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**INFORMATION SHEET**

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| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ ANM/22 | **Name:** Algorithms of numerical mathematics and optimization |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13
**Methods of study:** present

**Number of credits:** 6

**Recommended semester/trimester of study:** 1.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
Students can earn a maximum of 100 points during the semester. This includes 20 - 20 points for the written test and 60 points for the oral exam. At least 90 points are required to obtain an A rating, at least 80 points to obtain a B rating, at least 70 points for a C rating, at least 60 points for a D rating, and at least 50 points for an E rating. Credits will not be awarded to a student who scores less than 50 points on the exam.

**Results of education:**
Education results - knowledge:
Has mathematical literacy in the field of numerical mathematics and optimization.
Learning outcomes - skills:
After completing the subject, the student can analyze and algorithmize and solve problems.
Education results - competences:
After completing the subject, the student demonstrates a high degree of independence in creating programs and applications.

**Brief syllabus:**
1. Introduction to numerical mathematics, errors in numerical calculations.
2. Solving a system of linear equations - back-substitution algorithm, Gauss elimination method, Gauss elimination method with principal element selection, Jacobian iteration method, Gauss-Seidel iteration method, Gauss-Jordan method, solving a linear equation system with LU decomposition.
3. Eigennumbers – calculation of the eigennumber with the largest absolute value.
4. Solving a nonlinear equation - separation of roots, interval division, halving method, Newton's method, method of simple iterations, solving a system of nonlinear equations.
5. Interpolation – polynomials as approximate functions, linear interpolation, Lagrange interpolation polynomial, Newton interpolation polynomial, Aitken interpolation, method of least squares.
6. Numerical derivation – derivation with interpolation polynomial, approximation error.
7. Numerical integration - quadrature formulas (rectangular rule, trapezoidal rule, Simpson's rule).
8. Solving differential equations – Euler's method, Euler's predictor-corrector type method, Runge-Kuttu method. Classification of optimization tasks.

9. Linear programming, the task of linear programming.
10. Nonlinear programming. One-parameter optimization tasks - golden section method, Fibonacci method.
11. Multi-parameter optimization tasks - least squares method (discrete and continuous case), gradient method, largest gradient method.
12. Multiparameter problems with boundaries - Lagrange's method, method of penalty functions.

**Literature:**


1. KMEŤ, T. – VOZÁR, M. – KMEŤOVÁ, M.: MATLAB a vizualizácia numerických a optimalizačných metód. Nitra : FPV UKF, 2012. 191 s. ISBN 978-80-558-0114-8.
2. KOŘENÁŘ, V. – LAGOVÁ, M. a kol.: Optimalizační metody. Praha: Vysoká škola ekonomická, 2003. 187 s. ISBN 978-80 245-0609-2.
3. BAJALINOV, E. – IMREH, B.: Operációkutatás. Szeged : Polygon, 2001. 302 s. ISSN 0000-2467.
4. DANYI, A. – VARRÓ, D.: Operációkutatás: Lineáris programozás. Pécs: PTE, 2003. 306 s. ISBN 978-963-6413-77-0.
5. BÉKÉSOVÁ, S.: Základy numerickej matematiky a programovanie. Bratislava : Alfa, 1984. 211 s.
6. KMEŤ, T. - VOZÁR, M. – KMEŤOVÁ, M.: MATLAB a vizualizácia numerických a optimalizačných metód. Nitra : FPV UKF, 2012. 191 s. ISBN 978-80-558-0114-8.
7. NEKVIDA, M.: Úvod do numerické matematiky. Praha : SNTL, 1976. 288 s.
8. GISBERT, S. – TAKÓ, G.: Numerikus módszerek. Budapest : Typotex, 2002. 442 s. ISBN 978-963-9326-20-8.
9. SOMOGYI, I. – SZILÁRD, A.: Numerikus analízis. Cluj-Napoca: Presa Universitara Clujena, 2009. 264 s. ISBN 978-973-610-702-3.
10. STIEFEL, E.: Bevezetés a numerikus matematikába. Budapest : Műszaki Könyvkiadó, 1973. 299 s.
11. GISBERT, S.: - Numerikus matematika - Mérnököknek és programozóknak. Typotex Elektronikus Kiadó Kft. 2007. ISBN 9789639664418
12. HÁZY, A.: Nemlineáris optimalizálás. Miskolci Egyetem. 2009. 165 s.
13. KLERK, E., ROOS, C., TERLAKY, T. : NEMLINEÁRIS OPTIMALIZÁLÁS. Budapest, 2004. 203 s. ISBN: 963 503 323 0


**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
The students' workload is composed as follows: 13.00% for participation in lectures, 6.50% for participation in exercises, 10.73% for preparation for lectures, 5.37% for preparation for exercises, 32.20% for preparation of own project or preparation for written examinations, 32.20% for preparation for the exam. For the calculation, we used a reference load of 25 hours of work from each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 62

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 19.35 | 6.45 | 16.13 | 27.42 | 27.42 | 3.23 |

**Teacher:** prof. RNDr. Tibor Kmeť, CSc., prof. RNDr. Tibor Kmeť, CSc., doc. RNDr. József Bukor, PhD., doc. RNDr. József Bukor, PhD.,

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| **Date of last update:** 18.02.2025 |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/APDS/22 | **Name:** Architecture of parallel and distributed systems |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 1.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The course ends with a written exam, for which students can get 50% of the total number of points. During the semester, students pass two written examinations, for which they can receive 20% of the total number of points and 30% of the semester project.
In addition to contact teaching, students prepare for exercises, prepare for written examinations, work on their semester projects and prepare for the exam.
It is necessary to get at least 90 points to get an A rating, at least 80 points for a B rating, at least 70 points for a C rating, at least 60 points for a D rating and at least 50 points for an E rating. Credits will not be awarded to a student who earns less than 50 points.

**Results of education:**
Educational outcomes - knowledges:
Education results - knowledge:
After completing the subject, the student:
• knows the principles of parallel and distributed architectures,
• knows the principles of parallel programming and data transfer control,
• knows strategies for synchronizing shared data between individual devices.
Learning outcomes - skills:
After completing the subject, the student:
• can analyze tasks and determine whether it is effective to parallelize them,
• can recognize different ways of getting stuck in a distributed system,
• can implement parallel algorithms using the OpenMP and MPI models.
Education results - competences:
After completing the subject, the student:
• knows how to work efficiently and implement acquired theoretical knowledge,
• has an active and responsible approach to completing tasks,
• shows independence in solving more complex problems.

**Brief syllabus:**
1. Introduction to parallelization. Performance indicators, laws limiting acceleration.
2. Parallelization of programs, decomposition, task planning.

3. Multiprocessors with shared memory, memory organization, coherence of buffers, memory consistency models.
4. OpenMP, synchronization in OpenMP, locks and barriers.
5. Performance-oriented parallel programming.
6. Management of message transfer, architecture of routers. Collective communication, messaging programming (MPI).
7. Calculations in bundles using pairwise and collective communications.
8. Introduction to distributed systems (goals of distributed systems, types of distributed systems). Architectures of distributed systems.
9. Processes (threads, virtualization, client, server, process migration).
10. Communication (remote call of procedures, communication by sending messages and data flow). Synchronization (synchronization of physical and logical clocks, mutual exclusion).
11. Consistency and replication (data-oriented model, client-oriented model, management of replicas, protocols to ensure consistency).
12. Fault tolerance (flexibility of processes, reliable client-server communication, reliable group communication, recovery after failure).
13. Security (security channels, access control, security management).

**Literature:**

1. BARNEY, B.: Introduction to Parallel Computing. Lawrence Livermore National Laboratory. 2019. https://computing.llnl.gov/tutorials/parallel_comp/
2. EIJKHOUT, V.: Parallel Programming in MPI and OpenMP. 2016. http://pages.tacc.utexas.edu/~eijkhout/pcse/html/index.html
3. FORKKIN, W. Distributed Algorithms. 1. vyd. Cambridge-London : Massachusetts Institute of Technology, 2013. 231 s. ISBN 978-0-262-02677-2.
4. TANENBAUM, A. S. - STEEN, M. VAN.: Distributed Systems: Principles and Paradigms. Harlow : Pearson Education Limited, 2014. 633 s. ISBN 978-1-292-02552-0.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
The students' workload is compiled as follows: 15.60% for attending lectures, 7.80 % for participation in exercises, 10.21% for preparation for lectures, 5.11% for preparation for exercises, 30.64 % for preparing your own project or preparing for written examinations, 30.64% for preparing for exam. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 63

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 49.21 | 15.87 | 20.63 | 6.35 | 7.94 | 0.0 |

**Teacher:** prof. András Molnár, PhD., prof. András Molnár, PhD., Mgr. Norbert Annuš, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ AZI/22 | **Name:** Applications of complex intelligent systems |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 1 **For the study period:** 26 / 13<br>**Methods of study:** present | |
| **Number of credits:** 5 | |
| **Recommended semester/trimester of study:** 2. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course ends with a written exam, for which students can receive 40% of the total. During the semester, students work on semester projects for which they can receive 60% of all points.<br>In addition to contact education, students prepare for practicals, work on their semester papers and prepare for the exam.<br>A grade is at least 90 points, B grade is at least 80 points, C grade is at least 70 points, D grade is at least 60 points and E grade is at least 50 points. A student who scores less than 50 points cannot receive credit. | |
| **Results of education:**<br>Educational results - knowledge:<br>After completing the subject, the student:<br>• knows the principles and methods of problem solving using intelligent systems,<br>• knows the basic principles and methods of machine learning,<br>• knows the basic principles of various types of intelligent information systems,<br>• knows the methods of evolutionary and genetic algorithms.<br>Educational results - skills:<br>After completing the subject, the student:<br>• can design solutions using advanced artificial intelligence methods,<br>• can use advanced methods, techniques and tools of machine learning,<br>• able to design and implement genetic algorithms to solve problems.<br>Educational results - competences:<br>After completing the subject, the student:<br>• able to work efficiently and apply the acquired theoretical knowledge,<br>• has an active and responsible attitude towards completing tasks,<br>• shows independence in solving more complex problems. | |
| **Brief syllabus:**<br>1. Applications of artificial intelligence.<br>2. Applications of learning systems methods.<br>3. Applications of agent systems.<br>4. Applications of autonomous systems. | |

5. Applications of cooperative systems.
6. Applications of hybrid systems.
7. Applications of knowledge systems.
8. Applications of neuro-fuzzy systems.
9. Applications of evolutionary systems.
10. Applications of real-time systems.
11. Applications of any time systems.
12. Applications of fuzzy-genetic systems.

**Literature:**

1. VÁRKONYINÉ KÓCZY, A. – ÁLMOS, A. – GYŐRI, S. – HORVÁTH, G.: Genetikus algoritmusok. Budapest : Typotex, 2002. 254 s. ISBN 978-963-279-107-4
2. KÓCZY, T. L. – Tikk D.: Fuzzy rendszerek. Budapest : Typotex Kiadó, 2000. 209 s. ISBN 963 9132 55-1.
3. RETTER, Gy.: Fuzzy rendszerek 1. kötet : Fuzzy, neurális, genetikus módszerek. Budapest : Invest-Marketing Bt., 2002, 198 s. ISBN 978-963-0095-39-4.
4. RUSSEL, S. – NORVIG, P.: Mesterséges inteligencia modern megközelítésben. Budapest : Panem Kiadó Kft., 2005, 1206 s. ISBN 963-5454-11-2.
5. NÁVRAT, P. et al.: Umelá inteligencia. Bratislava : STU, 2002, 399 s. ISBN 80-227-1645 6.
6. NEDJAH, N. – de MACEDO MOURELLE, L.: Fuzzy Systems Engineering : Theory and Practice. New York, NY : Springer, 2005. 226 s. ISBN 978-3-540-25322-8.
7. KAPLAN, J.: Artificial Intelligence : What everyone needs to know. New York, NY : Oxford University Press, 2016. 165 s. ISBN 978-0-190-60239-0.

