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## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD202A/22	<b>Course title:</b> Architecture of Computer Systems
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 1 <b>hours per semester:</b> 13 / 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 3	<b>Working load:</b> 75 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Final assessment: oral exam (70%) and practical work with a microcontroller (30%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: To acquaint the student with digital computer architectures and provide him with theoretical and practical skills in connecting and programming microcontrollers. Learning outcomes (knowledge, skills and competences): - The student will know the basic architectures of computer systems. - He will have knowledge about the composition of digital computers and the principle of operation of individual computer components and peripheral devices. - He will know the basic architectures of single-chip microcontrollers and will know how to work with them. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competences of the student is carried out on the basis of theoretical and practical examinations at the end of the semester teaching of the subject.	
<b>Course contents:</b> 1. Computer architectures – concepts, types, evaluation, classification of digital computers. 2. Architectures of CISC and RISC processors, principles of processor acceleration. 3. Processors for personal computers, structural and functional organization. 4. Memory subsystem, hierarchical memory organization, processor, main and buffer memory, memory mapping. 5. Secondary and external memories, memory segmentation and paging.	

6. Input - output subsystem, communication management.
7. Principle of operation of basic peripheral devices.
8. Interfaces and buses of computer systems, hierarchical organization of the bus subsystem.
9. Architectures of single-chip microcontrollers.
10. Connection and programming of microcontrollers with an emphasis on practical applications, smart solutions and IoT.

**Recommended or required literature:**

1. ANDERSON, D. - SHANLEY, T.: Pentium Processor System Architecture. Mindshare, Inc., Addison–Wesley Publishing Company, 1995.
2. MINASI, M.: IBM PC - Big hardware guide. Grada, Prague 2002, 763 pp., ISBN: 80-247-0273-8.
3. BROŽA, P.: We are building a computer. Prague: Computer Press, 2000, 172 pp., ISBN: 80-7226-354-4.
4. JELŠINA, M.: Architectures of computer systems. Elfa Košice 2002.
5. UPTON, E.; HALFACREE, G.: Raspberry Pi user guide. Chichester : Wiley , 2014, 2nd updated edition, 298 pp., ISBN: 978-1-118-79548-4.
6. ROJČEK, M.: Electronic study support for teaching the subject Architecture of computer systems, <https://moodle.pf.ku.sk>.

**Language of instruction:**

Slovak language

**Notes:**

**Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
0.0	33.33	0.0	0.0	33.33	33.33

**Name of lecturer(s):** PaedDr. Michal Rojček, PhD., doc. Ing. Ján Pillár, PhD.

**Last modification:** 06.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD200A/22	<b>Course title:</b> Artificial Intelligence and Neuronal Networks 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 2 <b>hours per semester:</b> 13 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 3	<b>Working load:</b> 75 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Conditions for completing the course: 3 written tests during the semester + final oral exam. Subject evaluation: A – 100%-93,3% B – 90%-86,7% C – 83,3%-76,7% D – 73,3%-66,7% E – 63,3%-53,3% Fx – 50%- 0%	
<b>Learning outcomes of the course:</b> The aim of the subject: to know the place, possibilities and perspectives of artificial neural networks (NS), their computing capabilities, algorithms, adaptations, to be able to compare classic algorithmic computing methods with NS, basic models of NS, their computing capabilities, algorithms, adaptations, forward and recurrent NS, back-propagation, Hopfield NS, solving optimization tasks, neural networks in relation to other computational models	
<b>Course contents:</b> <ol style="list-style-type: none"> <li>1. Basic concept arising from biology. Linear Threshold Units,</li> <li>2. Polynomial threshold units, perceptrons.</li> <li>3. Linear separable objects, adaptation process (learning), higher order perceptrons.</li> <li>4. Feedforward neural networks, hidden neurons, adaptation process.</li> <li>5. Universal approximator, illustrative examples.</li> <li>6. Recurrent neural networks, properties, adaptation process, examples.</li> <li>7. Hopfield neural networks, properties.</li> <li>8. Model of associative memory, optimization tasks.</li> <li>9. Radial-basis functional networks, properties, universal approximator of functions.</li> <li>10. Neural networks in relation to other theoretical computational models.</li> <li>11. Use of neural networks to direct information flows in the network.</li> </ol>	

