

Course Syllabus

Course from study programme starting with the cycle: 2025/2026

I. General Information

Course name	Optimization Methods
Programme	Informatics
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BA
Form of studies (full-time, part-time)	full-time
Discipline	Computer and information sciences
Language of instruction	English

Course coordinator	Małgorzata Nowak-Kępczyk Ph.D.
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	15	6	2
tutorial			
classes			
laboratory classes	15	6	
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	Mathematics in the field of high school, basics of algebra
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II. Course Objectives

C1 - familiarization with the basics of optimization methods and their applications to solve practical issues

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	The student recognizes and distinguishes between basic concepts related to the issues of optimization methods, their use and limitations	K_W01, K_W02
W_02	The student models and knows the appropriate methods and tools of linear programming to solve problems	K_W03,
W_03	The student respects the principles of protection of intellectual property and skillfully applies them in his own and company activities	K_W05, K_W06, K_W10,
SKILLS		
U_01	The student can create an optimization model of the real situation and apply the appropriate optimization methods to solve it.	K_U03
U_02	The student prepares and presents reports on the results of optimization and discusses them.	K_U07, K_U20, K_U22
U_03	The student can implement selected algorithms of optimization methods using various programming environments.	K_U22
SOCIAL COMPETENCIES		
K_01	The student will use the acquired knowledge by maintaining ethical and legal standards and can critically assess the level of suction programming skills in the field of optimization methods	K_K01

IV. Course Content

1. Optimization models. General, canonical, standard form (1+1).
2. Graphical solution. Examples and interpretation (2+2).
3. Special graphical cases (1+1).
4. Simplex: bringing to the base form, transformation of variables (1+1).
5. Simplex: calculations and tables, special solutions, stopping criteria (3+3).
6. Dual problem: construction, relationship with primal (2+2).
7. Transport problem: balanced and unbalanced (1+1).
8. NW-Corner method and Vogel Approximation Method (VAM) method (1+1).
9. Method of potentials and correction of solutions (1+1).
10. Integer problems - ideas and examples (1+1).
11. Branch and Bound Algorithm (1+1).

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods (choose from the list)	Forms of assessment (choose from the list)	Documentation type (choose from the list)
KNOWLEDGE			
W_01	Conventional lecture/ Lecture	Written exam/written colloquium	Proven written exam / written colloquium
W_02	Conventional lecture, conversatorial lecture, work under direction	Written exam/written colloquium	Proven written exam / written colloquium

W_03	Conventional lecture, conversatorial lecture, work under direction	Written exam/written colloquium	Proven written exam / written colloquium
SKILLS			
U_01	Practical exercises	Written exam / written colloquium	Proven written exam / written colloquium
U_02	Practical exercises, discussion	Written exam / written colloquium	Proven written exam / written colloquium
U_03	Workshop exercises, design work, problem solving	Observations - activity in class, evaluation of documentation and program operation	Project report, code documentation, record in the rating sheet
U_04	Work under the direction, case analysis, project implementation	Assessment of the presentation of the results and the correctness of the methods used	Checked report, project files, saving in the rating sheet
SOCIAL COMPETENCIES			
K_01	Discussion	Written exam/written colloquium	Proven written exam / written colloquium
K_02	Discussion	Written exam/written colloquium	Proven written exam / written colloquium

VI. Grading criteria, weighting factors

LECTURE:

Laboratory pass is required. Assessment based on the oral exam:

- 91 - 100% - very good (5)
- 81 - 90% - good + (4.5)
- 71 - 80% - good (4.0)
- 61 - 70% - satisfactory + (3.5)
- 51 - 60% - satisfactory (3.0)
- less than 51% - non-satisfactory (2.0)

Laboratory exercises:

The presence of at least 80% of classes is required. Assessment based on colloquials:

- 91 - 100% - very good (5)
- 81 - 90% - good + (4.5)
- 71 - 80% - good (4.0)
- 61 - 70% - satisfactory + (3.5)
- 51 - 60% - satisfactory (3.0)
- less than 51% - non-satisfactory (2.0)

Detailed rules for completing classes and justifying the absence and supplementation of the resulting arrears are given in class.

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	32
Number of hours of individual student work	18

VIII. Literature

Basic literature
Topaloglu H., Fundamentals of Linear Optimization... (Cornell Tech, 2016–2021). “Accessible yet reasonably rigorous treatment” web.stanford.edu+14people.orie.cornell.edu+14www2.isye.gatech.edu+14 Guenin B., Könemann J., Tunçel L., A Gentle Introduction to Optimization (2014)
Additional literature
https://industri.fatek.unpatti.ac.id/wp-content/uploads/2019/03/116-A-Gentle-Introduction-to-Optimization-B.-Guenin-J.-K%C3%B6nemann-L.-Tun%C3%A7el-Edisi-1-2014.pdf?utm_source=chatgpt.com