Department of Earth Sciences Courses List (2012-2023) – Master Program

Note：

1. The number with the break（）indicates the credits.
2. Color Code: Eligible Course, Astronomy, Atmospheric Science, Geology, Geophysics, Ocean, Sci. Edu., Integrated Course.
3. Course with "*" are Undergraduate-Master Joint Courses; course with "#" are Master-Doctoral Joint Courses; courses in bold and italic are taught in English in the corresponding semester.

101-1 (2012 Fall)	Required	Selected
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Advanced Astronomical Observations(3)# Advanced Astrophysics(3)# Interstellar Medium(3)# ***Tools for Modern Astronomy(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Synoptic Meteorology(3)* Boundary Layer Meteorology(3) Research Methodologies in Atmospheric Sciences(3)#
GEOLOGY		Geodynamics(3) * Mineralogy(including Lab.)(3)* ***Planetary Geology(3)*** * Advanced Petroleum Geology(3)# Core-Log Integration(3)# Earth Sciences and Archaeology(3)#
GEOPHYSICS		Earth Science Data Processing(3) * Gravity and Geomagnetism(2)# Gravity and Geomagnetism Laborartory(1)# Inverse Theory(3)# The Dynamics of Fault Zone(3)#
OCEANOGRAPHY		Introduction to Marine Chemistry(3) * Physical Oceanography(3) *
EDUCATION		Curriculum Design in Earth Sciences(3) *
101-2 (2013 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Active Galaxies(3)* Radio Astronomy(3) * ***High Energy Astrophysics(3)#*** ***Introduction to Modern Cosmology(3)#***
ATMOSPHERIC SCIENCES		Meteorological Statistics(3)* Advanced Synoptic Meteorology(3)# Topics in Monsoon Dynamics(3)#
GEOLOGY		Advanced Field Geological Techniques(3) * Field Geology(including Lab.)(3) * ***Geochemistry(3)*** * Petrology(including Lab.)(3) *

		Stable Isotope Geology(3) * Regional Geology(3)#
GEOPHYSICS		Earthquakes of the Week(3) * Geophysical Methods(3) * Paleomagnetism(3) * Seismic Stratigraphy(2)# Seismic Stratigraphy Laboratory(1)#
OCEANOGRAPHY		Satellite Remote Data Analysis (I) (3)# Applied Numerical Methods in Oceanography (3)#
102-1 (2013 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Advanced Astrophysics(3)# Advanced Astronomical Observations(3)# Interstellar Medium(3)# ***Tools for Modern Astronomy(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Synoptic Meteorology(3)* Meso-scale Meteorology# Advanced Dynamic Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Topics in Numerical Weather Prediction(3)#
GEOLOGY		Mineralogy(including Lab.)(3)* Structural Geology(including Lab.)(3)* ***Continent and Supercontinent Evolution(3)**** ***Geo-technical Writing(3)#*** ***Micro-Structural Geology(3)#*** Advanced Geothermics(3)#
GEOPHYSICS		***Earth Science Data Processing(3)**** Engineering Geophysics(3)#
OCEANOGRAPHY		Ocean Circulation(3)* Numerical Ocean Circulation Modeling (3)#
102-2 (2014 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1)	NA
ATMOSPHERIC SCIENCES	Seminar(IV)(1)	Meteorological Statistics(3)* Tropical Meteorology(3)* Boundary Layer Meteorology(3)
GEOLOGY		Field Geology(including Lab.)(3)* ***Geochemistry(3)**** Geological Survey(3)* Petrology(including Lab.)(3)* Sedimentology and Stratigraphy(3)* Petrographic Methods(3)# Strain Analysis(3)# ***Stress Regimes in Lithosphere(3)#***
GEOPHYSICS		Earthquakes of the Week(3)* Paleomagnetism(3)*