**Recommended or required literature:**

1. NÁVRAT, P. A KOL.: Umelá inteligencia. STU Bratislava 2002.
2. KVASNÍČKA, V. a kol.: Úvod do teórie neurónových sietí, IRIS, Bratislava, 1997.
3. SINČÁK, P. – ANDREJKOVÁ, G.: Neurónové siete. I. diel: Dopredné siete, II. diel: Rekurentné a modulárne siete, Košice, 1997
4. JENČO, M. - ČERNÁK, I.: Telekomunikačné siete V.: Riadenie telekomunikačných sietí, Umelá inteligencia v telekomunikáciách, Skriptá: VA v Liptovskom Mikuláši, vydané v roku 2003, 134 strán, ISBN 80-8040-198-5
5. ČERNÁK, I.: Študijná elektronická podpora pre výučbu predmetu Umelá inteligencia a neurónové siete 1, modle.pf.ku.sk

**Language of instruction:****Notes:****Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	66.67	33.33

**Name of lecturer(s):** doc. Ing. Igor Černák, PhD.

**Last modification:** 31.08.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD206A/22	<b>Course title:</b> Artificial Intelligence and Neuronal Networks 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 3 <b>hours per semester:</b> 13 / 39 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The final evaluation will be based on the results of the oral exam, which may be in the form of an online test.	
<b>Learning outcomes of the course:</b> Objective of the subject: To learn how to use artificial intelligence methods in solving problems. Know the basic principles of knowledge representation and problem solving methods. Get to know the basic tasks of knowledge systems	
<b>Course contents:</b> 1. Definition of UI. A sensible agent. 2. Problem solving. 3. Representation of knowledge. 4. Logical reasoning. 5. Planning. 6. Machine learning. 7. Genetic algorithms 8. Knowledge engineering. 9. Architecture of knowledge and expert systems. 10. Processing uncertainty. Uncertainty. 11. Decision making. 12. Use of artificial intelligence in the Internet of Things - IoT	
<b>Recommended or required literature:</b> 1. MAŘÍK, V. - ŠTĚPÁNKOVÁ, O. – LAŽANSKÝ, J.: Umělá inteligence 1,2,3,4. Academia Praha 1993,1997,2001,2003. 2. KELEMEN, J. a kol.: Základy umelej inteligencie. Alfa Bratislava 1992. 3. ČERNÁK, I. - LEHOTSKÝ, M.: Študijná elektronická podpora pre výučbu predmetu Umelá inteligencia a neurónové siete 2, moodle.pf.ku.sk 4. NÁVRAT, P. a kol.: Umelá inteligencia. STU Bratislava 2002..	
<b>Language of instruction:</b>	
<b>Notes:</b>	

<b>Course evaluation:</b>					
Assessed students in total: 1					
A	B	C	D	E	FX
0.0	0.0	0.0	100.0	0.0	0.0
<b>Name of lecturer(s):</b> doc. Ing. Igor Černák, PhD.					
<b>Last modification:</b> 31.08.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD212A/22	<b>Course title:</b> Computer Graphics
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 2 <b>hours per semester:</b> 13 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Final assessment: final test (50%) and semester thesis with its defense (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: To acquire theoretical and practical knowledge in the field of raster and vector 2D and 3D graphics. Learning outcomes (knowledge, skills and competences): - The student will acquire basic knowledge about the principles of computer graphics - basic transformation, approximation and display methods in two-dimensional and three-dimensional space. - Furthermore, the student will acquire practical skills in selected raster, vector 2D or 3D graphics software. - The student will be able to model simple 3D objects and control a 3D printer. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competences of the student is carried out on the basis of theoretical and practical examinations at the end of the semester teaching of the subject.	
<b>Course contents:</b> 1. Raster and vector graphics in two-dimensional space. 2. Basic transformations - displacement, rotation, mirroring, skewing. 3. Raster graphics editor - work with layers, raster image editing, filters, colors. Raster graphics formats. 4. Vector graphics editor – creating graphic designs, working with groups, curves, areas and colors. Vectorization of raster images. Vector graphics formats.	



