GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Computer-aided engineering statistics, PG_00055047		
Field of study	Management and Production Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Maciej Majewski	
	Teachers	dr hab. inż. Maciej Majewski dr hab. inż. Dariusz Fydrych dr inż. Norbert Piotrowski	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						

Learning activity and number of study hours					
	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	30	10.0	35.0	75

Subject objectives	The aim of the course is to familiarize with the main methods and selected tools for statistical analysis and to show the possibility of using these tools to solve real problems related to data. The learning effect is the understanding and the ability to use statistical tools for analytical purposes, interpreting data and the practical use of statistical test results.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has knowledge of linear algebra, differential equations, analysis and mathematical statistics useful for modelling and interpreting mechanical systems, manufacturing processes and operating properties of devices, has structured knowledge of physics including classical mechanics, optics, electricity and magnetism, demonstrates knowledge of elements of quantum physics	The student defines the basic concepts of general statistics, statistical measures, measures of descriptive statistics. Student determines statistical methods for statistical analyzes. The student plans statistical research using statistical tools.	[SW1] Assessment of factual knowledge
[K6_K02] is able to interact and work in a group, assuming different roles, can inspire and organize the learning process of others, properly identifies priorities for realization of a task specified by themselves or others	The student defines the tasks to be performed by cooperating in a group and gathers the necessary data resources. The student verifies the results of the completed tasks and is aware of the responsibility for the correct interpretation of the results.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
[K6_U05] is able to prepare and present a presentation on the results of analysis of the tasks in the area of production engineering, is able to plan and carry out experiments, measurements, computer simulations and analyses and interpret the results and draw conclusions is able to use analytical methods, simulation and experiments for formulating and solving problems associated with production engineering	The student is able to obtain and convert statistical data from publicly available electronic databases. The student plans and performs statistical analyzes using the methods of descriptive statistics and statistical measures, selecting the description method for the type of data and interpreting the results. The student collects relevant statistical data, selects computer techniques and uses statistical analysis techniques to describe the sample, and then statistical inference about the population, even from large samples of data collected from various sources.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents

-LECTURES:
Statistics - basic concepts; contemporary definitions of statistics and its meaning; basic departments of statistics; Collective, Population and Sample; statistical research; typical areas of statistical research; feature measurement and measurement scales; examples of statistical features; measuring scales; descriptive statistics: collecting statistical data (statistical population), presentation of statistical data (in tabular and graphical manner), summary description of statistical data (using statistical parameters); 5 types of statistical analysis; descriptive statistics types; data types in statistics; statistical measures: measures of central tendency, measures of differentiation, measures of skewness; classical measures - positional measures; arithmetic, weighted, geometric, harmonic mean; median; fashion (modal value, mode); variance; standard deviation; average deviation; mean absolute deviation; distribution variation coefficient; asymmetry coefficient; measures of concentration; quantiles; gap; quadrant stretch mark; quarter deviation; regressions and regression coefficient; approximation; and other ...
-PROJECTS:
Obtaining and converting statistical data from publicly available electronic databases; planning and performing statistical analyzes using the methods of descriptive statistics and statistical measures; selecting description methods for the type of data and interpreting the results; collecting relevant statistical data; selecting computer techniques and using statistical analysis techniques to describe the sample, and then statistical inference about the population from samples of data collected from various sources; the use of statistical measures: measures of central tendency, measures of differentiation, measures of skewness; calculations for data sets of the following measures: arithmetic mean, weighted, geometric, harmonic, median, mode (modal value, mode), variance, standard deviation, average deviation, mean absolute deviation, distribution coefficient of variation, asymmetry coefficient, quantiles, range, range quarter, quarter deviation, regression and regression coefficient, approximation;

Prerequisites and co-requisites

Initial knowledge of elementary mathematical methods, knowledge of basic quantitative methods as well as IT tools and data structures.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	60.0%	50.0%
Written work	60.0%	50.0%

Recommended reading

Basic literature	1. Electronic content for lectures and projects on the course page on the e-learning platform "eNauczanie". 2. Book: Online Statistics Education: An Interactive Multimedia Course of Study - https://onlinestatbook.com/ https://onlinestatbook.com/Online_Statistics_Education.pdf 3. McClave James, Sincich Terry, "Statistics", Pearson Education, 2018.
Supplementary literature	1. Bruce Peter, Bruce Andrew, Gedeck Peter, "Practical statistics in data science. 50 key issues in R and Python" (in Polish), Helion Publishing House, Warsaw, 2021.

	eResources addresses	Adresy na platformie eNauczanie: Statystyka inżynierska wspomagana komputerowo - Moodle ID: 29554 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29554
Example issues/ example questions/ tasks being completed	1. Acquisition and conversion of statistical data from publicly available electronic databases in the form of CSV files (two-dimensional data structures with attributes); 2. Planning and performing the calculated statistical analyzes using the methods of descriptive statistics and statistical measures; 3. Selecting description methods for selected types of data and interpreting the results; 4. Collection of selected statistical data; 5. The selection of computer techniques and the use of statistical analysis techniques to describe the sample, and then statistical inference about the population from samples of data collected from various sources; 6. Applications of statistical measures: measures of central tendency, measures of differentiation, measures of skewness; calculations for data sets of the following measures: arithmetic mean, weighted, geometric, harmonic, median, mode (modal value, mode), variance, standard deviation, average deviation, mean absolute deviation, distribution coefficient of variation, asymmetry coefficient, quantiles, range, range quarter, quarter deviation, regression and regression coefficient, approximation;	
Work placement	Not applicable	

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