

## MODULE DESCRIPTION

Module code	Z-ZIP-1004
Module name	<b>Matematyka dyskretna</b>
Module name in English	<b>Discrete Mathematics</b>
Valid from academic year	<b>2016/2017</b>

## A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	<b>Management and Production Engineering</b>
Level of education	<b>1st degree</b> <i>(1st degree / 2nd degree)</i>
Studies profile	<b>General</b> <i>(general / practical)</i>
Form and method of conducting classes	<b>Full-time</b> <i>(full-time / part-time)</i>
Specialisation	<b>All</b>
Unit conducting the module	<b>The Department of Applied Computer Science and Applied Mathematics</b>
Module co-ordinator	<b>Artur Maciąg, PhD hab., Eng., Professor of the University</b>
Approved by:	

## B. MODULE OVERVIEW

Type of subject/group of subjects	<b>Basic</b> <i>(basic / major / specialist subject / conjoint / other HES)</i>
Module status	<b>Non-compulsory</b> <i>(compulsory / non-compulsory)</i>
Language of conducting classes	<b>Polish</b>
Module placement in the syllabus - semester	<b>3rd semester</b>
Subject realisation in the academic year	<b>Winter semester</b> <i>(winter / summer)</i>
Initial requirements	<b>No requirements</b> <i>(module codes / module names)</i>
Examination	<b>No</b> <i>(yes / no)</i>
Number of ECTS credit points	<b>2</b>

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	<b>20</b>	<b>10</b>			

### C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

<b>Module target</b>	The aim of the module is to familiarize students with the selected fields of discrete mathematics, taking the part of material applicable in practice into particular consideration. The subject comprises the following aspects: the elements of combinatorics and counting, induction and recursion, the tree and graph theories. These tools are used in the issues of optimisation (the algorithm of determining the shortest path as well as the algorithm of determining critical paths).
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Effect symbol	Teaching results	Teaching methods (l/c/lab/p/other)	Reference to subject effects	Reference to effects of a field of study
W_01	A student has the necessary knowledge from the field of discrete mathematics in order to formulate and solve simple tasks in production engineering.	l/c	K_W01	T1A_W01 T1A_W07
W_02	A student knows basic methods and tools of gathering, processing and presenting economic as well as engineering data.	l/c	K_W01	T1A_W01 T1A_W07
W_03	A student knows standard methods with regard to modelling and optimisation in production engineering.	l/c	K_W01	T1A_W01 T1A_W07
U_01	A student is able to work both individually and in teams applying various communication techniques.	c	K_U02	T1A_U02
U_02	A student can apply the learnt methods and theoretical models to formulate and solve tasks in the range of production engineering.	c	K_U14	T1A_U09
U_03	A student can, according to a given specification, plan, project and realise a simple process in logistics using proper methods.	c	K_U14 K_U19	T1A_U09 T1A_U15
K_01	A student understands the need of constant learning and knows the possibilities of improving his/her professional, personal, and social competences.	l/c	K_K01	T1A_K01
K_02	A student can improve and master the acquired knowledge from the field of mathematical methods in order to improve his/her professional qualifications.	l/c	K_K01	T1A_K01

#### Teaching contents:

##### 1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Counting the elements of discrete sets. Relations and their properties.	W_01 W_02 W_03 U_01 U_02 U_03 K_01 K_02
2	Proofs with the use of mathematical induction. Applications of recurrent formulas.	W_01 W_02 W_03 U_01 U_02 U_03 K_01

		K_02
3	The basics of graph theories, Eulerian paths and cycles, Fleury's algorithm.	W_01 W_02 W_03 U_01 U_02 K_01
4-5	Weighted graphs, the shortest path between vertices.	W_01 W_02 W_03 U_01 U_02 K_01
6-7	Computation nets and critical paths.	W_01 W_02 W_03 U_01 U_02 K_01
8	Transport nets and maximal flow.	W_01 W_02 W_03 U_01 U_02 K_01
9-10	The tree theory – binary trees and spanning trees – algorithms.	W_01 W_02 W_03 U_01 U_02 K_01

## 2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module
1	Counting the elements of discrete sets. Relations and their properties. Proofs with the use of mathematical induction. Applications of recurrent formulas.	W_01 W_02 W_03 U_01 U_02 K_01
2	The basics of graph theories, Eulerian paths and cycles, Fleury's algorithm. Weighted graphs, the shortest path between vertices.	W_01 W_02 W_03 U_01 U_02 K_01
3	Computation nets and critical paths. Transport nets and maximal flow.	W_01 W_02 W_03 U_01 U_02 K_01
4	The tree theory – binary trees and spanning trees – algorithms.	W_01 W_02 W_03 U_01 U_02 K_01

5	A test.	
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### 3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module

### 4. The characteristics of project assignments

## The methods of assessing teaching results

Effect symbol	Methods of assessing teaching results <i>(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)</i>
W_01	A final test.
W_02	A final test
W_03	A final test
U_01	A final test
U_02	A final test
U_03	A final test
K_01	Observing a student's individual work during the classes and the test; discussions during the classes.
K_02	Observing a student's individual work during the classes and the test; discussions during the classes.

## D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	Student's workload
1	Participation in lectures	20
2	Participation in classes	10
3	Participation in laboratories	
4	Participation in tutorials (2-3 times per semester)	3
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	<b>Number of hours requiring a lecturer's assistance</b>	<b>33</b> <i>(sum)</i>
10	<b>Number of ECTS credit points which are allocated for assisted work</b> <i>(1 ECTS point=25-30 hours)</i>	<b>1.1</b>
11	Unassisted study of lecture subjects	10
12	Unassisted preparation for classes	10
13	Unassisted preparation for tests	6
14	Unassisted preparation for laboratories	
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	
19		
20	<b>Number of hours of a student's unassisted work</b>	<b>26</b> <i>(sum)</i>
21	<b>Number of ECTS credit points which a student receives for unassisted work</b> <i>(1 ECTS point=25-30 hours)</i>	<b>0.9</b>
22	<b>Total number of hours of a student's work</b>	<b>59</b>
23	<b>ECTS points per module</b> <i>1 ECTS point=25-30 hours</i>	<b>2</b>
24	<b>Work input connected with practical classes</b> <i>Total number of hours connected with practical classes</i>	<b>23</b>
25	<b>Number of ECTS credit points which a student receives for practical classes</b> <i>(1 ECTS point=25-30 hours)</i>	<b>0.8</b>

## E. LITERATURE

Literature list	1. ... 2. ... 3. ... 4. ...
Module website	