5. Graphics in three-dimensional space - basic methods of modeling 3D objects. 6. Bodies and operations with bodies. Projection methods. 7. Lighting methods and shading. 8. Materials and texturing of 3D objects. 9. Scene rendering, distributed rendering, working with cameras 10. Simple 3D animation. 11. 3D printing - principle of operation, different types of printing, 3D printing options.					
<b>Recommended or required literature:</b> 1. POKORNÝ, P.: Blender: learn 3D graphics, Prague: BEN - technická literatura, 2009, 286 pp., ISBN: 97-8807-300-244-2. 2. ŽÁRA, J.: Modern computer graphics. Brno: Computer Press, 2004, 609 p., ISBN: 80-2510-454-0. 3. WALLACH KLOSKI, L; KLOSKI, N.: Getting started with 3D printing, Computer Press, 2017, 216 p., ISBN:97-8802-514-876-1. 4. ROJČEK, MICHAL.: Electronic study support for teaching the subject Computer graphics, available online at: <a href="https://moodle.pf.ku.sk">https://moodle.pf.ku.sk</a> .					
<b>Language of instruction:</b> Slovak language					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 4					
A	B	C	D	E	FX
0.0	25.0	25.0	50.0	0.0	0.0
<b>Name of lecturer(s):</b> PaedDr. Michal Rojček, PhD., doc. Ing. Igor Černák, PhD.					
<b>Last modification:</b> 30.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD205A/22	<b>Course title:</b> Concurrent Practice 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, students, based on the instructions of the pedagogical practice methodology of the department of informatics and in cooperation with the informatics teacher of the practice school, take part in listening sessions and their own outputs in the computer science lessons at the practice school in the number of hours determined by the faculty, they pass the analyzes of these lessons with the practice teacher and all records and documents they continuously enter in the pedagogical diary. Final evaluation based on the student's portfolio of written materials from pedagogical practice submitted to the methodology of pedagogical practice of the Department of Informatics: evaluation proposal from the trainee teacher, the quality of the submitted pedagogical diary and the student's final report on practice. Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the course: Successfully complete the output group pedagogical practice in informatics at a selected school of regional education (2nd grade of elementary school or secondary school) in coordination with the practice methodology and under the guidance of a practice teacher. To introduce the future computer science teacher to the entire complex of educational functions of the teacher, to improve abilities and skills in observation, analysis, creation of hospital records, preparation and management of the pedagogical process, to know the pedagogical documentation in primary and secondary schools. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - can communicate adequately with the computer science teacher of the practice school and, based on his instructions, develop detailed preparation for teaching,	

he is familiar with the recommended computer science textbooks and knows how to use them in his preparation for teaching and in direct teaching,  
 is able to synthesize acquired theoretical knowledge from the subjects of general didactics and didactics of informatics as well as completed subjects of pedagogic and psychological disciplines and can apply them to specific lessons of informatics; can expose new subjects using different methods, can activate pupils and carry out didactic diagnostics and evaluation,  
 can communicate adequately in the training school environment and speak in class in front of students,  
 can process documentation about his activities at the training school.

**Course contents:**

Pedagogical practice takes place at training schools. Forms, methods, procedures and means of theoretical training are verified in real pedagogical practice. Students acquire methodological skills in computer science lessons: they observe the work of the teacher in the lesson, work with the subject matter, the choice of methods and means, the level of management of the students' learning activity, the method of evaluating student performance. The student keeps a pedagogical diary during the internship. The student gains practical experience in developing the project of his own computer science lesson based on instructions and instructions from the teacher of the practice school, with independent management of lessons, gets to know the environment of the practice school and familiarizes himself with the relevant pedagogical documentation. The student consults the documentation for practice with the department's methodology.

**Recommended or required literature:**

Jacková, J.: Pedagogická prax INFORMATIKA (PedPraxINF), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=119>

Didaktika informatiky, učebnice informatiky pre 2.stupeň ZŠ a SŠ, elektronické vzdelávacie materiály.

Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>

Kalhous, O. a kol.: Školní didaktika, Portál 2009, ISBN 978-80-7367-571-4

**Language of instruction:**

Slovak

**Notes:**

**Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
66.67	0.0	0.0	0.0	0.0	33.33

**Name of lecturer(s):** Ing. Jana Jacková, PhD.

**Last modification:** 06.12.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD210A/22	<b>Course title:</b> Concurrent Practice 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, students, based on the instructions of the pedagogical practice methodology of the department of informatics and in cooperation with the informatics teacher of the practice school, take part in listening sessions and their own outputs in the computer science lessons at the practice school in the number of hours determined by the faculty, they pass the analyzes of these lessons with the practice teacher and all records and documents they continuously enter in the pedagogical diary. Final evaluation based on the student's portfolio of written materials from pedagogical practice submitted to the methodology of pedagogical practice of the Department of Informatics: evaluation proposal from the trainee teacher, the quality of the submitted pedagogical diary and the student's final report on practice. Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the course: Successfully complete the output group pedagogical practice in informatics at a selected school of regional education (2nd grade of elementary school or secondary school) in coordination with the practice methodology and under the guidance of a practice teacher. Continue familiarizing the future computer science teacher with the entire complex of educational and educational functions of the teacher and improving abilities and skills in observation, analysis, creation of hospital records, preparation and management of the pedagogical process, expand knowledge about pedagogical documentation in primary and secondary schools. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - can communicate adequately with the computer science teacher of the practice school and, based on his instructions, develop detailed preparation for teaching,	

he is familiar with the recommended computer science textbooks and knows how to use them in his preparation for teaching and in direct teaching,  
 is able to synthesize acquired theoretical knowledge from the subjects of general didactics and didactics of informatics as well as completed subjects of pedagogic and psychological disciplines and can apply them to specific lessons of informatics; can expose new subjects using different methods, can activate pupils and carry out didactic diagnostics and evaluation,  
 can communicate adequately in the training school environment and speak in class in front of students,  
 knows how to process documentation about his work at the training school.

**Course contents:**

Pedagogical practice takes place at training schools. Forms, methods, procedures and means of theoretical training are verified in real pedagogical practice. Students acquire methodological skills in computer science lessons: they observe the work of the teacher in the lesson, work with the subject matter, the choice of methods and means, the level of management of the students' learning activity, the method of evaluating student performance. The student keeps a pedagogical diary during the internship. Based on the instructions and instructions from the teacher of the training school, the student develops a project of his own lesson and then conducts the prepared lesson on his own. The student gets to know the environment of the training school and familiarizes himself with the relevant pedagogical documentation. The student consults the documentation for practice with the department's methodology.

**Recommended or required literature:**

Jacková, J.: Pedagogická prax INFORMATIKA (PedPraxINF), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=119>

Didaktika informatiky, učebnice informatiky pre 2.stupeň ZŠ a SŠ, elektronické vzdelávacie materiály.

Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>

Kalhous, O. a kol.: Školní didaktika, Portál 2009, ISBN 978-80-7367-571-4

**Language of instruction:**

Slovak

**Notes:**

**Course evaluation:**

Assessed students in total: 1

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

**Name of lecturer(s):** Ing. Jana Jacková, PhD.

**Last modification:** 06.12.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD214A/22	<b>Course title:</b> Continuous Practice
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 4 <b>hours per semester:</b> 52 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, based on the instructions of the pedagogical practice methodology of the department of informatics and in cooperation with the informatics teacher of the practice school, the student individually completes listening sessions with the practice teacher and his own outputs in the computer science classes at the practice school in the number of hours determined by the faculty, completes the analysis of these lessons with the practice teacher and all keeps records and documents in the pedagogic diary. Final evaluation based on the student's portfolio of written materials from pedagogical practice submitted to the methodology of pedagogical practice of the Department of Informatics: evaluation proposal from the trainee teacher, the quality of the submitted pedagogical diary and the student's final report on practice. Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: Successful completion of an individual output continuous pedagogical practice in informatics at a selected school of regional education (2nd grade of elementary school or secondary school) under the guidance of a practice teacher and in coordination with the practice methodology. To become comprehensively acquainted with the work of a computer science teacher with students, to deepen knowledge about the educational functions of a teacher, to improve in observation, didactic analysis of the curriculum, preparation and management of the pedagogical process, to expand knowledge about pedagogical documentation and current trends in the teaching of computer science at basic and secondary schools. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences:	

