



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Multivariate Statistics [S2SI1E>STA]

Course

Field of study

Artificial Intelligence

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

english

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4,00

Coordinators

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Lecturers

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Prerequisites

Probability theory, mathematical statistics, matrix algebra, basic skills in R

Course objective

The aim of the course is to provide students with knowledge of multivariate mathematical statistics, including the theory of estimation and testing hypotheses in multivariate models, principal components analysis, discriminant analysis and classification, and to gain practice in their implementation

Course-related learning outcomes

Knowledge

Student knows advanced methods, techniques and tools used to solve complex engineering tasks and conduct research in the field of artificial intelligence and related fields [K2st_W6]

Skills

Student is able to obtain information from literature, databases and other sources (both in Polish and English), integrate them, interpret and critically evaluate them, draw conclusions and formulate and fully justify opinions [K2st_U1]

Student is able to plan and carry out experiments, including computer measurements and simulations, interpret the obtained results and draw conclusions and formulate and verify hypotheses related to complex engineering problems and simple research problems [K2st_U3]

Student is able to interact in a team, taking various roles in it [K2st_U15]

Social competences

Student understands the importance of using the latest knowledge in the field of computer science and artificial intelligence in solving research and practical problems [K2st_K2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures – exam covering the issues presented in lectures

Laboratory classes – two tests covering the issues presented during labs with the use of computers

Programme content

Lectures + laboratory classes:

1. Matrix algebra - revisited
2. Random vectors and their distributions
3. Basic statistics and multivariate sampling distributions - vector of means, sample covariance matrix, Mahalanobis distance, generalized variance, total variance, Wishart distribution
4. Missing data problem
5. Tests of multivariate normality
6. Tests of expectation and covariance matrix - one and two samples
7. Multivariate linear models - one-way model, multivariate analysis of variance (MANOVA)
8. Multivariate multiple regression
9. Principal component analysis (PCA)
10. Linear discriminant function
11. Classification methods - two or more populations, logistic regression

Teaching methods

Lectures – theory presented in connection with the current knowledge of students, presentation of new topic preceded by a reminder of related content, known to students from other subjects

Laboratory – individual and team programming, computational experiments (using R package)

Bibliography

Basic:

1. Krzyśko, M. (2010). Podstawy wielowymiarowego wnioskowania statystycznego. Wydawnictwo Naukowe UAM w Poznaniu

Additional:

1. Anderson, T.W.(2003). An Introduction to Multivariate Statistical Analysis (3 ed). John Wiley & Sons
2. Rencher, A.C. (2002). Methods of Multivariate Analysis. John Wiley & Sons
3. Hardle, W., Simar, L. (2003). Applied Multivariate Statistical Analysis. Springer
4. Johnson, R.A, Wichern, W.A. (2007). Applied Multivariate Statistical Analysis. Pearson Prentice Hall

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50