



Course title: Statistical Methods in Climatology

Form of teaching: lecture – 26 hrs., 3p. ECTS; practices – 52 hrs., 10 p. ECTS, total – 78 hrs., 13p. ECTS

Course completion requirements: lecture – final exam; practices – final test, project evaluation, evaluation of activity

Language of instructions: English

1. Short description, objectives:

Objective of the course is to provide fundamental rules in application of numerical methods and statistical analysis necessary for description of processes and phenomena in meteorology and climatology..

2. Prerequisites:

1. reading and writing in English,
2. basic knowledge in statistics
3. basic knowledge in mathematics

3. Learning outcomes

W03 - possess a knowledge about mathematics necessary for understanding phenomena and processes ongoing in the atmosphere (14K-1A_W03, 14K-1A_W05)

W06 - possess a knowledge about statistics necessary for description and understanding phenomena and processes ongoing in the atmosphere (14K-1A_W07)

W07 - possess a knowledge about basic technics and research tools used in meteorology and climatology (14K-1A_W05, 14K-1A_W07)

U01 – is able to use basic technics and research tools in meteorology and climatology (14K-1A_U01, 14K-1A_U02)

U05 –uses basic statistical technics for description of phenomena and data analysis (14K-1A_U03, 14K-1A_U05)

U07 – is able to formulate justified judgements basing on data from different sources (14K-1A_U07)

K01 – is able to cooperate in the group, taking over different roles (14K-1A_K01; 14K-1A_K02)

K03 – is able to define priorities designed for realisation of specific aim (14K-1A_K05)

4. Course description:

- 1) Basic course in preparing programs: language fundamentals (entering commands, matrices and arrays, operators and elementary operations, special characters, data types), programing scripts and functions, data and file management
- 2) Graphics: two- and three-dimensional plots, data exploration and visualisation techniques, images, printing, graphic objects.
- 3) Elementary mathematic: arithmetic. trygonometry, polinomials, curve fitting.
- 4) Interpolation: Data interpolation, data gridding, polynomial evaluation, nearest point search
- 5) Descriptive statistics: range, moments, correlation
- 6) Distributions: distribution fitting and testing
- 7) Random numbers: seeds, distributions, algorithms
- 8) Linear algebra: matrix operation and analysis, matrix decomposition, eigenvectors and eigenvalues



5. Course evaluation

Final exam (W03, W06, K03) – 30% total score, (Exam can be taken by individuals who have passed practices),
 the finale test for practices (U01, U05, K03) – 30% total score,
 projects evaluation (U01, U05, U07, K01) – 30% total score,
 evaluation of activity (U01, U05, U07, K03) – 10% total score.

6. Teaching methods

Teaching methods: lecture, multimedia presentations, discussion, work with the source material (book, article),
 practical exercises single handed and in the team, auditorium.

7. Recommended reading list

- [1]. Rayner J.N., 1997, Dynamic Climatology, basis in Mathematics and Physics, Blackwell Publishers, p. 279 p.
- [2]. Wilks D.S., 2006, Statistical methods in the atmospheric sciences, Elsevier Academic Press Publications, 649 p.
- [3]. any online tutorial in Fortran and/or MATLAB