is able to integrate the practical experience gained during previous forms of pedagogical practice with new conditions and contexts at the regional school of his choice,  
 can communicate adequately in the training school environment and speak in class in front of students,  
 knows the activity of a computer science teacher, knows his activities and knows how to perform tasks close to the requirements of a real teaching position, including his extracurricular activities,  
 knows how to solve specific educational situations that arise during and outside of teaching,  
 knows how to document and present his activities at the training school.

**Course contents:**

Continuous pedagogical practice is considered to be the highest complex and integrating form of practical training of teacher students. The student arranges his continuous pedagogical practice in informatics individually in a training room of his choice. The student observes the work of the informatics teacher in class and outside of it. After the initial hearing in the informatics lesson with a trainee teacher, the student deepens his methodological skills in the informatics lessons in the form of his own outputs. Preparation and implementation of the student's exit lessons in cooperation with the trainee teacher, their analysis and evaluation: Based on the trainee teacher's instructions, the student works independently with the subject matter, chooses suitable methods and resources, leads the lessons, manages the pupils' learning activities, evaluates the pupils' performances. The student deepens his knowledge of working with pedagogical documentation, gets to know the environment of the practice school, and the possibilities of extracurricular activities for students. The student keeps a pedagogical diary during the internship. The student consults the documentation for practice with the department's methodology.

**Recommended or required literature:**

Jacková, J.: Pedagogická prax INFORMATIKA (PedPraxINF), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=119>  
 Didaktika informatiky, učebnice informatiky pre ZŠ a SŠ, elektronické vzdelávacie materiály. Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>  
 Kalhous, O. a kol.: Školní didaktika, Portál 2009, ISBN 978-80-7367-571-4

**Language of instruction:**

Slovak

**Notes:**

**Course evaluation:**

Assessed students in total: 4

A	B	C	D	E	FX
75.0	0.0	25.0	0.0	0.0	0.0

**Name of lecturer(s):** Ing. Jana Jacková, PhD.

**Last modification:** 06.12.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
 doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD204A/22	<b>Course title:</b> Didactics of Informatics 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 / 2 <b>hours per semester:</b> 26 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> On-going assessment: partial subject activities according to the semester assignment, micro-presentation, report (50%), Final assessment: submission, presentation and defense of one's own portfolio for the subject (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the course: To introduce students to the didactics of informatics, to familiarize themselves in detail with the content and methods of teaching informatics according to the Innovative State Education Program (ISCED 2, ISCED 3). To present in the form of micro-performances motivational tasks for the teaching of specified thematic areas. Refer to current information on the selected subject topic. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: <ul style="list-style-type: none"> <li>- recognizes the place of informatics in the state educational program,</li> <li>- can identify individual areas of informatics within ISCED 2 and ISCED 3,</li> <li>- learns the main principles of teaching and the basic conceptual apparatus of computer science teaching units, which are determined by the state educational program for primary and secondary schools,</li> <li>- knows computer science textbooks for primary and secondary schools and can use them in preparing lessons,</li> <li>- knows how to use various activating methods in the teaching of informatics,</li> <li>- is able to prepare written lesson plans and teach them in exercises.</li> </ul>	
<b>Course contents:</b>	



Basic terms from didactics, goals and content of didactics of informatics, tasks of didactics of informatics, relationship of informatics and didactics of informatics to other scientific disciplines. Didactic principles and principles in the subject. Forms, methods and means of teaching. State educational program and school educational program. Objectives of teaching informatics, educational standards. Framework curriculum. Time-thematic plans. Teacher preparation for lessons. Creation of tasks and assessment in the subject of computer science. Methodology of thematic areas of iŠVP for the 2nd grade of elementary schools and for gymnasiums and preparation for the lesson: Representations and tools (work with graphics, work with text, work with presentations, work with multimedia, work with tables, information, structures), Communication and cooperation (working with a website, searching the web, working with tools for communication, presenting information through a website, working with tools for collaboration and information sharing), Software and hardware (working with files and folders, working with an operating system, computer and additional devices, work in a computer network and on the Internet, programs against viruses and espionage), Information Society (security and risks, digital technologies in society, legality of software use). Report. Didactic project.

