PHYSICAL OCEANOGRAPHY

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

Doctor of Philosophy in Physical Oceanography

Core Coursew	ork	
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	e area:	
General Phys	ical Oceanography	
12.801	Large-scale Ocean Dynamics	
12.802	Waves, Instability and Turbulence at Small Scales	
Physical Ocea	anography and Climate	
12.801	Large-scale Ocean Dynamics	
12.812	The General Circulation of the Atmosphere and Climate Change	
Physical-Biol	ogical-Chemical Interactions	
7.470	Biological Oceanography	
12.742	Marine Chemistry	
Coastal/Near Engineering	shore Physical Oceanography and	
1.69	Introduction to Coastal Engineering	
12.802	Waves, Instability and Turbulence at Small Scales	
12.862	Coastal Physical Oceanography	
Applied Math	ematics 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 Ele	ectives 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.

- Additional units may be taken as electives.
- See list below.

Restricted Electives

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

General Physical Oceanography

General i nysica	Coccanography	
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 Paleoceanography	
12.740	Paleoceanography	
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

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