**Language, knowledge of which is necessary to complete a course:**
hungarian, slovak

**Notes:**
The workload of the students is as follows:
15.60% for attending lectures, 7.80% for participation in exercises, 10.21% for preparing for lectures, 5.11% for preparing for exercises, 30.64% to prepare their own project or to prepare for a written exam, 30.64 % for preparing for exam.
For the calculation, we used a reference workload of 25 working hours for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 61

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 96.72 | 1.64 | 1.64 | 0.0 | 0.0 | 0.0 |

**Teacher:** Dr. habil. Attila Elemér Kiss, CSc., prof. András Molnár, PhD., Mgr. Norbert Annuš, PhD., prof. András Molnár, PhD., Dr. habil. Attila Elemér Kiss, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ CGT/22 | **Name:** Cloud and grid technologies |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Seminar / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 0 / 0 **For the study period:** 26 / 0 / 0<br>**Methods of study:** present | |
| **Number of credits:** 3 | |
| **Recommended semester/trimester of study:** 2. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course is completed by a written examination, for which students can obtain 50% of the total number of points and another 50% of points can be obtained for the elaboration of the project.<br>In addition to contact teaching, students prepare for lectures, work on their semester projects and prepare for the exam.<br>A minimum of 90 points is required for a grade of A, a minimum of 80 points for a grade of B, a minimum of 70 points for a grade of C, a minimum of 60 points for a grade of D, and a minimum of 50 points for a grade of E. Credit will not be awarded to a student who scores less than 50 points. | |
| **Results of education:**<br>Knowledge: Upon completion of the course, students will become familiar with Open Source technologies that have been specifically designed for Cloud Computing.<br>Skills: Upon completion of the course, the student will:<br>- able to create and run an operating system image,<br>- able to use a distributed file system,<br>- able to use the NoSQL database of a distributed web service.<br>Competences: Upon completion of the course, the student will:<br>- can work effectively and implement the acquired theoretical knowledge,<br>- has an active and responsible approach to completing tasks,<br>- shows independence in solving more complex problems. | |
| **Brief syllabus:**<br>1. Linux operating system and the principle of Open Source development.<br>2. Linux remote administration, terminal, SSH and user rights.<br>3. Network layer configuration and iptools. Virtual networks, certification and OpenVPN.<br>4. Open Source software development models. GPL License, LGPL, AGPL, BSD, EUPL.<br>5. Fundamentals of Cloud Computing, architectural merits, major providers.<br>6. Cloud software services, metal as a service, platform as a service, software as a service, storage, cloud database, elastic queue, and other services.<br>7. Virtualization and containerization, KVM, VirtualBox, and Docker.<br>8. Distributed file systems, GlusterFS and LUSTRE, Amazon Elastic Storage, Amazon Glacier. | |

9. Distributed SQL Database, MySql, PostgreSQL, Amazon RDS.
10. NoSQL Database, MongoDB, Hadoop.
11. Message Queueing Services (Apache Kafka, RabbitMQ).
12. Programming Cloud and Grid systems using MPI (Message Passing Interface).
13. Distributed Web Services and Microservices

**Literature:**

1. BUYYA, R. - VECCHIOLA, S.C. - SELVI, T.: Mastering Cloud Computing : Foundations and Applications Programming. 1. vyd. Waltham : Elsevier, 2013. 452 s. ISBN 978-0-12-411454-8.
2. CROOKES, D.: Cloud Computing : covers all key aspects. 1. vyd. Leamington : In Easy Steps Limited, 2012. 192 s. ISBN 978-1-84078-532-6.
3. STAMPER, J. et al.: AWS Certified Solutions Architect Official Study Guide. Sybex, 2016. ISBN 978-1119138556.
4. STAMPER, J. et al.: AWS Certified Solutions Architect Official Study Guide: Associate Exam . 1st Edition. Sybex, 2016. ISBN-13: 978-1119138556. ISBN-10: 1119138558.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
Student workload is structured as follows: 26.00 % for attending lectures, 14.80 % for preparing for lectures, 29.60 % for preparing own project or preparing for written examinations, 29.60 % for preparing for examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 49

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 95.92 | 4.08 | 0.0 | 0.0 | 0.0 | 0.0 |

**Teacher:** prof. Sándor Szénási, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ DIO/22 | **Name:** Discrete optimization |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 1.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The course ends with a written exam. During the semester, students may earn a maximum of 30 points by solving exercises, and may earn a maximum of 70 points on the written examination. In addition to contact teaching, students prepare for the exercises and prepare for the exam..
For assessment A should be obtained at least 90 points, for assessment B at least 80 points, for assessment C at least 70 points, for assessment D at least 60 points, for assessment E at least 50 points. Credits for the subject will not be awarded to a student who does not obtain at least 50 points.

**Results of education:**
Knowledge: The aim of the course is to familiarize students with discrete optimization problems and algorithms.
Upon successful completion of the course, students will have a basic understanding of graph algorithms, integer linear programming theory, heuristics and approximation algorithms. The emphasis is on the possible application of the results in practice.
Skills: Can analyze, algorithmize, and solve problems in discrete optimization or find and apply existing solutions.
Competences: Demonstrates a high degree of independence in the development of programs and applications.

**Brief syllabus:**
1. An introduction to linear programming
2. Basic concepts of discrete optimization, applications
3. Integer linear programming – algorithms
4. Integer linear programming - applications
5. Algorithm for finding the shortest paths
6. Flows and cuts in network
7. Matching in bipartite graphs
8. Knapsack problem, approximation algorithms
9. Travelling salesman problem
10. Critical path method
11. Synchronous and asynchronous algorithms, problem of electing a leader

12. Parallel graph algorithms
13. Parallel random-access machine (PRAM)

**Literature:**

1. BÉKÉSOVÁ, S.: Základy numerickej matematiky a programovanie. 1. vyd. Bratislava: ALFA, 1984. 211 s.
2. ČERNÝ, J.: Základní grafové algoritmy. http://kam.mff.cuni.cz/~kuba/ka/ka.pdf .
3. ILLÉS, T.: Lineáris optimalizálás elmélete és algoritmusai. (pdf). Budapest : ELTE, 2013. 163 s. http://www.tankonyvtar.hu/hu/tartalom/tamop412A/2011_0025_mat_4/adatok.html
4. ROSINOVÁ, D. - DÚBRVSKÁ, M.: Optimalizácia. 1. vyd. Bratislava : STU, 2008. 189 s. ISBN 978-80-227-2795-2.
5. TÖPFER, P.: Algoritmy a programovací techniky.
6. Lynch, N. A.: Osztott algoritmusok, Budapest, Kiskapu Kiadó, 2002, ISBN: 963-9301-03-5
7. Iványi, A.: Párhuzamos algoritmusok, Budapest, ELTE Informatikai Kar, 2010. 335s. (https://www.inf.elte.hu/dstore/document/287/Parhuzamos-algoritmusok.pdf )

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
The students' workload is structured as follows: 15.60% for attending lectures, 7.80% for attending tutorials, 10.21% for preparing for lectures, 5.11% for preparing for tutorials, 30.64% for preparing their own project or preparing for written examinations, 30.64% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 61

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 14.75 | 9.84 | 14.75 | 27.87 | 32.79 | 0.0 |

**Teacher:** doc. RNDr. József Bukor, PhD., doc. RNDr. József Bukor, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ DIP1/22 | **Name:** Diploma seminar 1 |

**Types, range and methods of educational activities:**
**Form of study:** Seminar
**Recommended extent of course ( in hours ):**
**Per week:** 2 **For the study period:** 26
**Methods of study:** present

**Number of credits:** 2

**Recommended semester/trimester of study:** 3.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
Attendance at classes. Participation in individual consultations with the supervisor several times during the semester, to prepare and regularly consult the texts of the work with the supervisor.

**Results of education:**
Education results
Knowledge:
After completing the subject, the student masters the procedures for creating a final thesis.
Skills:
After completing the course, the student is able to obtain materials for the topic of the work, applies methods according to the topic of the work, can process information and prepare written materials according to a predetermined time schedule.
Competences:
Independence and creativity in the preparation of the diploma thesis.

**Brief syllabus:**
1. Preparation of the diploma project.
2. Methods and methodology of scientific research.
3. Determination of the objectives of the thesis.
4. The structure of the diploma thesis and its formal arrangement (internal rules of the university).
5. Preparation of the work plan for the diploma project.
6. Compilation of the timetable for the implementation of partial tasks.
7. Organization and implementation of work, planning of research experiments and their implementation.
8. Processing the results of experiments and their interpretation.
9. Citations and foundations of scientific ethics (related ISO and STN standards).
10. Preparation, presentation and defense of the diploma thesis, elaboration of an opinion on the opponent's assessment.
11. Originality of work, protection of originality. Copyright, plagiarism.

**Literature:**
1. KATUŠČÁK, D.: Ako písať záverečné a kvalifikačné práce. Nitra: Enigma. 2007. 164 s. ISBN 978-80-89132-45-4.

2. KIMLIČKA, Š.: Ako citovať : a vytvárať zoznamy bibliografických odkazov : podľa noriem ISO 690 pre klasické aj elektronické zdroje. Bratislava : Stimul, 2002. 82 s. ISBN 80-889-82-57-X.
3. Smernica rektora č. 2/2021 o úprave, registrácii, sprístupnení a archivácii záverečných prác na Univerzite J. Selyeho.
4. TUREK, I.: Ako písať diplomovú prácu. Prešov : Metodické centrum Prešov, 1999. 28 s. ISBN 8080451613.
5. A ďalšie podľa odporúčania vedúceho diplomovej práce.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
Student load distribution:
10% - participation in lessons,
50% - study of professional literature, preparation of thesis proposal,
40% - preparation of a project (software, website, etc.).

**Evaluation of subjects**
Total number of evaluated students: 59

| a | n |
|---|---|
| 100.0 | 0.0 |

**Teacher:** prof. RNDr. Tibor Kmeť, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ DIP2/22 | **Name:** Diploma seminar 2 |
| **Types, range and methods of educational activities:**<br>**Form of study:** Seminar<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 3 **For the study period:** 39<br>**Methods of study:** present | |
| **Number of credits:** 3 | |
| **Recommended semester/trimester of study:** 4. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>Attendance at classes. Participation in individual consultations with the supervisor several times during the semester, to prepare and regularly consult the texts of the work with the supervisor. Submission of written materials for the work according to the instructor's instructions. Before uploading the final version of the work in AIS, binding it and handing it over, the work must be handed over to the supervisor for checking. | |
| **Results of education:**<br>Education results<br>Knowledge:<br>After completing the subject, the student masters the procedures for creating a final thesis and is ready for independent planning and implementation of research.<br>Skills:<br>After completing the subject, students are ready for independent planning and implementation of research and are able to present the results of their own research activity in the professional community.<br>Competences:<br>Independence and creativity in the preparation of the diploma thesis. | |
| **Brief syllabus:**<br>1. Independent study and research according to the focus of the thesis.<br>2. Structure of DP and preparation of individual chapters of the thesis.<br>3. Specifying the assignment.<br>4. Current state of the problem (analysis).<br>5. Study and selection of used methods and implementation tools.<br>6. Description of creation of implementation and implementation.<br>7. Evaluation of results (research, or effectiveness).<br>8. Possibilities of further development of the application.<br>9. Summary, conclusion.<br>10. Work with reviews.<br>11. Preparation for defense (presentation of results). | |
| **Literature:** | |

1. KATUŠČÁK, D.: Ako písať záverečné a kvalifikačné práce. Nitra: Enigma. 2007. 164 s. ISBN 978-80-89132-45-4.
2. KIMLIČKA, Š.: Ako citovať : a vytvárať zoznamy bibliografických odkazov : podľa noriem ISO 690 pre klasické aj elektronické zdroje. Bratislava : Stimul, 2002. 82 s. ISBN 80-889-82-57-X.
3. ŠVEC, Š, et al.: Metodológia vied o výchove. Bratislava : Iris, 1998. 303 s. ISBN 80-88778-73-5.
4. Smernica rektora č. 2/2021 o úprave, registrácii, sprístupnení a archivácii záverečných prác na Univerzite J. Selyeho.
5. TUREK, I.: Ako písať diplomovú prácu. Prešov : Metodické centrum Prešov, 1999. 28 s. ISBN 8080451613.
6. A ďalšie podľa odporúčania vedúceho diplomovej práce.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, Slovak

**Notes:**
version 2022-05-12
Student load distribution:
10% - participation in lessons,
50% - study of professional literature, preparation of thesis proposal,
40% - preparation of a project (software, website, etc.).

**Evaluation of subjects**
Total number of evaluated students: 56

| a | n |
|---|---|
| 100.0 | 0.0 |

**Teacher:** prof. RNDr. Tibor Kmeť, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ DSO/22 | **Name:** Digital image processing and computer graphics |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 1 **For the study period:** 26 / 13<br>**Methods of study:** present | |
| **Number of credits:** 6 | |
| **Recommended semester/trimester of study:** 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The subject ends with a combined exam. A student can get 100 points, of which 50 points for exam and 50 points for own project. In addition to contact teaching, students prepare for exercises, work on their semester projects and are preparing for the exam.<br>At least 90% of the points must be obtained for the A rating, and at least 80% for the B rating, for grade C at least 70% points, for grade D at least 60% points and<br>for rating E at least 50% points. Credits will not be granted to a student who at the end of the semester did not collect 50% of points. | |
| **Results of education:**<br>Education results - knowledge:<br>• The aim of the course is to provide students with information about computer graphics and related topics.<br>• After successful completion of the subject, the student has mastered theoretical and practical knowledge from visualization<br>graphic information and its transformations, creation, storage and transmission of image data.<br>Learning outcomes - skills:<br>• The student will be able to implement algorithms for image processing, algorithms for improving image quality as well as enhancing images.<br>• The student will be able to digitally synthesize images using 3D models and to create animations.<br>• The student will be able to apply the principles of computer graphics in practice when working with images.<br>Education results - competences:<br>• The student can use his skills as a programmer in developing computer games, computer games programs supporting design (CAD) as well as in image quality improvement programs.<br>• The student can use his skills in programs to create multimedia applications. | |
| **Brief syllabus:**<br>1. Human image perception and image properties. Technical requirements of image display.<br>2. Colour properties, RGB, XYZ, CMY and HLS colour schemes. | |

3. Basic principles of image display on a computer. Creation, filtering and storage of digital images. Digitisation and image reproduction.
4. Methods for repairing images. Linear methods.
5. 2D convolution. Real-time filtering.
6. Nonlinear methods.
7. Image compression, graphic format files.
8. Classical and non-classical image processing methods. Adaptive cropping. Colour palette recolouring.
9. Image enhancement. Image processing in Fourier space. Image enhancement by deconvolution.
10. Geometric modelling. Coordinate systems, curves, surfaces, solids.
11. Geometric transformations and geometric data structures. Projective geometry and projective extension of Euclidean space.
12. 2D image synthesis. Theoretical foundations of 3D image synthesis. Incremental 3D image synthesis. Texture representation and content visualization.
13. Computer animation. Systems for image animation.