		Seismotectonics(3)* Inverse Theory(3)#
OCEANOGRAPHY		Innovation Trends in Oceanography(3)* Satellite Remote Data Analysis (I)(3)# Climatic and Oceanic Variability(3)#
EDUCATION		Historical Perspectives on Science Development(3)*
103-1 (2014 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Open Cluster(3) Advanced Astrophysics(3)# Advanced Astronomical Observations(3)# ***Interstellar Medium(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Numerical Weather Prediction(3)* Synoptic Meteorology(3)* Climate Change(3)# Research Methodologies in Atmospheric Sciences(3)#
GEOLOGY		Geodynamics(3)* ***Planetary Geology(3)**** Stable Isotope Geology(3)* Structural Geology(including Lab.)(3)* Advanced Marine Geology(3)# Core-Log Integration(3)# Earth Sciences and Archaeology(3)#
GEOPHYSICS		Sesimomagnetism(II)(3)#
OCEANOGRAPHY		Introduction to Marine Chemistry(3)* Introduction to Marine Physics(3)* Applied Numerical Methods in Oceanography (3)#
103-2 (2015 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Active Galaxies(3)* Radio Astronomy(3)* ***High Energy Astrophysics(3)#***
ATMOSPHERIC SCIENCES		Atmospheric Dynamics(II)(3)* Meteorological Statistics(3)* Tropical Meteorology(3)* Advanced Synoptic Meteorology(3)# Topics in Meteorological Phenomena in Eastern Asia(3)#
GEOLOGY		Advanced Field Geological Techniques(3)* Paleomagnetism(3)* Petrology(including Lab.)(3)* Petrographic Methods(3)# Regional Geology(3)# Stress Regimes in Lithosphere(3)#
GEOPHYSICS		Advanced Geophysics (3)# Theoretical Geophysics (3)#
OCEANOGRAPHY		Satellite Remote Data Analysis (I) (3)#

EDUCATION		Historical Perspectives on Science Development(3)* Cognition and Instruction(3)#
104-1 (2015 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	The structure and Kinematics of the Galaxy(3) Advanced Astrophysics(3)# AdvancedAstronomical Observations(3)# ***Interstellar Medium(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Synoptic Meteorology(3)* Meso-scale Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Statistical Analysis in Climate Research(3)# Topics in Monsoon Dynamics(3)# Topics in Numerical Weather Prediction(3)#
GEOLOGY		***Geochemistry(3)**** ***Stable Isotope Geology(3)**** Structural Geology(including Lab.)(3)*
GEOPHYSICS		Engineering Geophysics(3)#
OCEANOGRAPHY		Introduction to Marine Chemistry(3)* Introduction to Marine Physics(3)* Marine Environmental Education (3)# Ocean Dynamics (3)#
104-2 (2016 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Radio Astronomy(3)* ***Tools for Modern Astronomy(3)#***
ATMOSPHERIC SCIENCES		Atmospheric Dynamics(II)(3)* Meteorological Statistics(3)* Advanced Synoptic Meteorology(3)# Geophysical Fluid Dynamics(3)#
GEOLOGY		***Continent and Supercontinent Evolution(3)**** Field Geology(including Lab.)(3)*、 ***Geological Survey(3)**** ***Stress Regimes in Lithosphere(3)#***
GEOPHYSICS		Earthquakes of the Week(3)* Paleomagnetism(3)* Seismotectonics(3)* Time Series Analysis (3)#
OCEANOGRAPHY		Ocean Circulation(3)* Applied Numerical Methods in Oceanography (3)# Climatic and Oceanic Variability (3)#
EDUCATION		Historical Perspectives on Science Development(3)*
105-1 (2016 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Active Galaxies(3)* Advanced Astrophysics(3)# Advanced Astronomical Observations(3)# ***Interstellar Medium(3)#***

