BIO3214	Neurobiology	BMEG3330	Neuroengineering
BIO4203	Immunology	BCHE4060	Basic and Applied Immunology
BME2001	Anatomy/Physiology	BIOL3630	Animal Physiology
BME3001	Introduction to Biomedical Engineering I	BMEG2001	Introduction to Biomedical Engineering
BME3006	Biosensors and Medical Devices	MASE3104	Solid-State Sensors
BME3200	Biomedical Signal Processing	BMEG2300	Circuits and Signals for Biomedical Engineering
BME3201	Biomedical Instrument Design	BMEG3101	Medical Instrumentation and Design
BME3201	Biomedical Instrument Design	BMEG3111	Medical Instrumentation and Design
BME4003	Systems Bioengineering II: Neural Systems	BCHE4040	Aspects of Neuroscience
BME4007	Tissue Engineering	BMEG3430	Biomaterials and Tissue Engineering
BME4008	Biomechanics of the Human body	BMEG2210	Orthopaedic Biomechanics and Musculoskeletal Injury
BME4009	Clinical Laboratory Science	SBMS2105	Laboratory Techniques in Biomedical Sciences
CHM2317	Organic Chemistry and Biomolecules	CHEM1280	Introduction to Organic Chemistry and Biomolecules

2nd Major: Electronic Engineering (offered by CUHK)

Courses offered by CUHK		Courses offered by CUHK(SZ)	
EEEN4020	Solar Energy and Photovoltaic Technology	ENE3004	Fundamentals of Photovoltaic Materials and Devices
ELEG2310	Principles of Communication Systems	ECE3050	Principles of Communication Systems
ELEG3201	Microelectronic Devices and Circuits	ECE3201	Introduction to Microelectronic Circuits
ELEG3213	Fundamentals of Applied Electromagnetics	PHY2001	Electricity and Magnetism
ELEG3213	Fundamentals of Applied Electromagnetics	PHY3310	Electromagnetic Theory I
ELEG3214	Antennas and Wave Propagation for Wireless Communications	ECE4003	Wireless Communication Systems
ELEG3302	Fundamentals of Photonics	PHY4003	Introduction to Photonic Crystals
ELEG3303	Introduction to Optical Communications	ECE4004	Introduction to Optical Communications

ELEG3503	Introduction to Digital Signal Processing	ECE3510	Digital Signal Processing
ELEG3601	Introduction to Electric Power Systems	ENE3050	Electrical Power Systems
ELEG3701	Embedded Systems Design	ECE3080	Introduction to Embedded Systems
ELEG3910	Undergraduate Research in Electronic Engineering	ERG2081	Independent Study I
ELEG4211	CMOS Digital Integrated Circuits Design	ECE4102	CMOS Digital Integrated Circuits Design
ELEG4214	RF Circuits for Wireless Systems	ECE4213	Radio Frequency Integrated Circuits
ELEG4311	Physics and Technology of Semiconductor Devices	PHY3006	Physics of Semiconductors Devices
ELEG4512	Digital Image Processing	ECE4512	Digital Image Processing
ELEG4701	Intelligent Interactive Robot Practice	ECE4310	Programming for Robots
ENGG1120	Linear Algebra for Engineers	MAT2040	Linear Algebra
ENGG2030	Signals and Systems	ECE3001	Signals and Systems
ENGG2602	Engineering Practicum	ERG4100	Industrial Practices / Internship
ENGG2740	Differential Equations for Engineers	MAT2002	Ordinary Differential Equations
ENGG3201	Microelectronic Devices and Circuits	ECE3201	Introduction to Microelectronic Circuits

2nd Major: Energy and Environmental Engineering (offered by CUHK)

Courses offered by CUHK		Courses offered by CUHK(SZ)	
EEEN2020	Renewable Energy Technologies	ENE3001	Principles of Energy Engineering
EEEN2030	Energy and Environment Economics and Management	ENE4007	Energy Economics
EEEN2040	Heating, Ventilation, and Air-Conditioning (HVAC) I	ENE3003	Heat and Mass Transfer for Energy Systems
EEEN3030	Engineering Materials	ENE3006	Energy Materials and Carbon Neutralization
EEEN4050	Energy Storage Devices and Systems	ENE4003	Fundamentals of Thermal Energy Systems
EEEN4070	Green Building and Sustainable Technologies	ENE4001	Green Engineering and Environmental Compliance
EESC4240	Air Pollution Science and Engineering	ENE4001	Green Engineering and Environmental Compliance
ELEG2202	Fundamentals of Electric Circuits	ECE2001	Basic Circuit Theory

ELEG3207	Introduction to Power Electronics	ENE4008	Power Electronics
ELEG3601	Introduction to Electric Power Systems	ENE3050	Electrical Power Systems
ENGG1120	Linear Algebra for Engineers	MAT2040	Linear Algebra
MAEG3030	Fluid Mechanics	PHY2010	Fluid Mechanics
MAEG3050	Introduction to Control Systems	ECE3250	System and Control

2nd Major: Mechanical and Automation Engineering (offered by CUHK)