**Literature:**

1. Gabriel Gambetta (2021). Computer Graphics from Scratch. No Starch Press. ISBN: 9781718500761
2. BODNÁR, I. - NAGY, Z.: Számítógépes prezentáció és grafika. Budapest : PC-START STÚDIÓ, 1998. 186 s. ISBN 9630499371.
3. CHAPMAN, N. - CHAPMAN, J.: Digital multimedia. Second Edition. John Wiley & Sons, 2003. 700 s. ISBN 0470858907.
4. SOBOTA, B. – MILIÁN, J.: Grafické formáty. České Budejovice : Kopp, 1996. 157 s. ISBN 80-85828-58-8.
5. SZIRMAY - KALOS, L.: Háromdimenziós grafika, animáció és játékfejlesztés. Budapest : ComputerBooks, 2004. 486 s. ISBN 9636183031.
6. SZIRMAY - KALOS, L.: Számítógépes grafika. Budapest : ComputerBooks, 2003. 334 s. ISBN 963 618 208 6.
7. VARGA, M.: 3D grafika a modellezés és megjelenítés. Bicske : Szak, 2004. 200 s. ISBN 9789639131613.
8. WOODS, R.E. - GONZALEZ, R.C: Digital Image Processing. New Jersey : Person Prentice Hall, 2008. 954 s. ISBN 978-0-13-505267-X.
9. ŽÁRA, J.: Moderní počítačová grafika : kompletní průvodce metodami 2D a 3D grafiky. 2. prepracované a rozšírené vydanie. Brno : Computer Press, 2010. 608 s. ISBN 80-251-0454-0.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
The student fee is calculated as follows: 13.00% for attending lectures, 6.50% for participation in exercises, 10.73% for preparation for lectures, 5.37% for preparation for exercises, 32.20% for preparation of own project or preparation for written examinations, 32.20% for preparation for exam. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 62

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 17.74 | 24.19 | 33.87 | 19.35 | 3.23 | 1.61 |

**Teacher:** PaedDr. Ladislav Végh, PhD., PaedDr. Ladislav Végh, PhD.,

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| **Date of last update:** 18.02.2025 |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ FUS/22 | **Name:** Fuzzy systems |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 1 **For the study period:** 26 / 13<br>**Methods of study:** present | |
| **Number of credits:** 6 | |
| **Recommended semester/trimester of study:** 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course ends with a written exam, for which students can get 40% of the total number of points. During the semester, students pass two written tests, for which they can receive 30% points from the total number of points, and also 30% for the semester project.<br>In addition to contact teaching, students prepare for laboratory exercises, prepare for written tests, work on the semester project, and prepare for the exam.<br>To receive grade A in the course, student must obtain at least 90 points, for grade B at least 80 points, for grade C at least 70 points, for grade D at least 60 points and for grade E at least 50 points. Credits will not be given to a student who obtain less than 50 points. | |
| **Results of education:**<br>Knowledge:<br>After completing the subject, the student:<br>• aquires basic theoretical knowledge in the field of of fuzzy logic and fuzzy sets,<br>• is able to handle problems in the field of fuzzy logic,<br>• understands basic concepts and algorithms.<br>Skills:<br>After completing the subject, the student:<br>• can analyze and solve problems in the field of Fuzzy systems,<br>• is able to apply acquired knowledge in solving practical tasks.<br>Competencies:<br>After completing the subject, the student:<br>• is able to work independently and efficiently, and is able to implement acquired theoretical knowledge. | |
| **Brief syllabus:**<br>1. Two-valued logic, multi-valued logic and fuzzy logic.<br>2. Machine intelligence. Artificial intelligence. Computational intelligence.<br>3. Basic concepts of fuzzy logic. Historical review.<br>4. Classic sets and set operations.<br>5. Fuzzy sets and set operations.<br>6. Characteristic function of fuzzy set. T-norms and T-conorms, complement of the fuzzy set. | |

7. Fuzzy relations and operations with fuzzy relations.
8. Fuzzy arithmetics. The Extension Principle.
9. Fuzzy numbers and fuzzy intervals. Arithmetic operations with fuzzy numbers.
10. Elements of fuzzy logic.
11. Fuzzy inference (approximate deduction). Fuzzy measures.
12. Natural language. Fuzzy knowledge systems.
13. Fuzzy conceptual graphs.

**Literature:**

1. BEZDEK, J.C.: Fuzzy models and algorithms for pattern recognition and image processing. 1. vyd. New York : Springer Science+Business Media LLC, 1999. 776 s. ISBN 978-0-387-24515-7.Strana: 41
2. CSATÓ, L. – BODÓ, Z.: Neurális hálók és a gépi tanulás módszerei. Cluj-Napoca : Presa Universitara Clujeana, 2008. 179 s. ISBN 978-973-610-701-6.
3. KÓCZY, T. L. - TIKK, D.: Fuzzy rendszerek. (pdf). Tipotex, 2001. 120 s. http://www.tankonyvtar.hu/hu/tartalom/tkt/fuzzy-rendszerek-fuzzy/ch06.html
4. NÁVRAT, P.: Umelá inteligencia. 1. vyd. Bratislava : Slovenská Technická Univerzita, 2002. 399 s. ISBN 80 277 1645 6.
5. RETTER, Gy.: Fuzzy rendszerek 1. kötet : Fuzzy,neurális,genetikus módszerek. Budapest : Invest-Marketing Bt., 2002. 198 s. ISBN 963 00 9539 4.
6. TAYLOR, J. G.: Neural networks and their applications. Wiley, 1996. 322 s. ISBN 0471962821.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of the student's workload: 13% attendance on the presentations, 6.50% attendance on the laboratory exercises, 10.73% preparation for the presentations, 5.37% preparation for the laboratory exercises, 32.20% work on the semester project and preparation for the tests, 32.20% preparation for the exam. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 58

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 22.41 | 22.41 | 12.07 | 18.97 | 24.14 | 0.0 |

**Teacher:** prof. Annamária Várkonyiné Kóczy, DSc., prof. Annamária Várkonyiné Kóczy, DSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ HEU/22 | **Name:** Heuristic systems |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 1 **For the study period:** 26 / 13<br>**Methods of study:** present | |
| **Number of credits:** 5 | |
| **Recommended semester/trimester of study:** 2. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course ends with a written exam, for which students can get 50% of the total number of points. During the semester, students have to pass two written examinations, for which they can also receive 50% of the total number of points.<br>In addition to contact teaching, students prepare for exercises, prepare for written examinations, and prepare for the exam.<br>It is necessary to get at least 90 points to get an A grade, at least 80 points for a B grade, at least 70 points for a C grade, at least 60 points for a D grade and at least 50 points for an E grade. Credits will not be awarded to a student who earns less than 50 points. | |
| **Results of education:**<br>Education results<br>Knowledge:<br>• Knows the principles and concepts of computer-aided optimization.<br>• Knows the characteristics of heuristics and metaheuristics, their grouping and use cases.<br>• Knows local optimization algorithms.<br>• Understands the principles and possibilities of evolutionary methods (Genetic Algorithm, Genetic<br>Programming).<br>• Knows methods based on swarms (Particle Swarm Optimization).<br>• Knows the concept of clustering and its basic methods (K-Means, DBSCAN).<br>• Knows the concept and tools of multi-objective optimization (NSGA).<br>Skills:<br>• Can recognize tasks that require the use of heuristics.<br>• Can design and implement evolutionary methods to solve practical problems.<br>• Is able to design and implement swarm-based methods to solve practical problems.<br>• Is able to design and implement clustering methods.<br>• Recognizes multi-purpose optimization tasks and is able to solve them.<br>Competences:<br>• Can solve and model tasks that require complex solution. | |
| **Brief syllabus:** | |

1. Basic concepts, terminology.
2. Hill Climbing algorithm and its variants.
3. Search, random optimization.
4. Physical methods.
5. Simulated cooling.
6. Local optimization methods.
7. Genetic algorithm.
8. Genetic programming.
9. Multipurpose optimization, NSGA.
10. Swarm based methods, Particle Swarm Optimization.
11. K-Means clustering.
12. DBSCAN clustering.
13. Population based methods, clustering.

**Literature:**

1. Genetikus algoritmusok / Álmos Attila, Győri Sándor, Horváth Gábor, Várkonyiné Kóczy Annamária. - 2. vyd. - Budapest : Typotex, 2002. - 254 s. - ISBN 978-963-279-107-4.
2. Optimalizálás evolúciós számításokkal / Borgulya István. - 1. vyd. - Budapest : Typotex Kiadó, 2012. - 378 s. - ISBN 978 963 279 680 2.
3. Sándor, Szénási ; Imre, Felde, "Configuring Genetic Algorithm to Solve the Inverse Heat Conduction Problem", ACTA POLYTECHNICA HUNGARICA, 14 : 6, pp. 133-152., 2017
4. Imre, Felde ; Sándor, Szénási, “Estimation of temporospatial boundary conditions using a particle swarm optimisation technique”, INTERNATIONAL JOURNAL OF MICROSTRUCTURE AND MATERIALS PROPERTIES, 11 : 3-4 pp. 288-300. , 13 p. (2016)
5. Sándor, Szénási, "Parallel Implementation of DBSCAN Algorithm Using Multiple Graphics Accelerators", SGEM 16th International Multidisciplinary Scientific Geoconference (SGEM2016), Albena, Bulgária, 2016, pp. 327-333.

**Language, knowledge of which is necessary to complete a course:**

Hungarian, English

**Notes:**

version 2022-05-12
The students' workload is composed as follows: 15.60% for participation in lectures, 7.80% for participation in exercises, 10.21% for preparation for lectures, 5.11% for preparation for exercises, 30.64% for preparation of own project or preparation for written examinations, 30.64% for exam preparation. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**

Total number of evaluated students: 61

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 36.07 | 34.43 | 22.95 | 6.56 | 0.0 | 0.0 |

**Teacher:** prof. Sándor Szénási, PhD., prof. Sándor Szénási, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ ISP/22 | **Name:** Company information system |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 1 **For the study period:** 26 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 2.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
Students work on their own term papers during the semester. They are graded according to the average obtained in the exam (50%) and the term paper (50%). An average of at least 90% is required for an A grade, at least 80% for a B grade, at least 70% for a C grade, at least 60% for a D grade, and at least 50% for an E grade. Credit will not be awarded to a student who earns less than a 50% average.

**Results of education:**
The aim of the course is to teach students to orientate themselves in the use of IS/IT in in the corporate sphere in the performance of managerial functions at all levels of management. At the same time
provide basic knowledge in the areas of systems integration, information strategies, critical factors of IS/IT implementation and operation, IS/IT outsourcing, IS/IT auditing and IS/IT effectiveness. After completing the course, the student knows the basics of using IS/IT in enterprises, understands the principles of enterprise information systems, individual contexts and has an overview of integrated management systems. For some areas of the course, case studies are included in the teaching material. Exercises are focused on demonstrations of presenting basic business processes in the SAP R/3 integrated business information system and the design and implementation of own information database systems.

**Brief syllabus:**
1. Introduction to the subject, the growing role of information management.
2. Information systems, information and communication technologies.
3. 2. Systematic approach to problem solving.
4. Development and building of information systems.
5. Data and information, meaning, processing, archiving and protection of information.
6. Databases, OLAP systems.
7. Globalisation, the impact of ICT on organisations and organisational structures.
8. Integrated business management systems.
9. SAP R/3 and other information systems.
10. E-business.
11. Integrated enterprise information system.

12. Business intelligence.
13. The strategic role of information systems.

**Literature:**

Odporúčaná literatúra:

1. BASL, J. Podnikové informační systémy: Podnik v informační společnosti 1. vyd. Praha: Grada Publishing, 2002. 142 s. ISBN 80- 247-0214-2
2. BASL, J. – BLAŽÍČEK, R. Podnikové informační systémy: Podnik v informační společnosti 3. vyd. Praha: Grada Publishing, 2013. 323 s. ISBN 978 80 247 4307 3
3. GÁLA, L. – POUR, J. – ŠEDIVÁ, Z.: Podniková informatika: Grada Publishing, 2009. 496 s. – ISBN978-80-247-2615-1.
4. JUHÁSZ, S. Vállalati információs rendsyerek műszaki alapjai. Bicske: SZAK kiadó, 2011. 506 s. ISBN: 978-963-9863-22-4.
5. KOKLES, M.-ROMANOVÁ, A. Informačný vek. Bratislava: Sprint vfra, 2002. 305s. ISBN 80 89085 09 1.
6. SÁNTÁNÉ, E. – BIRÓ, M. – GÁBOR, A. – KŐ, A. – LOVRICS, L.: Döntéstámogató rendszerek: Budapest : Panem, 2008. 406 s. - ISBN 978-9-635454-82-2.
7. STOFFOVÁ, V. – CSÍZI, L. – TÓTH, K. – SZŐKÖL, Š.: Informačné a komunikačné technológie v praxi II. Komárno : Univerzita J. Selyeho, 2007. 316 s. ISBN 978-80-89234-42-4.
8. STOFFOVÁ, V. – CSÍZI, L. – TÓTH, K. – SZŐKÖL, Š.: Információs és kommunikációs technológiák a gyakorlatban II. Komárno : Univerzita J. Selyeho, 2008. 323 s. ISBN 978-80-89234-69-1.

