The Hebrew University of Jerusalem

Syllabus

Weather systems of the mid-latitudes - 82304

Last update 21-09-2023

HU Credits: 5

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Atmospheric Sciences

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Prof. Chaim Garfinkel

Coordinator Email: chaim.garfinkel@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof Chaim Garfinkel,
Mr. benjamin Keller

Course/Module description:
Application of the principles of the dynamics of the atmospheric flow for understanding the structure and evolution of mid-latitude weather systems and their related weather, and application to understanding the local weather and its prediction.

Course/Module aims:
Understanding of synoptic maps, weather systems and their prediction, and the principles of forecasting.

Learning outcomes - On successful completion of this module, students should be able to:
Understanding of synoptic maps, weather systems and their prediction, and the principles of forecasting.

Attendance requirements(%):
100%

Teaching arrangement and method of instruction: Frontal lectures and exercises

Course/Module Content:
1. Definition of weather systems; The differences between weather and climate systems.

2. The parameters that define weather; their regular measurements; the global synoptic network and its organization:
a. Surface measurements and their organization in a synoptic map.
b. Upper air measurements and their plotting.

3. review of primitive equations, gradient wind; geostrophic wind; hydrostatic equation; change of coordinates from pressure to geopotential maps; thermal wind

5. Derivation of QG Equations

6. Diagnosing the ageostrophic wind

7. Diagnosing vertical wind; applications to jet streak; baroclinic wave

8. Lifecycle and 3D structre of cyclones;
The classical Norwegian theory versus more recent theories; structure of decaying and growing cyclones

9. Fronts: The thermal structure of fronts and the wind field. Margulis equation. Ageostrophic feedbacks

10. Typical synoptic situations to Israel; analyzed case studies, using surface and upper air maps, along with satellite imagery. The systems are:
a. Cyprus llow
b. Siberian high
c. Warm high
d. Sharav low
e. Red Sea trough
f. Persian trough

11. Rossby waves: dispersion relation, downstream development

12. Potential vorticity

Required Reading:
None

Additional Reading Material:
1.Mid-Latitude Atmospheric Dynamics: A First Course
Jonathan E. Martin

2.Midlatitude Synoptic Meteorology: Dynamics, Analysis, and Forecasting
Gary Lackmann

Grading Scheme:
Written / Oral / Practical Exam 50 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 20 %
Mid-terms exams 15 %
Presentation / Poster Presentation / Lecture 15 %

Additional information:

None