#### **Recommended or required literature:**

- Petlák, E.: Všeobecná didaktika. Bratislava: IRIS, 1997. ISBN 80-88778-49-2
- Turek, I.: Didaktika. 3.vyd. Wolters Kluwer, 2014.
- Kalhous, O. a kol.: Školní didaktika, Portál 2009, ISBN 978-80-7367-571-4
- Učebnice informatiky pre 2. stupeň základnej školy a gymnáziá
- Jacková, J., Majherová, J.: Didaktika informatiky 1 (DidINF1), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=91>
- Sudolská, M. Didaktika informatiky. UMB, Banská Bystrica: 2004.
- Varga, M., Kalaš, I., Tomcsányiová, M.: Didaktika informatiky na ZŠ. Bratislava, 2011. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/didaktika\\_informatiky\\_na\\_zs.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/didaktika_informatiky_na_zs.pdf)
- Černák, I., Polčín, D.: Didaktika informatiky 1. Multimediálna učebnica na DVD 2007, Ružomberok: Pedagogická fakulta KU, ISBN: 978- 80-8084-174-4.
- Černák, I., Polčín, D.: Didaktika informatiky 2. Multimediálna učebnica na DVD 2008, Ružomberok: Pedagogická fakulta KU, ISBN 978-80-8084-278-9.
- Guniš, J., Sudolská, M., Šnajder, Ľ.: Aktivizujúce metódy vo výučbe školskej informatiky. Bratislava, 2009. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/aktivizujuce\\_metody.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/aktivizujuce_metody.pdf)
- Guniš, J., Šnajder, Ľ.: Tvorba úloh a hodnotenie žiakov v predmete informatika. Bratislava, 2009. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/tvorba\\_uloh\\_a\\_hodnotenie.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/tvorba_uloh_a_hodnotenie.pdf)
- Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>
- Štátny pedagogický ústav. Metodická príručka Zavádzanie inovovaných štátnych vzdelávacích programov pre vzdelávaciu oblasť Matematika a práca s informáciami v základnej škole [online]. Bratislava : Štátny pedagogický ústav, september 2015. [http://www.statpedu.sk/files/sk/metodicky-portal/metodicke-podnety/matematika\\_a\\_praca\\_s\\_informaciami.pdf](http://www.statpedu.sk/files/sk/metodicky-portal/metodicke-podnety/matematika_a_praca_s_informaciami.pdf)
- Tkáčová, Z., Hanesz, A., Tomcsányiová, M., Tomcsányi, P., Trajtel', Ľ., Jacková, J. Lovászová, G., Cápaj, M., Michaličková, V. Zbierka inovatívnych metodík z Informatiky pre 2. stupeň základných škôl a stredné školy Bratislava: Centrum vedecko-technických informácií SR, 2020. ISBN 978-80-89965-60-1. <https://vzdelavanie.itakademia.sk/vystupy/zim-inf-zs-ss.pdf>
- ECDL. Odporúčané študijné materiály. <https://www.ecdl.sk/odporucane-studijne-materialy>
- Zborníky konferencie DidInfo <http://didinfo.net/predchozi-rocniky>

