

Name of university, Name of faculty: Trnava University  
Faculty of Education

### INFORMATION SHEET OF THE SUBJECT

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| <b>Code:</b> YMIM401                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     | <b>Name:</b> Algorithm Difficulty |    |                             |                                 |
| <b>Cover:</b> Department of Mathematics and Computer Science                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                   |    |                             |                                 |
| <b>Type of educational activity:</b> Lecture, Seminar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |                                   |    | <b>Number of credits:</b> 3 | <b>Recommended semester:</b> WT |
| <b>Scope of educational activity (in hours):</b><br><b>Weekly:</b> 1/1<br><b>For term of study:</b> ZS 23,23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                   |    |                             | <b>Study grade:</b><br>Master   |
| <b>Method of educational activity:</b> Attendance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                                   |    |                             |                                 |
| <b>Underlie subjects:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |                                   |    |                             |                                 |
| <b>Conditions for passing the course:</b><br><b>Method of evaluation:</b> Completion by taking an examination<br><b>Continuous evaluation:</b> None.<br><b>Final evaluation:</b> The final evaluation consists of a written test for which a maximum of 100 points can be obtained. The tasks in the test are mainly oriented towards determining the complexity of a given algorithm (including recursive ones), the complexity of sorting algorithms, algorithms from number theory and algorithms from graph theory, the construction of efficient algorithms and NP-completeness.<br><b>Finished:</b> The course is completed on the basis of the result of a written test. At least 91 points are required for an A grade, at least 81 points for a B grade, at least 71 points for a C grade, at least 61 points for a D grade and at least 51 points for an E grade.<br>A condition for passing the course is also the implementation of the non-contact part of the course. This part is implemented mainly by regular study of the material covered in the last lecture, regular preparation for the next seminar, study of recommended study literature, study of video recordings available in Teams, preparation for the written test. |     |                                   |    |                             |                                 |
| <b>Learning outcomes:</b><br>LO1 The student will acquire basic knowledge of determining the time (and memory) complexity of algorithms.<br>LO2 The student can determine the time and memory complexity of a given algorithm.<br>LO3 The student can classify specific problems into different complexity classes.<br>LO4 The student will be able to apply the acquired knowledge in student's future practice as a teacher of computer science, whether in teaching programming or in preparing students for programming competitions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |                                   |    |                             |                                 |
| <b>Schedule of subject:</b><br>Algorithmic problem solving.<br>Time and memory complexity of specific algorithms.<br>Recursion. Weaknesses of recursion. Complexity of recursive algorithms.<br>Sorting algorithms and their complexity.<br>Selected algorithms on graphs and their complexity.<br>Selected number theory algorithms.<br>Methods of creating efficient algorithms.<br>Polynomial and exponential time complexity. NP-complete problems and their importance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                   |    |                             |                                 |
| <b>Recommended reading:</b><br>BENTLEY, J.: Perly programovania. Bratislava : Alfa, 1992.<br>WIRTH, N.: Algoritmy a štruktúry údajov. 2. vyd. Alfa : Bratislava, 1989. 481 s. ISBN 80-05-00153-3.<br>WRÓBLEWSKI, P.: Algoritmy – Datové štruktúry a programovací techniky. Brno : Computer Press, 2004.<br>DEMUTH, O. – KRYL, R. – KUČERA, A.: Teorie algoritmů I. 2. vyd., Praha : Univerzita Karlova, 1989.<br>DEMUTH, O. – KRYL, R. – KUČERA, A.: Teorie algoritmů II. 2. vyd., Praha : Univerzita Karlova, 1989.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |                                   |    |                             |                                 |
| <b>Language requirements:</b> Slovak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |                                   |    |                             |                                 |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |                                   |    |                             |                                 |
| <b>Course evaluation:</b><br>Assessed students in total: 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |                                   |    |                             |                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | B   | C                                 | D  | E                           | FX                              |
| 25%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 40% | 10%                               | 5% | 15%                         | 5%                              |
| <b>Lecturers:</b><br>doc. PaedDr. Milan Pokorný, PhD., lecturer, examiner, instructor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |                                   |    |                             |                                 |
| <b>Date of last change:</b> 01.09.2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                   |    |                             |                                 |
| <b>Approved by:</b> prof. Ing. Veronika Stoffová, CSc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                   |    |                             |                                 |