**Language, knowledge of which is necessary to complete a course:**

Hungarian language and Slovak language

**Notes:**

version 2022-05-12
The students' workload is structured as follows: 15.60% for attending lectures, 7.80% for attending seminars, 10.21% for preparing for lectures, 5.11% for preparing for seminars, 30.64% for preparing their own project or preparing for written examinations, 30.64% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**

Total number of evaluated students: 58

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 44.83 | 32.76 | 15.52 | 5.17 | 1.72 | 0.0 |

**Teacher:** Ing. Ondrej Takáč, PhD., Ing. Ondrej Takáč, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ ISS/22 | **Name:** Information systems in education |

**Types, range and methods of educational activities:**
**Form of study:** Seminar
**Recommended extent of course ( in hours ):**
**Per week:** 1 **For the study period:** 13
**Methods of study:** present

**Number of credits:** 1

**Recommended semester/trimester of study:** 2., 4.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The condition for granting credit is active participation in the class in the range of at least 80%, preparation and presentation of the semestral project.

**Results of education:**
Knowledges:
After completing the subject, the student:
• master the basics of developing school information systems,
• has deeper knowledge of programming,
• knows the implementation procedures.
Skills:
After completing the subject, the student:
• can design school information systems and implement them programmatically,
• can use his theoretical knowledge to solve practical problems of an application nature.

**Brief syllabus:**
• Basics of information systems, peculiarities of school information systems.
• Design and programming of school information systems with regard to application character.
• The validity of the C++ language compared to other programming languages, possibilities of use.
• User interaction, input processing and response to signals.
• Organization of the graphic interface and creation of Layouts.
• Implementation of the school information system in practice.

**Literature:**
1. BAKA, B.: Getting Started with Qt 5. Birmingham : Packt Publishing, 2019. 136 s. ISBN 9781789956030.
2. BENEDEK, Z.: Szoftverfejlesztés C++ nyelven. Bicske : Szak Kiadó, 2007. 510 s. ISBN 9789639131941.
3. STROUSTRUP, B.: A C++ programozási nyelv : I.kötet. Budapest : Kiskapu Kft., 2002. 560 s. ISBN 963 9301 18 3.
4. STROUSTRUP, B.: A C++ programozási nyelv - II. kötet. Budapest : Kiskapu Kft., 2002. 1328 s. ISBN 963 9301 19 1.
5. BASL, J. Podnikové informační systémy: Podnik v informační společnosti 1. vyd. Praha:

Grada Publishing, 2002. 142 s. ISBN 80- 247-0214-2
6. BASL, J. – BLAŽÍČEK, R. Podnikové informační systémy: Podnik v informační společnosti 3. vyd. Praha: Grada Publishing, 2013. 323 s. ISBN 978 80 247 4307 3

**Language, knowledge of which is necessary to complete a course:**
Hungarian and Slovak

**Notes:**
The students' workload is compiled as follows: 39.00% for participation in seminars, 61.00% for preparation for seminars. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 58

| a | n |
|---|---|
| 84.48 | 15.52 |

**Teacher:** Ing. Ondrej Takáč, PhD., Mgr. Norbert Annuš, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ KRY/22 | **Name:** Cryptography |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 1 **For the study period:** 26 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 1.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The course is completed by a written examination, for which students can obtain 50% of the total number of points. During the semester, students will take two written examinations for which they may earn 30% of the total points and 20% of the semester project.
In addition to contact instruction, students prepare for practicums, prepare for written quizzes, and prepare for the exam.
A grade of A requires a minimum of 90 points, a grade of B requires a minimum of 80 points, a grade of C requires a minimum of 70 points, a grade of D requires a minimum of 60 points, and a grade of E requires a minimum of 50 points. Credit will not be awarded to a student who scores less than 50 points.

**Results of education:**
Knowledge: Students learn about cryptographic methods from the Middle Ages to today.
Skills: Students will be able to use cryptographic methods in practice.
Competences: The student will be able to assess information security risks and propose the implementation of an appropriate level of data protection by selecting the required cryptographic method.

**Brief syllabus:**
1. Steganography, cryptography in antiquity, in the Middle Ages.
2. Selected algebraic structures, cryptographic models, Conventional symmetric cryptography.
3. Methods and possibilities of cryptanalysis, basic requirements for cryptographic systems.
4. Contemporary cryptography (Vigenere, Geometric, Plaifair Encryption, Le Grande Shiffre, Homophonic Code).
5. Influence of enigma and Alan Turing on cryptography, cryptographic methods, Feistel-type block ciphers.
6. Coding machines (Purple, Sigaba, Typex MK-III, Nema, ...).
7. DES encryption, AES encryption.
8. Development of asymmetric encryption (Diffie-Hellmann algorithm).
9. RSA.
10. Elliptic curves.
11. Hash functions.

12. Hybrid encryption, modern staganography (LSB technique).
13. Digital signature systems and related problems.

**Literature:**

1. IVÁNYI, A.: Informatikai algoritmusok : 3. kötet. 1. vyd. Vác : Mondat Kft., 2013. 1950 s. ISBN 978-963-87596-8-9.
2. KÖDMÖN, J.: Kriptográfia : Az informatikai biztonság alapjai - A PGP kriptorendszer használata. Budapest : ComputerBooks, 2003. 310 s. ISBN 9636182248.
3. LÁSZLÓ, B. - TÓTH, J.: Bevezetés a számelméletbe. 1. vyd. Dunaszerdahely : Lilium Aurum, 1999. 125 s.
4. ŠALÁT, T. a kol.: Algebra a teoretická aritmetika (2). 1. vyd. Bratislava : ALFA - Vydavateľstvo technickej a ekonomickej literatúry, 1986. 215 s.
5. VAJDA, I. - BUTTYÁN, L.: Kriptográfia és alkalmazás. Typotex Elektronikus Kiadó Kft., 2004. 448 s. ISBN 9639548138.
6. ZNÁM, Š.: Teória čísel. 2. vyd. Bratislava : Vydavateľstvo Technickej a Ekonomickej Literatúry, 1986. 207 s.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
The students' workload is structured as follows: 15.60% for attending lectures, 7.80% for attending tutorials, 10.21% for preparing for lectures, 5.11% for preparing for tutorials, 30.64% for preparing their own project or preparing for written examinations, 30.64% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 60

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 11.67 | 15.0 | 15.0 | 38.33 | 18.33 | 1.67 |

**Teacher:** Dr. habil. Dr. Gábor Kiss, PhD., Dr. habil. Dr. Gábor Kiss, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ LOG/22 | **Name:** Logistics |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 1 **For the study period:** 26 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 3.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
At the end of the semester, there will be a written exam for 100 points; you must score at least 90 points for an A grade, at least 80 points for a B grade, at least 70 points for a C grade, at least 60 points for a D grade, and at least 50 points for an E grade.

**Results of education:**
The aim of the course is to introduce students to the logistics, management and production planning approaches that play a key role in market economy enterprises, as well as the corporate philosophy behind these approaches. The aim is to provide students with a sufficiently deep knowledge to enable them to manage production and logistics processes. The course focuses on solving specific case studies in logistics, production planning and the evaluation of logistics and production costs.

**Brief syllabus:**
1. Basics of logistics, concepts, tasks of logistics, its objectives, costs of logistics
2. Customer service
3. Logistics of the value creation process: procurement logistics, production logistics
4. Transportation of goods
5. Warehousing, inventory management, material handling
6. Handling equipment, systems, packaging technology, logistics services, logistics handling waste
7. Sales logistics
8. Logistics and business organisation
9. Supply chain management
10. Information systems in logistics, relationship of logistics with quality, business economics: stakeholders
11. The place of the enterprise in society, human resources, business plan
12. E-logistics
13. Organisational aspects of the company logistics system, controlling in company production logistics

**Literature:**
1. GELEI, A. Logisztikai döntések – fókuszban a disztribúció. Budapest: Akadémiai Kiadó,

2013. 456 p. ISBN 978-963-059-3809
2. DUPAĽ, A. – BREZINA, I. Logistika v manažmente podniku. Bratislava: SPRINT, 2006. 326 p. ISBN 80-89085-38-5
3. WATERS, D. Global logistics. Cornwall: MPG Books Ltd., 2007. 536 p. ISBN 978 07494 48134
4. SZEGEDI, Z. – PREZENSZKI, J. Logisztika-Menedzsment. Budapest: Kossuth Kiadó, 2005. 456 p. ISBN 963 09 4777 3
5. SZEGEDI, Z. Logisztika-Menedzsment Esettanulmányok. Budapest: Kossuth Kiadó, 2008. 298 p. ISBN 978-963-09-5792-2

**Language, knowledge of which is necessary to complete a course:**
Hungarian language and Slovak language

**Notes:**
version 2022-05-12
The workload of students is structured as follows: 15.60% for attending lectures, 7.80% for attending tutorials, 17.02% for preparing for lectures, 8.51% for preparing for tutorials, 51.07% for preparing for exams . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 4

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 25.0 | 0.0 | 25.0 | 50.0 | 0.0 | 0.0 |

**Teacher:** PhDr. Erika Seres Huszárik, PhD., PhDr. Erika Seres Huszárik, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ MEDT/22 | **Name:** Modern educational technologies |
| **Types, range and methods of educational activities:**<br>**Form of study:** Seminar<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 1 **For the study period:** 13<br>**Methods of study:** present | |
| **Number of credits:** 1 | |
| **Recommended semester/trimester of study:** 1., 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The condition for awarding credit is at least 85% active participation in classes. During the semester students learn about mobile technologies in the teaching of primary and secondary school subjects, as well as the possibilities of using children's programming languages (microworlds), programmable robotic toys. They actively use environments and platforms that support online education, as well as interfaces used for sharing curricula (conference calls), and they constantly study the relevant literature. Students continuously and creatively work on their own projects for the given lesson (with given content), which they submit and present as part of the exercise. Students are evaluated for their activities (own projects) and performances (presentation of projects) during the semester, as well as students must develop 2 projects and present them. | |
| **Results of education:**<br>Knowledge:<br>After completing the subject, the student:<br>• knows the strategies and methods for developing the student's digital and programming skills;<br>• knows the basic principles of problem analysis from the point of view of digital and mobile technologies.<br>Skills:<br>After completing the subject, the student will:<br>• able to analyze and solve IT and algorithmic problems using mobile technologies and devices;<br>• able to work with various modern technologies. | |
| **Brief syllabus:**<br>• Areas of use of modern technologies in IT education.<br>• Tablets in school IT (universal teaching tool). Creating 3D images (MakeIt3D).<br>• Geolocation games (Geocaching, Wherigo, drawing with GPS).<br>• Educational programming - programming of mobile applications.<br>• Programming environments for creating mobile applications - MIT App Inventor, Urwigo.<br>• Mobile applications for teaching programming and developing algorithmic thinking (Run Marco, Lightbot, Tnyker, Bit by Bit, Scratch Jr., The Foos, Fic the Factory, Pocket Code). | |

• Robotics in education and its application in programming. Online simulators for controlling robots (Bee-bot emulator, Ozobot).

