

PHYSICAL OCEANOGRAPHY

MIT-WHOI Joint Program in Oceanography/Applied Ocean Science and Engineering (<https://catalog.mit.edu/interdisciplinary/graduate-programs/joint-program-woods-hole-oceanographic-institution>)

Doctor of Philosophy in Physical Oceanography

Core Coursework

12.800	Fluid Dynamics of the Atmosphere and Ocean	12
12.808	Introduction to Observational Physical Oceanography	12

Area-Specific Core Coursework **24-33**

Complete one area:

General Physical Oceanography

12.801	Large-scale Ocean Dynamics
12.802	Waves, Instability and Turbulence at Small Scales

Physical Oceanography and Climate

12.801	Large-scale Ocean Dynamics
12.812	The General Circulation of the Atmosphere and Climate Change

Physical-Biological-Chemical Interactions

7.470	Biological Oceanography
12.742	Marine Chemistry

Coastal/Nearshore Physical Oceanography and Engineering

1.69	Introduction to Coastal Engineering
12.802	Waves, Instability and Turbulence at Small Scales
12.862	Coastal Physical Oceanography

Applied Mathematics and Data Analysis Techniques ¹ **12**

Select one of the following:

12.805	Data Analysis in Physical Oceanography
18.075	Methods for Scientists and Engineers
18.085	Computational Science and Engineering I
18.086	Computational Science and Engineering II
18.305	Advanced Analytic Methods in Science and Engineering
18.306	Advanced Partial Differential Equations with Applications

Restricted Electives ² **48-84**

Thesis **327-372**

12.THG Graduate Thesis

Total Units

435-525

Note: Students in this program can choose to receive the Doctor of Philosophy or the Doctor of Science in Physical Oceanography. Students receiving veterans benefits must select the degree they wish to receive prior to program certification with the Veterans Administration.

¹ Additional units may be taken as electives.

² See list below.

Restricted Electives

Select 4–7 subjects in chosen or complementary area of focus:

General Physical Oceanography

12.701	Classic Papers in Physical Oceanography
12.805	Data Analysis in Physical Oceanography
12.809	Hydraulic Phenomena in Geophysical Fluid Flows
12.820	Turbulence in the Ocean and Atmosphere
12.824	Stability Theory for Oceanic & Atmospheric Flows
12.843	Large-scale Atmosphere and Ocean Dynamics
12.850	Computational Ocean Modeling
12.853	Advanced geophysical fluid dynamics
12.862	Coastal Physical Oceanography
12.870	Air-Sea Interaction: Boundary Layers

Physical Oceanography and Climate ¹

12.707	The History of Earth's Climate
12.708	Topics in Paleoclimatology
12.740	Paleoclimatology
12.757	
12.802	Waves, Instability and Turbulence at Small Scales
12.842	Climate Science
12.860	Climate Variability and Diagnostics
12.885[J]	Science, Politics, and Environmental Policy

Physical-Bio-Chemical Interactions

1.073	Introduction to Environmental Data Analysis
2.29	Numerical Fluid Mechanics
7.410	Applied Statistics
7.430	Topics in Quantitative Marine Science

7.431	Topics in Marine Ecology
7.434	Topics in Zooplankton Biology
7.435	Topics in Benthic Biology
7.436	Topics in Phytoplankton Biology
7.437	Topics in Molecular Biological Oceanography
7.439	Topics in Marine Microbiology
7.440	An Introduction to Mathematical Ecology
12.702	Elements of Modern Oceanography
12.714	Computational Data Analysis
12.746	Marine Organic Geochemistry
12.802	Waves, Instability and Turbulence at Small Scales
12.805	Data Analysis in Physical Oceanography
12.823	Modeling the Biology and Physics of the Ocean

Coastal/Nearshore Physical Oceanography and Engineering

1.72	Groundwater Hydrology
2.29	Numerical Fluid Mechanics
12.754	
12.805	Data Analysis in Physical Oceanography
12.820	Turbulence in the Ocean and Atmosphere
12.850	Computational Ocean Modeling

¹ *Harvard subjects EPS 208 Physics of Climate and EPS 231 Climate Dynamics can also be used to fulfill this area requirement.*