UNIVERSITY OF GOTHENBURG

DEPARTMENT OF MARINE SCIENCES

OCM103 Introduction to Physical Oceanography, 4 credits

Introduktion till fysisk oceanografi, 4 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Marine Sciences on 2020-06-17 to be valid from 2020-08-31, autumn semester of 2020.

Field of education: Science 100%
Department: Department of Marine Sciences

Position in the educational system

The course is an introduction to Physical Oceanography, for students with a background in calculus, physics and preferably notions in fluid dynamics. The course is given as part of the program *Civil engineers in marine techniques*, but can also be taken as a stand-alone course.

The course can be part of the following programmes: 1) Master's Programme in Physical Oceanography (N2FOC), 2) Marine Science, Bachelor's Programme (N1MAV) and 3) Marine Science, Master's Programme (N2MAV)

Main field of studies	*Specialization*
Physical Oceanography	A1N, Second cycle, has only first-cycle course/s as entry requirements
Marine Sciences	A1N, Second cycle, has only first-cycle course/s as entry requirements
Oceanography	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

For admission to the course, 120 credits of completed courses within natural sciences are required, including 15 credits in mathematics (analysis and linear algebra), 15hp in physics (mechanics, thermodynamic) and Basics of Fluid Mechanics 7.5 credits or

equivalent.

Learning outcomes

Upon completion of the course, the student is expected to be able to:

Knowledge and understanding

- Describe how the physical properties of seawater influence oceanic flows
- Describe the large-scale leading-order physical balance for a stratified rotating fluid: Geostrophic and thermal wind balance
- Describe the main dynamical balance for frictional boundary layers
- Describe the driving mechanisms of the wind-driven circulation in the sea and be able to describe some idealized models for ocean circulation

Competence and skills

- Know the definition and relevance of the most important physical properties of seawater
- Perform mathematical derivations and make calculations for some idealized flow cases
- Derive the main characteristics of wind-driven flows in the ocean

Judgement and approach

- Know how to apply fundamental principles of physics and mathematics to develop a quantitative understanding of ocean dynamics
- Understand standard simplifications and common limitations that are often associated to studies of ocean processes
- Apply and manipulate simple theories of the large-scale ocean circulation

Course content

The course provides a basic introduction to the principles that govern the large-scale flow in the oceans. A major emphasis is on describing various physical phenomena using quantitative mathematical tools.

The course deals with the following elements: Basic properties of a fluid and stratification effects, the derivation of simplified sets of equation describing large-scale oceanic flows, and the description of geostrophic flows, thermal wind, frictional effects, and basic theory of wind-driven ocean gyres.

Form of teaching
Teaching is given mainly in the form of lectures and calculation exercises.

Language of instruction: English

Assessment
4 credits: Written exam, U / G / VG

For students who have not been approved at regular examinations, additional examination opportunities are offered. The possibilities of retaking examinations are limited and decided in consultation with the course leader.

If a student who has failed twice at the same examination wishes to change the examiner before the next examination opportunity, he/she must submit a request to the department responsible for the course that should be approved if there are no special reasons on the other hand (HF 6 § 22).

If a student has a recommendation from the University of Gothenburg regarding special educational support, the examiner (in case it is compatible with the course's objectives and if not unreasonable resources are required) can decide to give the student an alternative examination form.

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year, but maximum two years from the last time the course was given.

Grades
The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
For grades G on the course, 55% is required for the exam. For grades VG on the course, 80% is required for the exam.

Regarding the application of the ECTS scale for grades, see Rector's decision 2007-05-28, ref. G 8 1976/07 and 2011-02-28, dnr O 2009/5545.

Course evaluation
A written evaluation is done at the end of the course. In the written evaluation, the student is anonymous. The results and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.