האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

DYNAMIC METEOROLOGY - 82301

Last update 27-10-2019

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Atmospheric Sciences

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Ori Adam

Coordinator Email: ori.adam@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Dr. Uri Adam,
Mr. Itamar Yacoby

Course/Module description:

The course the foundation for a number of courses in atmospheric sciences that are taught in the following semesters. In addition, the course is open to students of the Faculty of Sciences from other disciplines (geology, environmental sciences, physics) who are interested in gaining basic knowledge of the dynamics involved in the motion of air in the atmosphere

Course/Module aims:

1. Understanding the physical basis for the dynamics of air in Earth's atmosphere.
2. Understanding the interaction between the various controls of air flow in the atmosphere.
3. Identification of conditions in which there is a single controlling mechanism.
4. Basic understanding of simple time-dependent motion

Learning outcomes - On successful completion of this module, students should be able to:

Understand and analyze typical synoptic states and be able to calculate winds from observed pressure maps

Attendance requirements(%):

80

Teaching arrangement and method of instruction: frontal lectures
homework assignments

Course/Module Content:

1. Newton's laws of motion in a rotating system
2. Eulerian and Lagrangian time derivatives
3. separation between the vertical direction where the hydrostatic balance dominates and the horizontal direction where the geosptrophic balance is the dominant balance
4. Continuity equation and the assumption of incompressibility.
5. Natural coordinates and the gradient wind
6. The thermal wind
7. Inertial motion on the spherical earth
8. Application of the a-geostrophic wind to straight and curved jet streams
9. Definition of vorticity and circulation and derivation of the vorticity equation

10. application of the vorticity equation and the dispersion relation of non-divergent Rossby waves
11. The Shallow Water equations and the dispersion relation of kelvin waves, Rossby waves and Poincare waves.
12. Dynamical instability

Required Reading:
Holton, J. (1992). Introduction to Dynamical Meteorology.
Martin, J. E. (2006). Mid-Latitude Atmospheric Dynamics.

Additional Reading Material:
Gill, A. (1981). Ocean-Atmospheres Dynamics.
Pedlosky, J. (1979). Geophysical Fluid Dynamics

Course/Module evaluation:
End of year written/oral examination 90 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 10 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:
The final exam counts for 90% of the final grade. The HW counts for 10% of the final grade. Submission of all HW assignments is required. The HW with the lowest grade will be omitted from the final calculation of the HW assignments.