**Literature:**

1. CZAKÓOVÁ, K. - STOFFOVÁ, V. Kreativitást és az aktív tanulást támogató programkörnyezetek. In: Mikrovilág alkalmazások : Egyetemi tankönyv. 1. kiadás. Komárno :Univerzita J. Selyeho, 2016. s. 12-31. ISBN 978-80-8122-191-0.
2. CZAKÓOVÁ, K. Saját alkalmazás fejlesztése Imagine programkörnyezetben. In: Mikrovilág alkalmazások : Egyetemi tankönyv. 1. kiadás. Komárno : Univerzita J. Selyeho, 2016. s. 35-107. ISBN 978-80-8122-191-0.
3. EARLE Castledine, E. - EFTOS, M. - WHEELER, M.: Vytváříme mobilní web a aplikace : pro chytré telefony a tablety. 1. vyd. Brno : Computer Press, 2013. 288 s. ISBN 978-80-251-3763-5.
4. ILLÉS, Z. a kol.: Mobil világ és fejlesztése WP7 környezetben. [Online]. Dostupná na internete:<http://dtk.tankonyvtar.hu/xmlui/handle/123456789/3825>
5. KALAŠ, I.: Premeny školy v digitálnom veku. 1. vyd. Bratislava : Slovenské pedagogické nakladateľstvo - Mladé letá, s.r.o., 2013. 256 s. ISBN 978-80-10-02409-4.
6. LOVÁSZOVÁ, G. a kol.: Mobilné technológie vo vyučovaní informatiky. 1. vyd. Nitra : UKF, Fakulta prírodných vied, 2016. 90 s. ISBN 978-80-558-1104-8.
7. MACHAJ, J.: Kniha trendov vo vzdelávaní 2013/2014 : Vzdelanie v digitálnom svete. Ako držať krok s dobou? 1. vyd. Bratislava : EDULAB, n.o., 2014. 82 s.
8. McMANUS, S.: Scratch Programming : Covers Scratch 2.0 and Scratch 1.4. 1. vyd. Leamington : In Easy Steps Limited, 2013. 216 s. ISBN 978-1-84078-612-5.
9. MOLNÁR, P.: Hálózatosodás és tanulás hálózati környezetben. [Online]. Budapest : ELTE, 2013. 82 s. ISBN 978-963-284-325-4. Dostupná na internete: <http://dtk.tankonyvtar.hu/xmlui/handle/123456789/12007>
10. PENTELÉNYI, P.: Az algoritmikus szemléletmód kialakítása és fejlesztése a tanítási - tanulási folyamatban. Budapest : Ligatura, 1999. 128 s. ISBN 963 85138 8 8.
11. STOFFOVÁ, V. - CZAKÓOVÁ, K.: Úvod do programovania v prostredí mikrosvetov : Vysokoškolská učebnica. Komárno : Univerzita J. Selyeho, 2016. 115 s. ISBN 978-80-8122-170-5.
12. VALK, L.: The Lego Mindstroms EV3 Discovery Book : A beginner's guide to building and programming robots. 1. vyd. San Francisco : No Starch Press, 2014. 371 s. ISBN 978-1-59327-532-7.

**Language, knowledge of which is necessary to complete a course:**
Hungarian and Slovak

**Notes:**
The students' workload is composed as follows: 39.00% for participation in seminars, 61.00% for preparation for seminars. During the calculation, we used a reference workload of 25 working hours for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 53

| a | n |
|---|---|
| 96.23 | 3.77 |

**Teacher:** PaedDr. Krisztina Czakóová, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ MSP/22 | **Name:** Management of software projects |
| **Types, range and methods of educational activities:**<br>**Form of study:** Seminar<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 **For the study period:** 26<br>**Methods of study:** present | |
| **Number of credits:** 3 | |
| **Recommended semester/trimester of study:** 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>During the semester, students solve practical tasks for which they can receive 40 points. Students can score 60 points on the exam.<br>Students must acquire at least 90% of the points for the A classification, at least 80% of the points for the B classification, at least 70% of the points for the C classification, at least 60% of the points for the D classification, and at least 50% of the points for the E classification. Students who have not collected 50% of the points by the end of the semester will not receive credit. | |
| **Results of education:**<br>Educational outcomes - knowledges:<br>After completing the subject, the student knows the cycle of software development from concept to planning, implementation, testing and maintenance.<br>Educational outcomes - skills:<br>The student knows project management tools, tools for working with source code, tools for remote communication, and software production work methods.<br>Educational outcomes - competencies:<br>The student will be able to participate in the development of software products as a team member. They will be able to participate in all phases of the development of software solutions, from concept to maintenance. | |
| **Brief syllabus:**<br>1. Formation of teams and determination of team tasks<br>2. Issues of project management.<br>3. Agile methods, SCRUM, XP, TDD<br>4. Software support of project management (Redmine, Trac, Fossil)<br>5. UML modeling, types of UML models, models as software project management tools. Object-relational model.<br>6. Business modeling methods. Software business models and their use.<br>7. Business and development models for free software (free software/open source), cathedrals and bazaars.<br>8. Design patterns<br>9. Design counterpatterns | |

10. Cooperation with the source code (GIT).
11. Distance communication (how we communicate when members are isolated), classic and alternative communication options (phone, sms, IM, email, wiki, issue tracking, teleconference and other communication methods).
12. Software documentation and documentation methods (Doxygen). Documentation standards such as IEEE/ISO/IEC 26512-2017
13. Software testing. Testing methods and standards. Software product quality assurance, automated testing and integration (Jenkins CI)

**Literature:**

1. Raymond, Eric S. The Cathedral and the Bazaar : Musings on Linux and Open Source by an Accidental Revolutionary. Beijing ; Cambridge, [Mass.] :O'Reilly, 1999.
2. Rethinking Productivity in Software Engineering. Caitlin Sadowski, Thomas Zimmermann. Apress; 1st ed. (May 7, 2019); CC BY 4.0;ISBN-10: 1484242203 ISBN-13: 978-1484242209
3. Rethinking Productivity in Software Engineering Editors Caitlin Sadowski Thomas Zimmermann DOI https://doi.org/10.1007/978-1-4842-4221-6
4. Unit Testing Succinctly - Learn how unit testing can be integrated in your development cycle. Author(s) Marc Clifton; Publisher: Syncfusion Inc. (2013)
5. The Essence of Software Engineering; Author(s) Volker Gruhn, Rudiger Striemer; Publisher: Springer; (January 23, 2019); eBook (Creative Commons Edition); License(s): CC BY 4.0
6. The Art of Agile Development Author(s) James Shore, Shane Warden Publisher: O'Reilly Media; 1 edition (October 26, 2007); Paperback 440 pages; Language: English; ISBN-10: 0596527675; ISBN-13: 978-0596527679

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
The students' workload is compiled as follows: 39.00% for participation in seminars, 12.20% for preparation for seminars, 24.40% for preparation of own project or preparation for the written examination, 24.40% for preparation for the exam. For the calculation, we used a reference workload of 25 working hours for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 14

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 35.71 | 64.29 | 0.0 | 0.0 | 0.0 | 0.0 |

**Teacher:** prof. Imre Gábor Felde, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/NS/22 | **Name:** Neural networks |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Seminar / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13<br>**Methods of study:** present | |
| **Number of credits:** 6 | |
| **Recommended semester/trimester of study:** 2. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>During the semester, students create their own application - a computer simulation model of a given system. They will also solve system identification problems analytically, create mathematical models and carry out computer implementation of the models. Students will be graded on the basis of the average of the semester's continuous preparation, the project and the overall grade point average obtained in the exam. A grade of at least 90% is required for grade A, at least 80% for grade B, at least 70% for grade C, at least 60% for grade D, and at least 50% for grade E. | |
| **Results of education:**<br>Knowledge:<br>After completing the course, the student will be familiar with different types of neural network models such as feed-forward neural networks, recurrent neural networks, Hopfield neural networks, RBF networks, self-organizing maps.<br>Skills:<br>After completing the course, students will be able to analyse and solve complex problems using neural networks, such as processing numerical data, text, images and sound.<br>Competences:<br>After completing the course, the student will show a high degree of autonomy in creating models. The student will develop a high level of skills in modelling neural networks in different application domains. | |
| **Brief syllabus:**<br>1. Defining and building neural networks.<br>2. Elements and topology of neural networks.<br>3. History and applications of neural networks.<br>4. Binary perceptron - learning rule of perceptron, pattern classification.<br>5. Backpropagation 1 - multilayer feedforward networks, derivation of learning rules.<br>6. Backpropagation 2 - teaching and testing sample set, relearning, modifications to the default learning rule.<br>7. The approximation capabilities of neural networks.<br>8. Linear neural networks. | |

9. Radial basis function (RBF) networks.
10. Hopfield discrete and continuous networks.
11. Recurrent neural networks - temporal structure in data, feed forward neural time delay (TDNN), echo - echo state neural networks.
12. Learning and application of recurrent neural networks.
13. Self-organising maps, Kohonen model, LVQ, Max-net, Oja and Sanger learning rule, extract principal components from data, data dimension reduction, clustering.

**Literature:**

1. KVASNIČKA, V. - BEŇUŠKOVÁ, L. - POSPÍCHAL, J. - FARKAŠ, I. - TIŇO, P. – KRÁĽ, A.: Úvod do teórie neurónových sietí . IRIS, Bratislava, 1997.
2. SIVANANDAM, S. N. - SUMATHi, S. – DEEPA, S.N. : Introduction to Neural Networks Using Matlab 6.0. Tata McGraw-Hill New Delhi 2006
3. HAYKIN, S.: Neural Networks: A Comprehensive Foundation (2nd ed.). Prentice Hall, NJ 1999.
4. TAYLOR, J. G.: Neural networks and their applications. New York : Wiley, 1996, 302 s. ISBN 0471962821.
5. KMEŤ, T. - KMEŤOVÁ, M. - ANNUŠ, N.: Neurális hálózatok programi megvalósítása MATLAB-ban, UJS, 2021, 225 s. ISBN 9788081224041
6. FAZEKAS, I.: Neurális Hálózatok, Debreceni Egyetem, 2013, 201 s. Forrás: https://gyires.inf.unideb.hu/GyBITT/19/Neuralis_halozatok_v8.pdf
7. ALTRICHTER, M. - HORVÁTH, G. - PATAKI, B. - STRAUSZ, Gy. - TAKÁCS, G. - VALYON, J.: Neurális hálózatok, Panem Könyvkiadó, 2006, 413 s. Forrás: https://docplayer.hu/10994735-Neuralis-halozatok-altrichter-marta-horvath-gabor-pataki-bela-strausz-gyorgy-takacs-gabor-valyon-jozsef.html

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
50% - participation in tutorials, preparation for exams,
50% - study of literature, practice of acquired knowledge, development of practical exercises.

**Evaluation of subjects**
Total number of evaluated students: 88

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 23.86 | 13.64 | 19.32 | 25.0 | 14.77 | 3.41 |

**Teacher:** prof. RNDr. Tibor Kmeť, CSc., prof. RNDr. Tibor Kmeť, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ ODP/22 | **Name:** Diploma thesis and its defense |
| **Types, range and methods of educational activities:**<br>**Form of study:**<br>**Recommended extent of course ( in hours ):**<br>**Per week: For the study period:**<br>**Methods of study:** present | |
| **Number of credits:** 20 | |
| **Recommended semester/trimester of study:** 3., 4.. | |
| **Level of study:** II. | |
| **Prerequisites:** KINF/AIdm/ANM/22 and KINF/AIdm/OP/22 and KINF/AIdm/DIP2/22 and KINF/AIdm/TNMS/22 and KINF/AIdm/FUS/22 and KINF/AIdm/DSO/22 and KINF/AIdm/DIP1/22 and KINF/AIdm/SHA/22 and KINF/AIdm/HEU/22 and KINF/AIdm/NS/22 and KINF/AIdm/AZI/22 and KINF/AIdm/PIK/22 and KINF/AIdm/DIO/22 and KINF/AIdm/APDS/22 | |
| **Conditions for passing the subject:**<br>Completion of all compulsory courses and the number of compulsory elective courses prescribed by the relevant study programme. Obtaining at least the minimum number of credits for the relevant degree. Obtaining the minimum number of credits required for the degree of study.<br>The student must complete the thesis by the specified deadline and successfully defend it publicly and in person before the committee. | |
| **Results of education:**<br>The student will demonstrate the ability to independently acquire theoretical and practical knowledge and creatively apply and use them in solving specific problems. Thesis can be theoretical, research or application.<br>Knowledge:<br>• The student knows the structure of a scientific publication,<br>• the student can independently and creatively use professional sources,<br>• the student is able to analyse and evaluate the current state of the problem in his/her field,<br>• the student can synthesize and apply the acquired theoretical knowledge in practical educational activities,<br>• the student can adequately choose research procedures and functionally apply them.<br>Skills:<br>• By processing the diploma thesis, the student should demonstrate the ability to independently acquire theoretical and practical knowledge and creatively apply them and use them in solving specific problems,<br>• the student is able to present and defend his/her professional position on problems of educational work and find ways of their solution,<br>- the student has developed the skills of independent learning, which enables him/her to continue further study,<br>• the student can understand the complexity of phenomena and formulate decisions even when incomplete or limited information, embracing social and ethical responsibility in the application of their knowledge and in making decisions, | |

- the student will be able to justify the ideas presented, as well as to articulate in a sophisticated manner practical conclusions and recommendations,
- the student will be able to prepare a presentation of the results of his/her own research activities, the student will be able to apply the principles of scientific integrity and ethics.
Competencies:
• The student will be able to demonstrate his/her professional and scientific knowledge and skills in his/her field of study,
• the student is able to argue and methodically apply knowledge in theoretical, didactic and methodological contexts,
• the student is able to implement and synthesize the acquired knowledge in practice,
• the student is able to creatively apply knowledge in solving the assigned tasks, analyse the problem and synthesize a new solution,
• the student is able to answer the questions of the supervisor and the opponent at the required level, to successfully defend the final thesis.

