SYLLABUS OF A MODULE

Polish name of a module	**Matematyka dyskretna**
English name of a module	**Discrete mathematics**
ISCED classification - Code	0541
ISCED classification - Field of study	*Mathematics*
Languages of instruction	*English*
Level of qualification: ***1 – BSc (EQF 6)*** ***2 – MSc (EQF 7)*** ***3 – PhD (EQF 8)***	*1*
Number of ECTS credit points	*6*
Examination: ***EO – exam oral*** ***EW – exam written*** ***A - assignment***	*A*
Available in semester: ***S – spring only*** ***A – autumn only*** ***Y - both***	*Y*

Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
30	30	-	-	-	-

MODULE DESCRIPTION

Module objectives

O1. Making the students familiar with basic problems of discrete mathematics both from the theoretical and computational methods.

O2. Acquainting the students with practical skills of solving discrete mathematics problems, interpreting technical terms, including information technology with the use relations, ability to apply graph theory and recursion to solve application problems, in particular, to analyze network problems.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Course of linear algebra.
2. Course of logic.
3. Course of the calculus of one variable
4. Ability to use different sources of information.
5. Ability to work independently and in a group.
6. Ability to correctly interpret and present their own activities.

LEARNING OUTCOMES

LO 1 – Student is familiar with mathematical induction and recursion.

LO 2 – Student is able to use divisibility properties and congruence relation.

LO 3 – Student is able to construct the graph and determine its properties.

MODULE CONTENT

Type of classes – lecture	**Number of hours**
Lec1 Course introduction. Set theory. Inclusion-exclusion principle. Pigeonhole principle.	**2**
Lec2 Mathematical induction.	**2**
Lec3 Recurrence. Fibonacci numbers. Golden ratio.	**2**
Lec4,5 Combinatorics.	**4**
Lec6,7 Number theory.	**4**
Lec8 Theory of relations.	**2**
Lec9 Modular arithmetic.	**2**
Lec10 Basic terms of graph theory.	**2**
Lec11 Euler cycle. Hamiltonian cycle.	**2**
Lec12 Trees.	**2**
Lec13 Code theory.	**2**
Lec14 Weighted graph. The shortest path problem.	**2**
Lec15 Test	**2**
Sum	**30**
Type of classes– tutorials	**Number of hours**
Tut1 Operations on sets. Inclusion-exclusion principle.	**2**
Tut2 Mathematical induction.	**2**
Tut3 Recurrence. Fibonacci numbers.	**2**
Tut5,4 Combinatorics.	**4**
Tut6 Divisibility of integers. The greatest common divisor. The Euclidean algorithm. The least common multiple. Primes.	**2**
Tut7 Test	**2**
Tut8 Properties of relations.	**2**
Tut9 Modular arithmetic.	**2**
Tut10 Properties of graphs. Directed and undirected graph. Isomorphism invariants.	**2**
Tut11 Euler cycle. Hamiltonian cycle.	**2**
Tut12 Weighted graph. The shortest path problem.	**2**
Tut13 Trees.	**2**
Tut14 Huffman coding.	**2**
Tut15 Test.	**2**
Sum	**30**

TEACHING TOOLS

1. Lectures with multimedia presentations
2. Blackboard and chalk or whiteboards and markers
3. Literature

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE)

F1. - assessment of preparation for exercises
F2. - assessment of the ability to apply the acquired knowledge while doing the exercises
F3. - assessment of activity during classes and lectures
S1. - assessment of the ability to solve the problems posed

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	30
1.3	Laboratory	-
1.4	Seminar	-
1.5	Project	-
1.6	Examination	-
	Total number of contact hours with teacher:	60
2.	**Student's individual work**	
2.1	Preparation for tutorials and tests	45
2.2	Preparation for final lecture assessment	20
2.3	Individual study of literature	15
	Total number of hours of student's individual work:	80
	Overall student's workload:	140
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:		-

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1.	Lecture notes.
2.	N.L.Biggs, Discrete mathematics, Oxford University Press, 1989.
3.	L.Lovász, K. Vesztergombi, Lecture Notes, Yale University, 1999.
4.	K.A.Ross, C.R.B. Wright, Discrete mathematics, Pearson, 2002.
5.	S. Epp, Discrete Mathematics with Applications, Brooks Cole, 2010.

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

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