ATMOSPHERIC SCIENCES		Climatology(3)* Numerical Weather Prediction(3)* Synoptic Meteorology(3)* Meso-scale Meteorology(3)# Geophysical Fluid Dynamics(3)#
GEOLOGY		***Economic Geology(3)**** Petrology(including Lab.)(3)* ***Stable Isotope Geology(3)**** ***Core-Log Integration(3)#*** Earth Sciences and Archaeology(3)# ***Micro-Structural Geology(3)#***
GEOPHYSICS		Topics on Seismology (3)#
OCEANOGRAPHY		Introduction to Marine Chemistry(3)* Introduction to Marine Physics(3)* Numerical Ocean Circulation Modeling(3)# Satellite Remote Data Analysis (I)#
EDUCATION		Historical Perspectives on Science Development(3)*
105-2 (2017 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Active Galaxies(3)* ***Molecular Astrophysics(3)***
ATMOSPHERIC SCIENCES		Atmospheric Dynamics (II)(3)* Tropical Meteorology(3)* Advanced Synoptic Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Statistical Analysis in Climate Research(3)# Boundary Layer Meteorology(3)
GEOLOGY		***Advanced Field Geological Techniques(3)**** Geology of Taiwan(3)* Mineralogy (including Lab.)(3)* ***Geo-technical Writing(3)#*** ***Stress Regimes in Lithosphere(3)#***
GEOPHYSICS		Earthquakes of the Week(3)* Seismotectonics(3)* Advanced Geophysics(3)#
OCEANOGRAPHY		Ocean Dynamics(3)* Satellite Oceanography(3)* Satellite Remote Data Analysis(I)(3)#
106-1 (2017 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	***Advanced Astronomical Observations(3)#*** ***Advanced Astrophysics(3)#***
ATMOSPHERIC SCIENCES		Synoptic Meteorology(3)* Geophysical Fluid Dynamics(3)# Meso-scale Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Topics in Numerical Weather Prediction(3)#

GEOLOGY		***Geochemistry(3)**** Petrology(including Lab.)(3)* ***Stable Isotope Geology(3)*** * Structural Geology(including Lab.)(3)*
GEOPHYSICS		Theoretical Geophysics(3)#
OCEANOGRAPHY		Innovation Trends in Oceanography(3)* Introduction to Marine Physics(3)* Marine Environmental Education(3)#
EDUCATION		Cognition and Instruction(3)#
106-2 (2018 Spring)	**Required**	**Selected**
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	***Radio Astronomy(3)**** ***Intergalactic Medium(3)#***
ATMOSPHERIC SCIENCES		Atmospheric Dynamics(II)(3)* Climatology(3)* Meteorological Statistics(3)* ***Advanced Synoptic Meteorology(3)#*** Climate Change(3)#
GEOLOGY		Field Geology(including Lab.)(3)* Geological Survey(3)* Geology of Taiwan(3)* Mineralogy(including Lab.)(3)* Paleontology(including Lab.)(3)*
GEOPHYSICS		Paleomagnetism(3)* Seismotectonics(3)*
OCEANOGRAPHY		Satellite Remote Data Analysis (I)(3)#
INTEGRATED		Earth System and Comparative Planetology(3)*
107-1 (2018 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Advanced Astrophysics(3)# ***Advanced Astronomical Observations(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Numerical Weather Prediction(3)* Synoptic Meteorology(3)* ***Geophysical Fluid Dynamics(3)#*** Simulation and Diagnosis of Mesoscale Weathers(2)# ***Statistical Analysis in Climate Research(3)#***
GEOLOGY		Petrology(including Lab.)(3)* ***Planetary Geology(3)**** ***Stable Isotope Geology(3)**** Structural Geology(including Lab.)(3)* ***Core-Log Integration(3)#*** Earth Sciences and Archaeology(3)#
GEOPHYSICS		Earthquakes of the Week(3)*
OCEANOGRAPHY		Ocean Circulation(3)* Introduction to Marine Physics(3)* Marine Environmental Education(3)#
INTEGRATED		Scientific Field Expeditions of Earth Systems(3)*