**Brief syllabus:**
• Development of a thesis.
• Preparation of the thesis.
• Defence of the thesis in terms of the opinions and discussions on the thesis.
The thesis defense has a course:
1. The student’s presentation of the thesis.
2. Presentation of the main points from the written opinions of the thesis supervisor and opponent.
3. Student's answers to the thesis supervisor's and opponent's questions.
4. A professional discussion of the thesis with questions for the student.
The student's presentation of the thesis should include, in particular, the following points:
1. A brief justification of the choice of the topic, its topicality, practical contribution.
2. Clarification of the objectives and methods used in the elaboration of the thesis.
3. The main content problems of the thesis.
4. Conclusions and practical recommendations reached by the author of the thesis.
During the presentation, the student has at his/her disposal his/her own copy of the thesis, or an electronic presentation. The speech is to be delivered independently, in the scope of 10 min. The student may use computer technology.
The thesis is available to the committee before and during the defence.

**Literature:**
1. KATUŠČÁK, D.: Ako písať záverečné a kvalifikačné práce. Nitra: Enigma, 2007. 164 s. ISBN 978-80-89132-45-4.
2. KIMLIČKA, Š.: Ako citovať : a vytvárať zoznamy bibliografických odkazov : podľa noriem ISO 690 pre klasické aj elektronické zdroje. Bratislava : Stimul, 2002. 82 s. ISBN 80-889-82-57-X.
3. LAWS, A.: Presentations. Longman, 2000. 140 s. ISBN 1902741161.
4. PAOLO, F.: Umění verějně vystoupit = aneb řečníkem za 2 hodiny. 1. vyd. Frýdek - Místek : Alpress, s.r.o., 1997. 256 s. ISBN 80-87218-000-2.
5. PEERY, A.: Creating Effective Presentation : Staff Development with Impact. 1. vyd. Plymouth : Rowman & Littlefield Education, 2011. 106 s. ISBN 978-1-60709-622-1.
6. Smernica rektora č. 7/2011 o úprave, registrácii, sprístupnení a archivácii záverečných prác na Univerzite J. Selyeho.
7. KATUŠČÁK, D. Ako písať vysokoškolské a kvalifikačné práce. Bratislava: Enigma, 2004. Aktuálna Smernica rektora o úprave, registrácii, sprístupnení a archivácii záverečných prác na Univerzite J. Selyeho – dostupné na https://www.ujs.sk/documents/

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**Language, knowledge of which is necessary to complete a course:**
Hungarian, Slovak

**Notes:**
The preparation and defence of the thesis has a time workload of approximately 500 working hours.

**Evaluation of subjects**
Total number of evaluated students: 56

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 67.86 | 12.5 | 14.29 | 3.57 | 1.79 | 0.0 |

**Teacher:**

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/OP/22 | **Name:** Professional practice |

**Types, range and methods of educational activities:**
**Form of study:** Practical
**Recommended extent of course ( in hours ):**
**Per week:** 6 **For the study period:** 78
**Methods of study:** present

**Number of credits:** 6

**Recommended semester/trimester of study:** 4.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
Certificate of completion of at least 4 weeks (minimum 150 hours) of professional practice.
The website prax.ujs.sk is used to coordinate students' professional practice.

**Results of education:**
Education outcomes - knowledges:
After completing the subject, the student:
• has an overview of the organizational structure of the institutions in which he completed his professional practice.
Education outcomes - skills:
• can get involved in the work process and can understand work processes,
• can acquire work habits, take responsibility and work in a team,
• can apply theoretical knowledge in practice.
Education outcomes - competences:
• is independent in fulfilling work duties,
• is a valid member in teamwork.

**Brief syllabus:**
1. Active participation in professional practice in institutions and organizations of their choice or workplace offers.
2. Fulfilling work tasks in institutions and organizations.

**Literature:**
1 According to the content of the job description.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
The students' workload includes at least 150 hours of professional practice, which corresponds to practice for at least 4 weeks.

**Evaluation of subjects**
Total number of evaluated students: 58

| a | n |
|---|---|
| 100.0 | 0.0 |
| **Teacher:** PaedDr. Ladislav Végh, PhD., prof. RNDr. Tibor Kmeť, CSc., | |
| **Date of last update:** 18.02.2025 | |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. | |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ PIK/22 | **Name:** Computer and information communications |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 1 **For the study period:** 26 / 13<br>**Methods of study:** present | |
| **Number of credits:** 5 | |
| **Recommended semester/trimester of study:** 1. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>Students are classified according to the evaluation obtained from the continuous training during the semester (20 points) and the exam (80 points).<br>In addition to contact teaching, students prepare for exercises, prepare for written examinations and prepare for the exam.<br>It is necessary to get at least 90% of points for A rating, at least 80% of points for B rating, at least 70% of points for C rating, at least 60% of points for D rating and at least 50% of points for E rating. Credits will not be granted to a student who receives less than 50% of the points from the written examination. | |
| **Results of education:**<br>Education results - knowledge:<br>• Students will become familiar with computer networks, their architecture, communication protocols and algorithms ensuring computer communication.<br>• They also know mobile, intelligent and reconfigurable networks.<br>• Students master basic theoretical and practical knowledge in the field of communication technologies, computer networks and their applications.<br>Learning outcomes - skills:<br>• The student will be able to configure a computer network, design a network architecture, configure protection against unauthorized access (firewall).<br>• The student will be able to create a private network and divide computer networks based on security requirements, for example, into internal, demilitarized and external.<br>• The student will be able to design a computer network for a specific application case with regard to modern building elements and the economic side of the project.<br>Education results - competences:<br>• The student can use his skills as a network administrator, as a user administrator or as a security auditor.<br>• The student will be able to analyze the information flow, detect and eliminate network problems independently, even when solving more complex problems. | |
| **Brief syllabus:**<br>1. Global, local, public, and closed computer networks, design of computer networks. | |

2. Network architectures, cooperation of computer networks.
3. Metallic, optical and wireless computer networks, their merging and operation.
4. Communication algorithms and communication protocols used in computer networks.
5. Intelligent networks.
6. Security of computer networks.
7. Mobile computer networks - technical basics, protocols.
8. Mobile computer networks - radio concept, global mobility.
9. Computer networks of the new generation, intelligent and reconfigurable information systems.
10. Information and communication management, marketing activities.
11. information and communication sector of the EU.
12. Economic and legal issues of competition in the global market of information and communication technologies.
13. Information and communication technology development strategy process, network development and management.

**Literature:**

1. CSÓRIÁN, S.: Számítógépes hálózatok. Budapest : Kossuth Kiadó, 1999. 84 s. ISBN 9630940965.
2. PALKOVA, Z. – RODNY, T. – OKENKA, I. – HAJOS, L.: The optimisation agricultural processes using mathematical modeling. Budapest : Szaktudás Kiadó Ház, 2013. 110 s. ISBN 978-615-5224-35-5.
3. SOSINSKY, B.: Počítačové sítě : Vše, co potřebujete vědět o správě sítí. Brno : Computer Press., 2010. 840 s. ISBN 978-80-251-3363-7.
4. STOFFOVÁ, V.: Az informatika alapjai II. : A számítógépes hálózatok. Komárno : UJS, 2010. 140 s. ISBN 978-80-89234-65-3.
5. TORSELLO, D. – PAPPOVÁ, M.: Social Networks in Movement. Dunajská Streda : Lilium Aurum. 2003. 324 s. ISBN 80-8062-179-9.
6. VYMĚTAL, J. – ŠILHÁNEK, J.: Informační středisko ve firemní praxi. Ostrava: MONTANEX, 1996. 131 s. ISBN 80 85780 61 5.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
The students' workload is composed as follows: 15.60% for participation in lectures, 7.80% for participation in exercises, 10.21% for preparation for lectures, 5.11% for preparation for exercises, 30.64% for preparation of own project or preparation for written examinations, 30.64% for preparation for the exam. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 65

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 16.92 | 36.92 | 23.08 | 10.77 | 4.62 | 7.69 |

**Teacher:** prof. András Molnár, PhD., Dr. habil. Dr. Gábor Kiss, PhD., Dr. habil. Dr. Gábor Kiss, PhD., Mgr. Norbert Annuš, PhD., prof. András Molnár, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ RB/22 | **Name:** Robotics |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 1 **For the study period:** 26 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 3.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The course ends with a written exam, for which students can get 50% of the total number of points. During the semester, students pass two written examinations, for which they can receive 50% of the total number of points.
In addition to contact teaching, students prepare for exercises, prepare for written examinations and the exam.
It is necessary to get at least 90% of points for A rating, at least 80% of points for B rating, at least 70% of points for C rating, at least 60% of points for D rating and at least 50% of points for E rating. Credits will not be granted to a student who has not collected 50% of points at the end of the semester.

**Results of education:**
Education results - knowledge:
After successfully completing the subject, the student:
• has deeper knowledge in the field of robotics, autonomous mobile systems and their use in wide practice,
• knows the principles of positioning and navigation in connection with the mathematical evaluation of navigation signals,
• knows individual functional and structural parts of robots,
• knows the concept of neural networks in robotics.
Learning outcomes - skills:
After successfully completing the subject, the student:
• can design mobile or stationary robotic systems,
• can design and implement multisensory systems,
• can mathematically evaluate navigation signals,
• can analyze and solve basic problems of stationary or mobile robots,
• can navigate robotic systems and use them in specific applications.
Education results - competences:
After successfully completing the subject, the student:
• knows how to work efficiently and implement acquired theoretical knowledge,
• has an active and responsible approach to completing tasks,

• shows independence in solving more complex problems.

**Brief syllabus:**

1. Introduction to robotic systems, platform stability solutions, CLAWAR machines.
2. Mobile robots - wheeled, tracked and biologically inspired systems.
3. Stationary robots - manipulation systems, relative positioning, transformations.
4. Visual positioning systems - properties, principle of operation, use.
5. Possibilities of precise positioning of robotic systems.
6. Use of neural networks and interpolation systems in positioning.
7. General principles of navigation of mobile robots, processing of navigation variables of external sensors.
8. Autonomous robotic systems and their interactive interaction with the environment.
9. Sensory system of autonomous robots, multisensory approach.
10. Computer vision – laser, camera, infrared and ultrasound principles, based mainly on trigonometric principles.
11. Basic problems of mobile robotics – navigation in known and unknown environments.
12. Planning the route of the mobile robot, creating maps, avoiding obstacles.
13. Cooperation of mobile robots using centralized and distributed control.

**Literature:**

1. STUART, R. - NORVIG, P.: Mesterséges intelligencia modern megközelítésben Budapest :
2. Panem Könyvkiadó, 2005. 1206 s. ISBN 963 545 411 2.
3. KULCSÁR, B.: Robottechnika LSI Oktatóközpont, 2003. 394 s. ISBN 963 577 243 2.
4. CSEREY, G. – ISTENES, Z.: Autonom Mobil Robotok. Budapest: Eötvös Loránd Tudományegyetem, 2019. ISBN 978-963-284-467-1. http://dtk.tankonyvtar.hu/xmlui/handle/123456789/3722
5. MESTER, G.: Robotika. Szeged. Szegedi Tudományegyetem, 2011. ISBN 978-963-279-515-7. http://dtk.tankonyvtar.hu/xmlui/handle/123456789/7525
6. PIGLERNÉ, L. R. – STARKNÉ, W. A.: Ágens-technológia. Pannon Egyetem, 2011. http://dtk.tankonyvtar.hu/xmlui/handle/123456789/7529
7. LACZIK, B.: Robottechnika. EDUTUS Főiskola, 2012. http://dtk.tankonyvtar.hu/xmlui/handle/123456789/11920
8. SZABÓ, Z. – BUDAI, C. – KOVÁCS, L. – LIPOPVSKI, G.: Robotmechanizmusok. BME, 2014. http://dtk.tankonyvtar.hu/xmlui/handle/123456789/3421

**Language, knowledge of which is necessary to complete a course:**

Hungarian, English

**Notes:**

version 2022-05-12

The students' workload is composed as follows: 15.60% for participation in lectures, 7.80% for participation in exercises, 10.21% for preparation for lectures, 5.11% for preparation for exercises, 30.64% for preparation of own project or preparation for written examinations, 30.64% for preparation for the exam. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**

Total number of evaluated students: 46

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Teacher:** prof. András Molnár, PhD., prof. András Molnár, PhD.,

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| **Date of last update:** 18.02.2025 |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ SHA/22 | **Name:** Statistics and in-depth data analysis |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 2.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The course is completed by a written examination, for which students can obtain 50% of the total number of points. During the semester, students will take two written examinations for which they can also obtain 50% of the total points.
In addition to contact teaching, students prepare for practicals, prepare for written quizzes, and prepare for the exam.
A grade of A requires at least 90 points, a grade of B requires at least 80 points, a grade of C requires at least 70 points, a grade of D requires at least 60 points, and a grade of E requires at least 50 points. Credit will not be awarded to a student who achieves less than 50 points.

**Results of education:**
Knowledge: Upon completion of the course, the student will:
- the student masters advanced data analysis,
- has advanced statistical knowledge.

Skills: Upon completion of the course, the student will:
- able to use statistical software at an advanced level,
- able to use parametric and non-parametric tests in practice.

Competences: Upon completion of the course, the student will be able to extract relevant knowledge from a larger data set independently, using appropriate statistical software, even when solving more complex problems.

