Syllabus

THERMODYNAMICS OF THE ATMOSPHERE - 82314

Last update 20-12-2013

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Atmospheric Sciences

Academic year: 2

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Carynelisa Haspel

Coordinator Email: caryn@vms.huji.ac.il

Coordinator Office Hours: by request

Teaching Staff:
Prof Carynelisa Haspel
Yael Amitai
**Course/Module description:**
This course covers the basic concepts of thermodynamics in general and all of the detailed concepts of atmospheric thermodynamics.

**Course/Module aims:**
This course aims to provide students all of the information related to atmospheric thermodynamics that they will need in continuing courses towards a degree in atmospheric sciences.

**Learning outcomes - On successful completion of this module, students should be able to:**
1. Describe the phases of matter (gas, liquid, and solid) microscopically and macroscopically.
2. Define internal energy.
3. Write the ideal gas law for a single gas and a mixture of gases.
4. Explain why atmospheric pressure and density decrease with altitude.
5. Explain the terms in the total energy balance equation, in Bernoulli's equation, and in the 1st law of thermodynamics.
6. Explain why the temperature of a rising parcel of air decreases and at what rate.
7. Describe under what conditions a parcel of air reaches saturation with respect to liquid water.
8. Explain vertical convection and cloud formation.

**Attendance requirements(%):**
none

**Teaching arrangement and method of instruction:** Three weekly hours of frontal lecture in which the lecturer explains, writes on the board, and presents questions to the class and opens debates, plus one weekly hour of recitation with powerpoint presentations, extra material, and hints and help on homework questions.

**Course/Module Content:**
Topics:
1. thermodynamics - why and what

2. the ideal gas law

3. the atmosphere as a mixture of gases

4. pressure, density, and temperature as a function of altitude

5. energy, work, and heating

6. adiabatic processes

7. water vapor

8. static stability

9. entropy

Required Reading:
the lecturer's notes

Additional Reading Material:


**Course/Module evaluation:**
- End of year written/oral examination 80 \%
- Presentation 0 \%
- Participation in Tutorials 0 \%
- Project work 0 \%
- Assignments 20 \%
- Reports 0 \%
- Research project 0 \%
- Quizzes 0 \%
- Other 0 \%

**Additional information:**
- none