



## *The Hebrew University of Jerusalem*

### *Syllabus*

## *Objective Methods of Data Analysis in the Earth Sciences - 82653*

*Last update 19-11-2018*

*HU Credits: 3*

*Degree/Cycle: 2nd degree (Master)*

*Responsible Department: Atmospheric Sciences*

*Academic year: 0*

*Semester: 2nd Semester*

*Teaching Languages: Hebrew*

*Campus: E. Safra*

*Course/Module Coordinator: Prof. Chaim Garfinkel*

*Coordinator Email: [chaim.garfinkel@mail.huji.ac.il](mailto:chaim.garfinkel@mail.huji.ac.il)*

*Coordinator Office Hours: by appointment*

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Teaching Staff:

Dr. Chaim Garfinkel

Course/Module description:

*This course introduces many of the methods commonly used in the earth sciences to extract information from large datasets using objective, as opposed to subjective, methods. The goals of this course are to provide a working knowledge of the basic methods of objective analysis of meteorological, oceanographic, and related data, and to provide the fundamental knowledge necessary for evaluating published studies utilizing these techniques. After introducing the necessary linear algebra, the course will focus on techniques such as compositing, time series spectral analysis and filtering, singular value decomposition, and principal component analysis. The course will emphasize the practical application of these techniques in Matlab.*

Course/Module aims:

n/a

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

*understand key data analysis techniques widely used in the earth sciences.*

Attendance requirements(%):

100%

*Teaching arrangement and method of instruction: Frontal lectures and exercises*

Course/Module Content:

- 1. Linear algebra - matrix multiplication, eigenvalue problem, matrix decomposition*
- 2. Quick review of probability and statistics*
- 3. compositing*
- 4. Empirical orthogonal decomposition*
- 5. time series analysis - filtering and spectral decomposition*

Required Reading:

*Statistical Analysis in Climate Research, von Storch and Zwiers, 1999, U.Cambridge*

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*Statistical Methods in the Atmospheric Sciences, Daniel S. Wilks, 1995/2005, Academic Press.*

Additional Reading Material:

*If you need more elemental background reading, I recommend the Schaum's outline series books on Linear Algebra, Probability and Statistics and Probability, Random Variables and Random Processes. Each of this is a separate book, and there are three total.*

Course/Module evaluation:

*End of year written/oral examination 50 %*

*Presentation 15 %*

*Participation in Tutorials 0 %*

*Project work 0 %*

*Assignments 35 %*

*Reports 0 %*

*Research project 0 %*

*Quizzes 0 %*

*Other 0 %*

Additional information:

*None*