**Brief syllabus:**
1. Methods of mathematical statistics: random selection, estimation, statistical hypotheses and tests.
2. Multivariate distributions. Multivariate normal distribution, Wishart distribution. Cochran's theorem.
3. Estimation of parameters of multivariate normal distribution. Parameter testing and tests for
4. verifying the normality of the distribution.
5. Multivariate regression analysis, analysis of variance, covariance analysis.
6. Principal components analysis, their properties and interpretation. Factor analysis.
7. Contingency table analysis, discriminant analysis.
8. Cluster analysis, basic clustering procedures.
9. Probit and Logit model. Statistical software for multivariate analysis.

10. Classification, Bayes' decision rule. Classification problem of discriminant analysis. Neural networks.
11. Modern data mining algorithms.
12. Dependency between attributes. Association rules.
13. Applications of data mining and knowledge discovery in databases.

**Literature:**

1. ADRIAANS, P. - ZANTINGE, D.: Adatbányászat. 1. vyd. Budapest : PANEM, 1996. 158 s. ISBN 963-545-367-1.
2. BOLLA, M. – KRÁMLI, A.: Statisztikai következtetések elmélete. Typotex, 2012. 407 s. ISBN 9639548413.
3. BODON, F.: Adatbányászati algoritmusok. 2010. [online]. http://www.cs.bme.hu/~bodon/magyar/adatbanyaszat/tanulmany/index.html .

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
The students' workload is structured as follows: 15.60% for attending lectures, 7.80% for attending tutorials, 10.21% for preparing for lectures, 5.11% for preparing for tutorials, 30.64% for preparing their own project or preparing for written examinations, 30.64% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 61

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 32.79 | 24.59 | 18.03 | 16.39 | 8.2 | 0.0 |

**Teacher:** Dr. habil. Attila Elemér Kiss, CSc., Dr. habil. Dr. Gábor Kiss, PhD., Dr. habil. Dr. Gábor Kiss, PhD., Dr. habil. Attila Elemér Kiss, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ SLAW/22 | **Name:** Software law |

**Types, range and methods of educational activities:**
**Form of study:** Seminar
**Recommended extent of course ( in hours ):**
**Per week:** 1 **For the study period:** 13
**Methods of study:** present

**Number of credits:** 1

**Recommended semester/trimester of study:** 1., 3.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The requirements of granting the credit are active class participation of at least 85%, development and presentation of a semestral project.

**Results of education:**
Educational outcomes - knowledges:
The course provides students with a general knowledge and understanding of software law.

**Brief syllabus:**
• Basic characteristics of the software law
• Licences and licensing agreement, Open Source and Free software
• Software piracy prevention
• Employee monitoring, appropriate contractual arrangements
• Software distribution options
• Confidentiality agreement
• Data analytics contracts
• General Data Protection Regulation
• Liability for defects in construction contracts
• Legal background of used software

**Literature:**
JANSA, Lukáš, Petr OTEVŘEL a Martin ŠTEVKO. Softwarové právo. 3. aktualizované a rozšířené vydání. Brno: Computer Press, 2018. ISBN 978-80-251-4914-0.
Zákon č. 305/2013 Z. z. o elektronickej podobe výkonu pôsobnosti orgánov verejnej moci a o zmene a doplnení niektorých zákonov (zákon o e-Governmente)
Zákon 275/2006 Z.z. (o informačných systémoch verejnej správy a o zmene a doplnení niektorých zákonov)
Zákon č. 18/2018 Z. z. o ochrane osobných údajov a o zmene a doplnení niektorých zákonov

**Language, knowledge of which is necessary to complete a course:**
Slovak and Hungarian

**Notes:**
Distribution of students' workload:

The students' workload is structured as follows: 39.00% for attending lectures, 61.00% for preparing their own projec, For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 52

| a | n |
|---|---|
| 98.08 | 1.92 |

**Teacher:** Mgr. Balázs Vígh,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ SMP/22 | **Name:** Social, moral and legal context of computer systems development |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 **For the study period:** 26<br>**Methods of study:** present | |
| **Number of credits:** 3 | |
| **Recommended semester/trimester of study:** 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>During the semester, students will complete two written quizzes for which they may earn 100% of the total points.<br>In addition to contact teaching, students prepare for lectures and prepare for written examinations.<br>For assessment A should be obtained at least 90 points, for assessment B at least 80 points, for assessment C at least 70 points, for assessment D at least 60 points, for assessment E at least 50 points. Credits for the subject will not be awarded to a student who does not obtain at least 50 points. | |
| **Results of education:**<br>Educational outcomes - knowledges:<br>Upon successful completion of the course, the student:<br>- will be aware of the social, moral, legal and economic contexts of his/her profession,<br>- acquire a basic knowledge of the methods and means of ensuring safety on Internet security, and acquire basic knowledge in selected areas of law application,<br>- gain knowledge of the understanding of ICT and the information revolution.<br>Educational outcomes - skills:<br>Upon successful completion of the course, the student:<br>- can use selected legal norms,<br>- can use the Internet and means of communication in accordance with the protection of personal data, with the protection of business privacy and general security,<br>- can use electronic signature.<br>Educational outcomes - competencies:<br>Upon successful completion of the course, the student will be able to make independent and correct decisions and act in specific ethical and cybercrime situations. | |
| **Brief syllabus:**<br>1. Legal protection of computer software<br>2. Copyright protection of computer programs<br>3. Social context of informatics and information and communication technologies<br>4. Information and communications technology law | |

5. Software piracy
6. Cybercrime
7. Legal regulations for e-commerce in Slovakia
8. Electronic signature
9. Internet safety
10. Legal issues and the internet in Slovakia
11. Domain name registration
12. General Data Protection Regulation
13. Cross-border flow of personal data

**Literature:**

1. CRUME, J.: Az internetes biztonság belülről : Amit a hekkerek titkolnak. Addison-Wesley, 2003. 302 s. ISBN 9639131512.
2. CHLIPALA, M. a kol.: Právo informačných a komunikačných technológií. Slovenská technická univerzita, 2005. 186 s. ISBN 9788022721950.
3. HANCE, O. - SISÁK, G.: Üzlet és jog az interneten. Budapest : Panem, 1997. 410 s. ISBN 963545127x.
4. KYAS, O. - INOTAI, L.: Számítógépes hálózatok biztonságtechnikája. Budapest : Kossuth, 2000. 312 s. ISBN 9630941538.
5. MAISNER, M. a kol.: Základy práva informačných technológií. IURA EDITION, 2013. 320 s. ISBN 9788080785949.
6. MAISNER, M.: Základy softwarového práva. Wolters Kluwer, 2011. 356 s. ISBN 978-80-7357-638-7.
7. POLČÁK, R.: Internet a proměny práva, Vydavateľstvo: Auditorium, 2012. 388 s. ISBN 978-80-87284-22-3.
8. POLČÁK, M. Právo na internetu, Spam a odpovědnost ISP. Computer Press, 2007. 150 s. ISBN 8025117774.
9. RHEE, Y. M.: Internet Security. Wiley, 2003. 408 s. ISBN 0470852852.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
Distribution of students' workload:
The students' workload is structured as follows: 26.00% for attending lectures, 14.80% for preparing for lectures 29.60% for preparing their own project or preparing for written examinations, 29.60% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 12

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 50.0 | 8.33 | 25.0 | 8.33 | 8.33 | 0.0 |

**Teacher:** Mgr. Balázs Vígh,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/SVK/22 | **Name:** Student Scientific Conference |
| **Types, range and methods of educational activities:**<br>**Form of study:** Seminar<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 1 **For the study period:** 13<br>**Methods of study:** present | |
| **Number of credits:** 1 | |
| **Recommended semester/trimester of study:** 2., 4. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course is completed by awarding credits (no grade) - passed. It is a condition that the student prepares and submits and presents a paper at the University round of the Student Scientific Activity. | |
| **Results of education:**<br>The graduate of the course will be able to:<br>- competency to write a professional thesis on a topic of their choice and according to the required<br>criteria, i.e. the thesis meets the professional and formal criteria;<br>- work with professional texts and sources and use them appropriately for the elaboration of the topic;<br>- argue, argue polemically and engage appropriately in professional discourse;<br>- speak publicly and present the results of their work in a professional manner. | |
| **Brief syllabus:**<br>Preparation of a professional text, a topic of your choice and its presentation | |
| **Literature:**<br>According to the topic of work | |
| **Language, knowledge of which is necessary to complete a course:**<br>Hungarian and Slovak | |
| **Notes:**<br>The student workload is structured as follows: 39.00% for attending seminars, 61.00% for preparing for seminars. For the calculation we used a reference workload of 25 hours of work for each ECTS credit. | |
| **Evaluation of subjects**<br>Total number of evaluated students: 6 | |

| a | n |
|---|---|
| 100.0 | 0.0 |

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| **Teacher:** Ing. Ondrej Takáč, PhD., PaedDr. Krisztina Czakóová, PhD., |
| **Date of last update:** 18.02.2025 |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ TES/22 | **Name:** Development of educational software |

**Types, range and methods of educational activities:**
**Form of study:** Seminar
**Recommended extent of course ( in hours ):**
**Per week:** 1 **For the study period:** 13
**Methods of study:** present

**Number of credits:** 1

**Recommended semester/trimester of study:** 2., 4.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
The condition for granting credit is active participation in the class in the range of at least 80%. During the semester, students independently solve an assigned programming task – a semester project, the output of which is their own pedagogical software.

**Results of education:**
Knowledges:
After completing the subject, the student:
• knows strategies, methods and forms of pedagogical software development;
• knows the principles of program development in programming languages;
• knows the basic principles of creating algorithms and program structures;
• knows effectively apply acquired programming knowledge to create own pedagogical software;
Skills:
After completing the subject, the student:
• can analyze and solve problems using a programming language;
• can choose the right algorithm for solving a problem;
• can actively program in a given programming environment, can integrate several environments to achieve the set goal;

**Brief syllabus:**
• Possibilities of using computers in several forms and phases of teaching.
• Presentation of learning material – computer-use skills.
• Pedagogical and psychological aspects of creating pedagogical software.
• Classification of pedagogical software according to various aspects.
• Selection of a suitable pedagogical software topic, project proposal.
• Implementation of pedagogical software.
• Computer testing of knowledge.
• Possibilities of creating animation in different programming languages.

**Literature:**
1. ANGSTER, E.: Az objektumorientált tervezés és programozás alapjai. Budapest : Akadémiai, 2000. 312 s.ISBN 9636508186.
2. CHAPMAN, N. - CHAPMAN, J.: Digitel multimedia: Second Edition, 2003. 700 s. ISBN

0470858907.
3. CZAKÓOVÁ, K. – STOFFOVÁ, V. Kreativitás és az aktív tanulást támogató programkörnyezetek. In: Mikrovilág alkalmazások : Egyetemi tankönyv. 1. kiadás. Komárno : Univerzita J. Selyeho, 2016. s. 12-31. ISBN 978-80-8122-191-0.
4. CZAKÓOVÁ, K. Saját alkalmazás fejlesztése Imagine programkörnyezetben. In: Mikrovilág alkalmazások : Egyetemi tankönyv. 1. kiadás. Komárno : Univerzita J. Selyeho, 2016. s. 35-107. ISBN 978-80-8122-191-0.
5. KADLEC, V.: Učíme se programovat v Delphi a jazyce OBJECT PASCAL. Brno : Computer Press, 2002. 290 s. ISBN 8072262459.
6. MCCARTHY, J.: Softwarové projekty. 1. vyd. Praha : Computer Press, 1999. 190 s. ISBN 80-7226-164-0.
7. MCCARTHY, J.: Softwarové projekty. Brno : Computer Press, 1999. 190 s. ISBN 8072261940.
Strana: 55
8. STOECKER, M.: Developing Wisndows-Based Applicatoins with Microsft. Microsoft .net, 2003. 600 s. ISBN 0735619263.
9. STOFFOVÁ, V. – CZAKÓOVÁ, K.: Prostredie na učenie sa bádaním. In: Úvod do programovania v prostredí mikrosvetov : Vysokoškolská učebnica. Komárno : Univerzita J. Selyeho, 2016. 115 s. ISBN 978-80-8122-170-5.
10. STOFFOVÁ, V. – CZAKÓOVÁ, K.: Tvorba vlastných aplikácií v Imagine. In: Úvod do programovania v prostredí mikrosvetov : Vysokoškolská učebnica. Komárno : Univerzita J. Selyeho, 2016. 115 s. ISBN 978-80-8122-170-5.
11. SZIRMAY-KALOS, L. - LÁSZLÓ, Z. – KONDOROSI, K.: Objektum-orientált szoftverfejlesztés. Budapest : ComputerBooks, 2001. 427 s. ISBN 963 618 108 X.
12. SZIRMAY-KALOS, L. Háromdimenziós grafika, animáció és játékfejlesztés. Budapest : ComputerBooks, 2004. 486 s. ISBN 9636183031.
13. VÁMOSSY, Z.: Delphi a gyakorlatban. Bicske : Szak, 2002. 132 s. ISBN 963 9131 22 9.
14. VÉG, Cs.: Alkalmazásfejlesztés : a Unified Modeling Language szabványos jelöléseivel. Debrecen : Logos 2000, 1999. 246 s. ISBN 963 03 7660 1.

