

Course description

Course abbreviation:	KIP/7ZMSP	Page:	1 / 3
Course name:	Statistical data processing		
Academic Year:	2019/2020	Printed:	22.08.2019 13:58

Department/Unit /	KIP / 7ZMSP			Academic Year	2019/2020
Title	Statistical data processing			Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.			Type of completion	Written
Number of hours	Přednáška 2 [Hours/Week] Cvičení 2 [Hours/Week]			Course credit prior to	NO
Occ/max	Status A	Status B	Status C	Counted into average	YES
Summer semester	0 / -	0 / -	0 / -	Min. (B+C) students	not determined
Winter semester	0 / 0	0 / 0	0 / 0	Repeated registration	NO
Timetable	Yes			Semester taught	Winter semester
Language of instruction	Czech, English			Internship duration	0
Optional course	Yes				
Evaluation scale	A B C D E F				
Hrs. in comb. stud.					
Auto acc. of credit	No				
Periodicity					
Substituted course	None				
Preclusive courses	N/A				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

Measurement, observation, statistical data. Descriptive and inductive statistic's tasks. Methods of descriptive statistics. Random event, probability, conditional probability. Random variable. Distribution function, probability mass function, probability density function. Characteristics of random variables. Independence of variables. Discrete and continuous distributions: Normal distribution and central limit theorem. Samples and sample distributions. Introduction to statistical estimate and hypothesis testing theory.

Requirements on student

During the semester, the points are made from:

- solving the examples in seminars (up to 10 points).
 - two tests after one and two third of semester (up to 15 points per test).
- Seventy percent presence of seminars for each student is required.

During the final examination student solves examples in writing form, notebook or calculator and materials in paper form are enabled (i.e. books, etc.). Student can obtain up to 60 points and 35 points are needed for successfully passed the examination.

The evaluation of the course including the classification is carried out in accordance with the Study and Examination Regulations OU.

Content

- Basic terms of statistics. Measurement, observations, inductive thinking, population and sample, parameters and estimations, variables, scales. Descriptive statistics, counts and frequencies, empirical data processing, class intervals, histogram, cumulative counts and frequencies.
- Central tendency characteristics. Arithmetic mean, deviations from mean, arithmetic mean features, median, quartiles, modus, geometric mean.
- Characteristics of variability. Variance, standard deviation. Empirical moments, skewness and kurtosis. Techniques of data processing, stem-and-leaf display, box-plot, dependence of two variables.
- Random phenomenon, frequency and probability, conditional probability, independency of phenomena, law of total probability,

Bayesian probability.

5. Random variable. Discrete and continuous distributions, distribution function, probability mass function, probability density function. Mean value, variance.

6. Quantile, median, modus, moments, skewness, kurtosis. Random sample, distribution function, marginal distribution. Independence of variables.

7. Mean value's and variance's features, standardized variable, covariance, correlation.

8. Examples of discrete distributions: Alternative, binomial, Poisson distribution.

9. Examples of continuous distributions: Uniform distribution, normal (Gaussian) distribution, log-normal distribution, Chi-square-, t- and F-distributions. Central limit theorem.

10. Population and sample, parameter and its estimate (population's and sample's characteristics), random sample. Sampling techniques, sample distributions.

11. Estimations of parameters. Point estimators and their features, interval estimators

12. Statistical hypothesis testing. Null hypothesis, alternative hypothesis, I-type and II-type errors, significance level, statistical power, sample size.

One lecture is for one of the topics.

Fields of study

Guarantors and lecturers

- **Guarantors:** RNDr. Petr Bujok, Ph.D.
- **Lecturer:** RNDr. Petr Bujok, Ph.D.
- **Tutorial lecturer:** RNDr. Petr Bujok, Ph.D.

Literature

- **Basic:** Introduction to Probability and Statistics Using R (Kerns, G. J.) - <https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf> >
- **Basic:** Základy pravděpodobnosti a statistiky (Bujok P., Tvrdík J., Poláková R.) - <http://www1.osu.cz/~bujok/files/zstats.pdf> >
- **Extending:** Komenda S. *Biometrie*. UP Olomouc, 1994.
- **Extending:** Svoboda H. *Moderní statistika*. Praha, Svoboda, 1977.
- **Extending:** Křivý I. *Úvod do teorie pravděpodobnosti*. PF Ostrava, 1983.
- **Recommended:** Analýza dat (Tvrdík J.) - <http://www1.osu.cz/~tvrdik/down/vyuka.html> >
- **Recommended:** Zvára K. *Biostatistika*. Karolinum, Praha, 1998.
- **Recommended:** Cyhelský L., Kahounová, J., Hindls R.: *Elementární statistická analýza*. Management Press, Praha, 1996.
- **Recommended:** Probability and Statistics for Computer Science (David Forsyth) - <https://link.springer.com/book/10.1007/978-3-319-64410-3> >
- **Recommended:** Statistics and Data Analysis (Abebe A., Daniels J., McKean J. W., Kapenga J. A.) - <http://www.stat.wmich.edu/s160/hcopy/book.pdf> >

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Being present in classes	52
Semestral work	20
Self-tutoring	15
Preparation for an exam	18
Preparation for test	15
Total:	120

assessment methods**Knowledge - knowledge achieved by taking this course are verified by the following means:**

- Continuous analysis of student's achievements
- Point system
- Written examination

prerequisite**Competences - students are expected to possess the following competences before the course commences to finish it successfully:**

- Student has basic knowledge of basic secondary-level mathematics' operations. Student has user-level experiences of table processor (MS Excel or another). Higher knowledge of mathematical analysis is advantage.

teaching methods**Knowledge - the following training methods are used to achieve the required knowledge:**

- Dialogic (discussion, dialogue, brainstorming)
- Monologic (explanation, lecture, briefing)

learning outcomes**Knowledge - knowledge resulting from the course:**

- Student is get to know of descriptive statistics techniques, principle of software tools for statistical data processing, basics of the theory of probability, population and random sampling, statistical estimation, and hypothesis testing

Skills - skills resulting from the course:

- Student is able to use of descriptive statistics techniques, applies of software tools for statistical data processing, basics of the theory of probability, population and random sampling, statistical estimation, and hypothesis testing

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Applied Information Science	Bachelor	Full-time	Aplikovaná informatika	1	2018	2019	Povinné předměty	A	3	ZS
Applied Information Science	Bachelor	Full-time	Softwarové systémy	1	2018	2019	Povinné předměty	A	3	ZS
Informatics	Bachelor	Full-time	Informatika	1	2019	2019	Povinné předměty	A	3	ZS
Information Science	Bachelor	Full-time	Information Science	1	2019	2019	Povinné předměty	A	3	ZS