107-2 (2019 Spring)	Required	Selected
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Active Galaxies(3)* ***Radio Astronomy(3)**** ***Interstellar Medium(3)#***
ATMOSPHERIC SCIENCES		Tropical Meteorology(3)* Atmospheric Dynamics (II)(3)* Advanced Synoptic Meteorology(3)* ***Research Methodologies in Atmospheric Sciences(3)#***
GEOLOGY		Petrology (including Lab.)(3)* Geodynamics(3)* Field Geology(including Lab.)(3)* Advanced Field Geological Techniques(3)* Sedimentology and Stratigraphy(3)* ***Continent and Supercontinent Evolution(3)**** Principle of Geotechnical Engineering(3)* Geology of Taiwan(3)* ***Stress Regimes in Lithosphere(3)#***
GEOPHYSICS		Topics in Geophysics(3)* Physics and Chemistry of the Earth's Interior(3)* Seismotectonics(3)*
OCEANOGRAPHY		Water Wave Theory(3)* Satellite Remote Data Analysis (I)(3)#
INTEGRATED		Earth System and Comparative Planetology(3)*
108-1 (2019 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	***Advanced Astrophysics(3)#*** ***Advanced Astronomical Observations(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Synoptic Meteorology(3)* Topics in Meteorological Phenomena in Eastern Asia(3)# Geophysical Fluid Dynamics(3)# Research Methodologies in Atmospheric Sciences(3)#
GEOLOGY		***Geochemistry(3)**** Mineralogy (including Lab.)(3)* Structural Geology(including Lab.)(3)* Introduction to Petroleum Geology (3)* ***Core-Log Integration(3)#***
GEOPHYSICS		Earth Science Data Processing(3)* Earthquakes of the Week(3)* ***Theoretical Geophysics(3)#***
OCEANOGRAPHY		Ocean Circulation(3)* Introduction to Marine Physics(3)* Innovation Trends in Oceanography(3)* Marine Environmental Education(3)#
INTEGRATED		Earth Science Practicum(II)(3)*
108-2	**Required**	**Selected**

(2020 Spring)		
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Intergalactic Medium (3)# ***Open Cluster (3)***
ATMOSPHERIC SCIENCES		Advanced Synoptic Meteorology(3)# Climate Change(3)# Meteorological Statistics(3)* Atmospheric Dynamics (II) (3)*
GEOLOGY		Stable Isotope Geology(3)* Petrology (including Lab.) (3)* Field Geology (including Lab.) (3)* Geology of Taiwan(3)* Principle of Geotechnical Engineering(3)* ***Economic Geology(3)****
GEOPHYSICS		Seismotectonics(3)* Paleomagnetism(3)* Geophysical Planetary Exploration(3)*
OCEANOGRAPHY		Water Wave Theory(3)* Satellite Remote Data Analysis (I)(3)#
INTEGRATED		Earth System and Comparative Planetology(3)*
109-1 (2020 Fall)	**Required**	**Selected**
ASTRONOMY	***Seminar(I)(1)*** ***Seminar(III)(1)***	Advanced Astronomical Observations(3)# Advanced Astrophysics(3)# High Energy Astrophysics(3)# Radio Astronomy(3)* ***Statistics for Astronomy(3)#***
ATMOSPHERIC SCIENCES		Climatology(3)* Geophysical Fluid Dynamics(3)# Synoptic Meteorology(3)* Statistical Analysis in Climate Research(3)# Research Methodologies in Atmospheric Sciences(3)#
GEOLOGY		***Advanced Igneous Petrology(3)#*** ***Geochemistry (3)**** Introduction to Petroleum Geology(3)* ***Micro-Structural Geology(3)#*** Mineralogy (including Lab.)* Sedimentology and Stratigraphy(3)* Structural Geology (including Lab.) (3)*
GEOPHYSICS		Earthquakes of the Week(3)* Earth Science Data Processing(3)* The Dynamics of Fault Zone(3)#
OCEANOGRAPHY		Innovation Trends in Oceanography(3)* Introduction to Marine Physics(3)* Marine Environmental Education(3)# Ocean Circulation(3)*
INTEGRATED		Earth Science Practicum (II) (3)* Introduction to Marine Geology(3)* Scientific Field Expeditions of Earth Systems) (3)*