Courses offered by CUHK		Courses offered by CUHK(SZ)	
IERG1080	Introduction to Python for Engineering Applications	CSC3002	C/C++ Programming
EEEN2020	Renewable Energy Technologies	ENE3001	Principles of Energy Engineering
ELEG2202	Fundamentals of Electric Circuits	ECE2001	Basic Circuit Theory
ENGG1120	Linear Algebra for Engineers	MAT2040	Linear Algebra
ENGG2020	Digital Logic Design	ECE2050	Digital Logic and Systems
ENGG2720	Complex Variables for Engineers	MAT3253	Complex Variables
ENGG2740	Differential Equations for Engineers	MAT2002	Ordinary Differential Equations
MAEG1020	Computational Design and Fabrication	PHY2650	Computational Physics and AI Tools
MAEG2020	Engineering Mechanics	PHY3110	Classical Mechanics I
MAEG3010	Mechanics of Materials	MSE2021	Materials Mechanics
MAEG3030	Fluid Mechanics	PHY2010	Fluid Mechanics
MAEG3050	Introduction to Control Systems	ECE3250	System and Control
MAEG3060	Introduction to Robotics	ECE3060	Introduction to Robotics
MAEG3080	Fundamentals of Machine Intelligence	ECE4010	Machine intelligence and Applications
MAEG4030	Heat Transfer	ENE3003	Heat and Mass Transfer for Energy Systems
MAEG4070	Engineering Optimization	MAT3007	Optimization
MATH3270	Ordinary Differential Equations	MAT2002	Ordinary Differential Equations
MATH4230	Optimization	MAT3007	Optimization

2nd Major: Chemistry (offered by CUHK)

Courses offered by CUHK		Courses offered by CUHK(SZ)	
CHEM2110	Fundamentals of Spectroscopic Analysis	CHM3130	Fundamentals of Spectroscopy, Microscopy and Chromatography
CHEM2120	Main Group Chemistry	CHM2210	Inorganic Chemistry
CHEM2400	Analytical Chemistry	CHM2110	Analytical Chemistry
CHEM2868	Basic Integrated Chemistry Laboratory	CHM2228	Inorganic Chemistry Laboratory
CHEM2878	Basic Integrated Chemistry Laboratory II	CHM3418	Physical Chemistry Laboratory
CHEM3130	Transition Metal Chemistry	CHM3210	Advanced Inorganic Chemistry
CHEM3320	Chemical Kinetics	CHM2002	Physical Chemistry
CHEM4100	Advance Inorganic Chemistry	CHM3210	Advanced Inorganic Chemistry
CHEM4110	Frontier Organometallic Catalysis	CHM4330	Organometallic Chemistry and Catalysis
CHEM4200	Bioorganic Chemistry and Chemical Biology	CHM4710	Chemical Biology
CHEM4300	Advanced Physical Chemistry	CHM3420	Advanced Physical Chemistry (Structural Chemistry)
CHEM4303	Introduction to Nanoscience and Nanotechnology	PHY4720	Topics in Nanoscience and Technology
CHEM4400	Advanced Analytical Chemistry	CHM3110	Advanced Analytic Chemistry and Experiments
CHEM4630	Asymmetric Organic Synthesis	CHM4351	Organocatalysis
CHEM4730	Special Topics in Chemistry	CHM4340	Modern Organic Synthesis
CHEM4785	Industrial Chemistry	CHM4340	Modern Organic Synthesis

2nd Major: Physics (offered by CUHK)

Courses offered by CUHK		Courses offered by CUHK(SZ)	
PHYS1122	University Physics II – Introduction to Optics and Modern Physics	PHY2020	Principles of Physics III (Optics and Modern Physics)
PHYS1712	Physics Laboratory I	PHY1910	Physics Laboratory I
PHYS2041	University Physics III – Introduction to Heat and Electromagnetism	PHY1010	Principles of Physics II (thermodynamics and EM)
PHYS2051	Quantitative Methods for Basic Physics	PHY2610	Mathematical Methods in Physics I
PHYS2401	Introduction to Astronomy and Astrophysics	PHY3820	Introduction to Astronomy and Astrophysics
PHYS2711	Physics Laboratory II	PHY1920	Physics Laboratory II
PHYS3011	Classical Mechanics I	PHY3110	Classical Mechanics I
PHYS3021	Quantum Mechanics I	PHY3410	Quantum Mechanics and its Applications I

PHYS3023	Introduction to Quantum Information Physics	PHY3421	Introduction to Quantum Information
PHYS3031	Thermodynamics and Statistical Physics	PHY2002	Thermodynamics
PHYS3041	Electromagnetic Theory I	PHY3310	Electromagnetic Theory I
PHYS3051	Methods in Theoretical Physics I	PHY2610	Mathematical Methods in Physics I
PHYS3061	Introduction to Computer Simulation of Physical Systems	PHY3650	Computer Simulation of Physical Systems
PHYS3410	Practical Electronics	PHY3950	Basic Electronics
PHYS4011	Classical Mechanics II	PHY3120	Classical Mechanics II
PHYS4041	Electromagnetic Theory II	PHY3320	Electromagnetic Theory II
PHYS4041	Electromagnetic Theory II	PHY4002	Electrodynamics II
PHYS4061	Computational Physics	PHY4650	Computational Physics II
PHYS4460	Relativity	PHY4810	Relativity