SYLLABUS OF A MODULE

Polish name of a module	**Analiza Systemów Probabilistycznych (i Statystyka)**
English name of a module	**Probabilistic Systems Analysis (& Statistics)**
ISCED classification - Code	0613
ISCED classification - Field of study	*Software and applications development and analysis*
Languages of instruction	*English*
Level of qualification:	*2*
Number of ECTS credit points	*6*
Examination:	*EW*
Available in semester	*S*

Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
30	15	15			

MODULE DESCRIPTION

Module objectives

O1. Making the students familiar with the elements of the theory and methods of probability useful in engineering problems.

O2. Making the students familiar with the elements of the statistical methods.

O3. Introducing the students into using the computer methods in probability and statistics.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Course of the calculus of one variable

LEARNING OUTCOMES

LO 1 – student is familiar with the basics of probability; student understands the need of probability in statistics.

LO 2 – student is familiar with the introductory methods of a point and interval estimation.

LO 3 – student has basics of Maple enabling her/him to use it when solving basic probability and statistics problem

MODULE CONTENT

Type of classes – Lecture	Number of hours
Lec 1 - Course introduction. The subject of statistics, the need of probability. Types of data	**2**
Lec 2 - Methods for describing data	**2**
Lec 3 - The numerical descriptive measures	**2**
Lec 4 - The numerical descriptive measures, cont. , random experiment, events, sample spaces	**2**
Lec 5 - Probability – axioms and properties	**2**
Lec 6 - Conditional probability, total probability, Bayes theorem	**2**
Lec 7 - Independence. Introduction to the random variables. Discrete random variables.	**2**
Lec 8 - Continuous random variables. Probability distribution for continuous random variables, expected value. Basic continuous distributions.	**2**
Lec 9 - Introduction to sampling distributions.	**2**
Lec 10- The law of large numbers. The central limit theorem.	**2**
Lec 11- The laws of large numbers.	**2**
Lec 12 - The point estimation.	**2**
Lec 13 - The confidence intervals.	**2**
Lec14 – Hypothesis testing	**2**
Lec 15 – Final test	**2**
Sum	**30**
Type of classes– Tutorials	**Number**

	of hours
Tut 1 - Types of data.	**1**
Tut 2 - Graphical description of data	**1**
Tut 3 - The mode, the arithmetic mean.	**1**
Tut 4 - The range of data. Variance and standard deviation.	**1**
Tut 5 - Variance and standard deviation cont., Interpretation of the standard deviation.	**1**
Tut 6-7 - Properties of probability, Bayes rule	**2**
Tut 8 - Independence	**1**
Tut 9 - Discrete random variables: calculating the expected value and the standard deviation	**1**
Tut 10- Continuous random variables: calculating the expected value and the standard deviation	**1**
Tut 11- Random variables: applications to the real world problems	**1**
Tut 12 - Point estimation, maximum likelihood method	**1**
Tut 13-14 - A confidence interval for a population mean	**2**
Tut 15 - Test of hypothesis about a population mean	**1**
Sum	**15**
Type of classes - Laboratory	**Number of hours**
Lab 1 - Review of integration	**1**
Lab 2-3 - Methods for describing data	**2**
Lab 4 - Calculating numerical descriptive measures	**1**
Lab 5 – Basics of procedures in Maple	**1**
Lab 6 –Basics of loops and linear algebra in Maple	**1**
Lab 7-9 Classical definition of probability	**3**
Lab 10 Conditional probability, total probability, Bayes' theorem, independence	**1**
Lab 11-12 Random variables in Maple	**2**
Lab 13-14 Basic statistics in Maple	**2**

Lab 15 Assessment problems	1
Sum	**15**

TEACHING TOOLS

1. – lecture
2. – tutorials
3. – computer laboratory

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE

F1. - assessment of preparation for laboratory exercises
F2. - assessment of the ability to apply the acquired knowledge while doing the exercises
F3. - evaluation of reports on the implementation of exercises covered by the curriculum
F4. - assessment of activity during classes
S1. - assessment of the ability to solve the problems posed and the manner of presentation obtained results - pass mark *
S2. - assessment of mastery of the teaching material being the subject of the lecture - exam

*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
1. Contact hours with teacher		
1.1	Lectures	30
1.2	Tutorials	15
1.3	Laboratory	15
1.4	Seminar	0
1.5	Project	0

1.6	Examination	4
	Total number of contact hours with teacher:	64
2. Student's individual work		
2.1	Preparation for tutorials and tests	10
2.2	Preparation for laboratory exercises, writing reports on laboratories	10
2.3	Preparation of project	
2.4	Preparation for final lecture assessment	20
2.5	Preparation for examination	20
2.6	Individual study of literature	20
	Total number of hours of student's individual work:	80
	Overall student's workload:	144
Overall number of ECTS credits for the module		6 ECTS
Number of ECTS points that student receives in classes requiring teacher's supervision:		2,6 ECTS
Number of **ECTS** credits acquired during practical classes including laboratory exercises and projects:		ECTS

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Ramachandran, K. M., Tsokos.C.P., *Mathematical statistics with applications*, Elsevier Academic Press, 2009
2. J.T.McLeve, P.G.Benson, *Statistics for business and economics*, Macmillan, London 1988 and later issues

MODULE COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

1. Piotr Puchała, Institute of Mathematics, piotr.puchala@im.pcz.pl