109-2 (2021 Spring)	Required	Selected
ASTRONOMY	Seminar(II)(1) Seminar(IV)(1)	Active Galaxies(3)*
ATMOSPHERIC SCIENCES		Atmospheric Dynamics (II)(3)*
GEOLOGY		***Continent and Supercontinent Evolution(3)**** Earth Science Aspects of Renewable Energy(3)* ***Field Geology (including Lab.)(3)**** ***Geodynamics(3)**** Geology of Taiwan(3)* Petroleum Geochemistry(3)* Petrology (including Lab.)(3)* Principle of Geotechnical Engineering(3)* ***Regional Geology(3)**** ***Strain Analysis(3)#***
GEOPHYSICS		Geophysical Planetary Exploration(3)* Physics and Chemistry of the Earth's Interior(3)* Topics on Seismology(3)#
OCEANOGRAPHY		Satellite Data Analysis Techniques Applied to Oceanography(3)* Tropical Meteorology(3)*
INTEGRATED		Earth System and Comparative Planetology(3)*
110-1 (2021 Fall)	**Required**	**Selected**
ASTRONOMY	Seminar(I)(1) Seminar(III)(1)	Advanced Astronomical Observations(3)# Advanced Astrophysics (3)# Radio Astronomy(3)*
ATMOSPHERIC SCIENCES		Advanced Synoptic Meteorology(3)# Fluid Climatology(3)* Geophysical Fluid Dynamics(3)# Meso-scale Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)#
GEOLOGY		***Advanced Structural Geology(3)#**** ***Core-Log Integration(3)#**** ***Geochemistry(3)**** Introduction to Petroleum Geology(3)* Mineralogy (including Lab.)(3)* **Quaternary Geology and Environmental Changes(3)#** Structural Geology (including Lab.)(3)* ***Sequence Stratigraphy(3)#***
GEOPHYSICS		Earthquakes of the Week(3)* Earth Science Data Processing(3)* **Theoretical Geophysics(3)#** Time Series Analysis(3)*
OCEANOGRAPHY		Introduction to Marine Physics(3)* Innovation Trends in Oceanography(3)* Marine Environmental Education(3)#

		Marine Resources and Sustainable Development(3)* Ocean Circulation(3)*
INTEGRATED		NA
110-2 (2022 Spring)	**Required**	**Selected**
ASTRONOMY	***Seminar(II)(1)*** ***Seminar(IV)(1)***	
ATMOSPHERIC SCIENCES		Meteorological Statistics(3)* Planetary Geology(3)* Atmospheric Dynamics (II)(3)* Statistical Analysis in Climate Research(3)# ***Climate Change(3)#***
GEOLOGY		***Stable Isotope Geology(3)**** Petrology (including Lab.)(3)* Field Geology (including Lab.)(3)* ***Planetary Geology(3)**** Sedimentology and Stratigraphy(3)* Geological Survey(3)* Geology of Taiwan(3)* Principle of Geotechnical Engineering(3)* Petroleum Geochemistry(3)* Earth Science Aspects of Renewable Energy(2)* ***Geo-technical Writing(3)#*** ***Stress Regimes in Lithosphere(3)#***
GEOPHYSICS		Geophysical Planetary Exploration(3)*
OCEANOGRAPHY		Satellite Data Analysis Techniques Applied to Oceanography(3)*
INTEGRATED		Introduction to Marine Geology(3)* Earth System and Comparative Planetology(3)* Inquiry and Practical Work in Science(2)*
111-1 (2022 Fall)	**Required**	**Selected**
ASTRONOMY	***Seminar(I)(1)*** ***Seminar(III)(1)***	Radio Astronomy(3)* Advanced Astrophysics(3)# Advanced Astronomical Observations(3)#
ATMOSPHERIC SCIENCES		Numerical Weather Prediction(3)* Synoptic Meteorology(3)* Meso-scale Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Geophysical Fluid Dynamics(3)# Special Topic on Mei-Yu in Taiwan(2)#
GEOLOGY		Geodynamics(3)* Mineralogy (including Lab.)(3)* Structural Geology (including Lab.)(3)* Introduction to Petroleum Geology(3)* Petrographic Methods(3)# Earth Sciences and Archaeology(3)# ***Core-Log Integration(3)#***