**Language, knowledge of which is necessary to complete a course:**
Hungarian and Slovak

**Notes:**
The students' workload is compiled as follows: 39.00% for participation in seminars, 61.00% for preparation for seminars. For the calculation, we used a reference load of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 53

| a | n |
|---|---|
| 96.23 | 3.77 |

**Teacher:** PaedDr. Krisztina Czakóová, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ TGR/22 | **Name:** Developing graphical user interfaces in C++ |

**Types, range and methods of educational activities:**
**Form of study:** Lecture / Seminar / Practical
**Recommended extent of course ( in hours ):**
**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13
**Methods of study:** present

**Number of credits:** 5

**Recommended semester/trimester of study:** 1.

**Level of study:** II.

**Prerequisites:**

**Conditions for passing the subject:**
During the semester, students solve practical tasks for which they can receive 30 points. At the end of the semester, students prepare a semester project for which they can receive 30 points. Students can score 40 points on the exam.
Students must acquire at least 90% of the points for the A classification, at least 80% of the points for the B classification, at least 70% of the points for the C classification, at least 60% of the points for the D classification, and at least 50% of the points for the E classification. Students who have not collected 50% of the points by the end of the semester will not receive credit.

**Results of education:**
Educational outcomes - knowledges:
• students know the basics of the C++ programming language,
• at the end of the course, the student will create interactive graphic applications with graphic components.
Educational outcomes - skills:
• The student will be able to object-oriented programming in the C++ language,
• The student will be able to create graphic applications using the Qt toolkit.
• The student will be able to create interactive functions, graphical environments, multi-window applications, configuration dialogs and use other graphical and non-graphical components of the Qt toolkit.
• The student can use his skills in developing graphic programs, as well as in developing high-performance programs and programs that require a high degree of optimization.
Educational outcomes - competencies:
• The student has skills that will enable him to work as a programmer, software engineer, developer of graphic programs, designer of graphic user environments, but also as a programmer of high-performance programs, as a game programmer or programmer of embedded applications such as information panels, ATMs, etc.

**Brief syllabus:**
1. The validity of the C++ language compared to other programming languages. Possibilities of use. Comparison of C++ with procedural languages like C. Comparison of C++ with object-oriented languages like C# and Java.

2. Basics of C++ syntax. Variables, basic types, structures, references and pointers, operators, expressions and commands. Functions and procedures. Compilation of the source code and creation of the application.
3. CMake configuration system.
4. Work with source code. Version management system - GIT. Creating versions, branches and revisions.
5. Teamwork with source code. Accepting changes, mixing versions, sending and receiving changes.
6. Objects and classes. Variables, methods, constructors, copy constructors, destructors. Encapsulation (visibility), public, protected and private. Friend functions and friend classes.
7. Working with text in C++. Text encoding, loading and saving text. Serialization and deserialization of variables and structures, regular expressions.
8. Structures in STL (Standard Template Library). List, Queue, Vector, Map, Set, Stack. Algorithms in STL. Sort, for_each, copy, fill.
9. Qt library for creating cross-platform graphic applications. Qt widgets, windows, buttons, labels, selections and images.
10. Organization of the graphic interface and creation of Layouts.
11. Signals and slots in Qt. Communication between components. Creation of signals, connection of signals with procedures.
12. User Interaction. Input processing and reaction to signals. Creation of menus, dialogs and multiple windows.
13. QTest – testing applications in Qt.

**Literature:**

1. Gazihan Alankus, Olena Lizina, Rakesh Mane, Vivek Nagarajan, Brian Price (2019). Advanced C++. Packt Publishing. ISBN: 9781838821135
2. BAKA, B.: Getting Started with Qt 5. Birmingham : Packt Publishing, 2019. 136 s. ISBN 9781789956030.
3. BENEDEK, Z.: Szoftverfejlesztés C++ nyelven. Bicske : Szak Kiadó, 2007. 510 s. ISBN 9789639131941.
4. STROUSTRUP, B.: A C++ programozási nyelv : I.kötet. Budapest : Kiskapu Kft., 2002. 560 s. ISBN 963 9301 18 3.
5. STROUSTRUP, B.: A C++ programozási nyelv - II. kötet. Budapest : Kiskapu Kft., 2002. 1328 s. ISBN 963 9301 19 1.

**Language, knowledge of which is necessary to complete a course:**

Hungarian, English

**Notes:**

The students' workload is compiled as follows: 15.60% for participation in lectures, 7.80% for participation in exercise classes, 10.21% for preparation for lectures, 5.11% for preparation for exercise classes, 30.64% for preparation of own project or preparation for the written examination, 30.64% for preparation for the exam. For the calculation, we used a reference workload of 25 working hours for each ECTS credit.

**Evaluation of subjects**

Total number of evaluated students: 58

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 24.14 | 18.97 | 20.69 | 22.41 | 12.07 | 1.72 |

**Teacher:** prof. Imre Gábor Felde, PhD., prof. Imre Gábor Felde, PhD.,

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|---|
| **Date of last update:** 18.02.2025 |
| **Approved by:** prof. RNDr. Tibor Kmeť, CSc. |

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ TNMS/22 | **Name:** Theory and tools of modeling and simulation |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 2 **For the study period:** 26 / 26<br>**Methods of study:** present | |
| **Number of credits:** 7 | |
| **Recommended semester/trimester of study:** 3. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course ends with a combined examination. The student can obtain 100 points, 60 points for the written exam and 40 points for the project, which he/she develops individually.<br>In addition to contact teaching, students prepare for practicals, work on their semester projects and prepare for the exam.<br>A grade of A requires a minimum of 90 points, a grade of B requires a minimum of 80 points, a grade of C requires a minimum of 70 points, a grade of D requires a minimum of 60 points, and a grade of E requires a minimum of 50 points. Credit will not be awarded to a student who obtains less than 50 points. | |
| **Results of education:**<br>Learning outcomes - knowledge:<br>- Possesses knowledge of different types of computer science models such as discrete event systems, hybrid systems and tools for their simulation.<br>Learning Outcomes - Skills:<br>- Can analyse and solve complex problems using computer science models<br>Learning outcomes - competences:<br>- Demonstrates a high degree of independence in developing computer science models for different application domains | |
| **Brief syllabus:**<br>1. Modeling and simulation theory, DEVS (Discrete Event System Specification) formalism.<br>2. HLA (High Level Architecture).<br>3. Modeling and Simulation of Continuous Systems (DESS).<br>4. Modeling and Simulation of Discrete Systems (DTSS).<br>5. Modeling and simulation of hybrid systems (DEV&DESS).<br>6. Discrete spatial models, cellular automata.<br>7. Continuous spatial models.<br>8. Case studies of simulation systems, examples of DESS, DTSS, DEVS and DEV&DESS simulation models.<br>9. Modelling and simulation tools , simulation software Simulink, SimEvents, Stateflow. | |

10. Design and control of simulation experiments, theoretical approaches to verification and validation of simulation models.

**Literature:**

1. DABNEY, J. B. - HARMAN, T. L.: Mastering Simulink, Prentice Hall, 2003. 400 s. ISBN 978-0131424777.
2. FISHWICK, P.: Simulation Model Design and Execution. Prentice Hall, 1995. 432 s. ISBN 0130986097.
3. HINRICHCEN, D. - PRITCHARD, A.J.: Mathematical Systems Theory I, Springer Berlin Heidelberg
New York 2005. 804 s. ISBN 978-3-540-44125-0. https://link.springer.com/book/10.1007%2FB137541. (pdf).
4. KNUHL, F. - WEATHERY, R. - DAHMANN, J.: Creating Computer Simulation Systems: An Introduction to the High Level Architecture. Prentice Hall, 1999. 224 s. ISBN 978-0130225115.
5. LAW, A.- KELTON, D.: Simulation Modelling and Analysis. 3rd Edition. McGraw-Hill, 2000. 784 s. ISBN 978-0071165372. https://fac.ksu.edu.sa/sites/default/files/index.pdf .
6. ROSS, S.: Simulation. Academic Press, 2012. 328 s. ISBN 978-0124158252.
7. Zeigler, B., P., Muzy, A., Kofman, E. Theory of Modeling and Simulation: Discrete Event & Iterative System Computational Foundations. 3rd Edition, 2018. ISBN 9780128134078

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
The students' workload is structured as follows: 13.00% for attending lectures, 13.00% for attending tutorials, 7.40% for preparing for lectures, 7.40% for preparing for tutorials, 29.60% for preparing their own project or preparing for written examinations, 29.60% for preparing for the examination . For the calculation we used a reference workload of 25 hours of work for each ECTS credit.

**Evaluation of subjects**
Total number of evaluated students: 59

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 25.42 | 15.25 | 16.95 | 35.59 | 6.78 | 0.0 |

**Teacher:** prof. RNDr. Tibor Kmeť, CSc., prof. RNDr. Tibor Kmeť, CSc.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.

**INFORMATION SHEET**

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|---|---|
| **Name of the university:** J. Selye University | |
| **Name of the faculty:** Faculty of Economics and Informatics | |
| **Code:** KINF/AIdm/ VSP/22 | **Name:** Embedded systems and programming of real-time applications |
| **Types, range and methods of educational activities:**<br>**Form of study:** Lecture / Seminar / Practical<br>**Recommended extent of course ( in hours ):**<br>**Per week:** 2 / 0 / 1 **For the study period:** 26 / 0 / 13<br>**Methods of study:** present | |
| **Number of credits:** 5 | |
| **Recommended semester/trimester of study:** 2. | |
| **Level of study:** II. | |
| **Prerequisites:** | |
| **Conditions for passing the subject:**<br>The course ends with a combined examination. The student can get 100 points, 60 points for the written exam and 40 points for the project which he/she will prepare individually. In addition to contact teaching, students prepare for practicals, work on their semester projects and prepare for exams. To obtain grade „A“ students have to obtain minimum 90% of the total score, to obtain grade „B“ students have to obtain 80% of the total score, to obtain grade „C“ students have to obtain 70% of the total score, to obtain grade „D“ students have to obtain 60% of the total score, to obtain grade „E“ students have to obtain 50% of the total score. There is no credit for the subject if a student obtains less than 50%. | |
| **Results of education:**<br>Education results - knowledge:<br>• The student is introduced to Embedded Linux.<br>• The student will learn the basics of Linux, command line (shell), Bash scripts, remote setup via ssh and serial port.<br>• Possesses knowledge regarding system configuration, application installation and error analysis.<br>Learning outcomes - skills:<br>• The student will be able to use Linux using the command line.<br>• The student will be able to use basic command line commands.<br>• The student will be able to configure a Linux computer.<br>• The student will be able to configure a web server on a nested computer, create a private network, and set up a computer remotely.<br>Education results - competences:<br>• The student can use his/her skills and take his/her place as an administrator or Linux user.<br>• The student can use his/her skills in automation, IOT device configurations, information monitors and kiosks. | |
| **Brief syllabus:**<br>1. Linux operating system. Operating system architecture. Linux Kernel, GNU Userland, Busybox and GNU Compiler Suite.<br>2. Embedded Linux: Buildroot, Yocto and OpenWRT | |

3. Configure hardware using Device Tree. Configuration format. Using documentation to find out the address of the registry. GPIO, Hearbeat, UART, SPI, I2C and USB peripherals setup. Register status verification.
4. Working with a nested operating system. Command line via ssh. Command line via UART. Setting up the operating system using the command line.
5. Configuring the operating system. Network configuration. Setting up programs to run automatically.
6. Programs in GNU Userland: vi editor, emacs editor, less, cat, candump, iptools
7. Processes and filters: processes in Linux, signals, programs for handling processes: ps, kill, wait, sleep.
8. Shell Scripting: variables, loops, functions, working with text
9. Cross-compilation of applications. GNU Compiler Suite. CMake configuration system. Creating multiple configurations.
10. Install applications. Copying information between desktop and embedded operating systems. RSYNC, SCP.
11. Web server installation and configuration.
12. Installing a private network using OpenVPN and sending emails.
13. Cross compiler, crossing

**Literature:**

1. SIMMONDS, Ch.: Mastering Embedded Linux Programming. Second Edition. Packt Publishing, 2017. 478 s. ISBN 9781787283282.
2. VIZUETE, D. M.: Instant Buildroot. Packt Publishing, 2013. 60 s. ISBN 9781783289455.

**Language, knowledge of which is necessary to complete a course:**
Hungarian, English

**Notes:**
version 2022-05-12
Student workload is structured as follows:
15.60 % - for attending lectures,
7.80% - for attendance,
10.21% - for preparation for lectures,
5.11% - for preparation for exercises,
30.64% - for preparing your own project or preparing for written examinations,
30.64% - for preparing for the examination.

**Evaluation of subjects**
Total number of evaluated students: 60

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 86.67 | 11.67 | 1.67 | 0.0 | 0.0 | 0.0 |

**Teacher:** prof. Sándor Szénási, PhD., László Marák, PhD., prof. Sándor Szénási, PhD., PaedDr. Márk Csóka, PhD.,

**Date of last update:** 18.02.2025

**Approved by:** prof. RNDr. Tibor Kmeť, CSc.