ENV-407

Atmospheric processes: from cloud to global scales

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Cursus	Sem.	Type
Environmental Sciences and Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	**5 weekly**
Courses	2 weekly
Exercises	2 weekly
Project	1 weekly
Number of positions	

Summary

The main objective is to present important atmospheric processes from the local to global scales. The course will start with cloud processes, continue to synoptic phenomena like extratropical cyclones and fronts, to finally cover numerical modeling at the regional and global scales.

Content

- Recap on atmospheric thermodynamics, stability, boundary layer.
- Convection: strato-cumulus to cumulus.
- Cloud formation and microphysics.
- Extratropical cyclones.
- Numerical modeling.
- Mountain meteorology.
- Tropical cyclones.
- Aerosol-cloud-climate interactions

Keywords

cloud processes, global circulation, synoptic meteorology, instrumentation, numerical modeling, extratropical and tropical cyclones, fronts, jet stream.

Learning Prerequisites

Recommended courses

Physics and chemistry of the atmosphere (ENG-320)
Fluid Mechanics (ENG-272)

Learning Outcomes

By the end of the course, the student must be able to:

- Describe the important atmospheric processes
- Differentiate the dominant ones
- Interpret atmospheric observations
- Analyze typcal meteorological situations

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Communicate effectively with professionals from other disciplines.
- Keep appropriate documentation for group meetings.
- Demonstrate the capacity for critical thinking
- Manage priorities.
- Write a scientific or technical report.

Teaching methods

Ex-cathedra lectures, exercices session and a 4-week mini project

Assessment methods

The final grade will be based on the evaluation of the report from the project (30%) and a written exam during the exam session (70%).

Resources

Moodle Link

- https://go.epfl.ch/ENV-407