GEOPHYSICS		Time Series Analysis(3)* Earth Science Data Processing(3)* ***Earthquakes of the Week(3)****
OCEANOGRAPHY		Innovation Trends in Oceanography(3)* Introduction to Marine Physics(3)* Marine Resources and Sustainable Development(3)* Marine Environmental Education(3)#
INTEGRATED		Earth Science Practicum (II)(3)* Earth System Sciences and Disaster Risk Assessment(3)*
111-2 (2023 Spring)	**Required**	**Selected**
ASTRONOMY	***Seminar(II)(1)*** ***Seminar(IV)(1)***	Active Galaxies(3)*
ATMOSPHERIC SCIENCES		***Advanced Synoptic Meteorology(3)#*** Boundary Layer Meteorology(3) Atmospheric Dynamics (II)(3)* Climate Change Science and Practical Data Analysis (3)*
GEOLOGY		***Stress Regimes in Lithosphere(3)#*** Petrology (including Lab.)(3)* Field Geology (including Lab.)(3)* Advanced Field Geological Techniques(3)* Sedimentology and Stratigraphy(3)* ***Continent and Supercontinent Evolution(3)**** Geology of Taiwan(3)* Volcanology and Volcanic Hazards (Including Lab.) (3)* Principle of Geotechnical Engineering(3)* Petroleum Geochemistry(3)* Earth Science Aspects of Renewable Energy(2)*
GEOPHYSICS		***Theoretical Geophysics(3)#*** Physics and Chemistry of the Earth`s Interior(3)*
OCEANOGRAPHY		***Introductory Marine Biology(3)****
INTEGRATED COURSE		Earth System and Comparative Planetology(3)* Scientific Field Expeditions of Earth Systems(3)* Inquiry and Practical Work in Science(2)*
112-1 (2023 Fall)	**Required**	**Selected**
ASTRONOMY	***Seminar(I)(1)*** ***Seminar(III)(1)***	Radio Astronomy(3)* Advanced Astrophysics(3)# Advanced Astronomical Observations(3)# Bioastronomy(3)#
ATMOSPHERIC SCIENCES		Synoptic Meteorology(3)* Climatology(3)* Meso-scale Meteorology(3)# Research Methodologies in Atmospheric Sciences(3)# Topics in Meteorological Phenomena in Eastern Asia(3)#

GEOLOGY		***Geochemistry(3)**** Geological Survey(3)* Introduction to Petroleum Geology(3)* Mineralogy (including Lab.)(3)* Structural Geology (including Lab.)(3)* Advanced Igneous Petrology(3)#
GEOPHYSICS		Earth Science Data Processing(3)* Time Series Analysis(3)*
OCEANOGRAPHY		Innovation Trends in Oceanography(3)* Introduction to Marine Chemistry(3)* ***Introduction to Marine Geology(3)**** Introduction to Marine Physics(3)* Marine Resources and Sustainable Development(3)* Marine Environmental Education(3)#
INTEGRATED		Earth Science Practicum (II)(3)*