<b>Language of instruction:</b> Slovak					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 3					
A	B	C	D	E	FX
33.33	0.0	33.33	0.0	0.0	33.33
<b>Name of lecturer(s):</b> Ing. Jana Jacková, PhD.					
<b>Last modification:</b> 06.12.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD209A/22	<b>Course title:</b> Didactics of Informatics 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 / 2 <b>hours per semester:</b> 26 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> On-going assessment: partial subject activities according to the semester assignment, micro-presentation, report (50%), Final assessment: submission, presentation and defense of one's own portfolio for the subject (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: To deepen the knowledge of the didactics of informatics, methods and procedures of teaching the thematic area Algorithmic problem solving according to the Innovative State Education Program (ISCED 2, ISCED 3). Present motivational tasks for teaching algorithmization and programming in the form of micro-outputs. Refer to current information on the selected subject topic. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: <ul style="list-style-type: none"> <li>- is oriented in the educational standard to the thematic area Algorithmic problem solving according to the Innovative State Education Program (ISCED 2 and ISCED 3) and controls the basic conceptual apparatus,</li> <li>- is oriented in working with at least one children's programming language suitable for the 2nd grade of elementary school,</li> <li>- is oriented in working with at least one higher level programming language suitable for gymnasiums,</li> <li>- knows the textbooks for teaching algorithmization and programming for the 2nd grade of elementary school and gymnasium and can use them when preparing lessons,</li> <li>- can use various activating methods in teaching algorithmization and programming,</li> <li>- is able to prepare written lesson plans and teach them in exercises,</li> </ul>	

knows different programming paradigms and can assess the appropriateness of their use.

**Course contents:**

Algorithmization and programming. Programming paradigms. Programming languages in the teaching of computer science at primary and secondary schools (children's programming languages, advanced programming languages). Forms and methods of teaching programming. Methodology of the thematic areas of iŠVP for the 2nd grade of primary schools and for gymnasiums and preparation for the lesson: Algorithmic problem solving (problem analysis, language for writing the solution, using a sequence of commands, using cycles, using branching, using variables, using tools for interaction, interpretation of notation solutions, finding and fixing errors). Intersubject relations. Forms of interest and IT competitions, projects and conferences. Report. Didactic project / excursion.

**Recommended or required literature:**

Tomcsányiová, M. a kol.: Riešenie problémov a základy programovania 1. Bratislava, 2009. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/riesenie\\_problemov\\_a\\_zaklady\\_programovania\\_1.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/riesenie_problemov_a_zaklady_programovania_1.pdf)

Tomcsányiová, M. a kol.: Riešenie problémov a základy programovania 2. Bratislava, 2010. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/riesenie\\_problemov\\_a\\_zaklady\\_programovania\\_2.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/riesenie_problemov_a_zaklady_programovania_2.pdf)

Salanci, Ľ., Tomcsányiová, M., Blaho, A.: Didaktika programovania. Bratislava, 2010. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/didaktika\\_programovania.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/didaktika_programovania.pdf)

Lovászová, G., Galbavá, Ľ., Palmárová, V., Tomcsányiová, M., 2010. Malé programovacie jazyky. Bratislava, 2010. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/male\\_programovacie\\_jazyky.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/male_programovacie_jazyky.pdf)

Hornik, T., Musílek, M., Milková, E., 2019: Didaktika programování. [https://imysleni.cz/images/vyukove\\_materialy/UHK\\_Didaktika\\_programovani.pdf](https://imysleni.cz/images/vyukove_materialy/UHK_Didaktika_programovani.pdf)

Drábková, J., 2019: Didaktika programování. [https://imysleni.cz/images/vyukove\\_materialy/TUL\\_Didaktika\\_programovani.pdf](https://imysleni.cz/images/vyukove_materialy/TUL_Didaktika_programovani.pdf)

Salanci, Ľ., 2018: Didaktika programovania. [https://imysleni.cz/images/vyukove\\_materialy/JU\\_Didaktika\\_PRG.pdf](https://imysleni.cz/images/vyukove_materialy/JU_Didaktika_PRG.pdf)

Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>

Štátny pedagogický ústav. Metodická príručka Zavádzanie inovovaných štátnych vzdelávacích programov pre vzdelávaciu oblasť Matematika a práca s informáciami v základnej škole [online]. Bratislava : Štátny pedagogický ústav, september 2015. [http://www.statpedu.sk/files/sk/metodicky-portal/metodicke-podnety/matematika\\_a\\_praca\\_s\\_informaciami.pdf](http://www.statpedu.sk/files/sk/metodicky-portal/metodicke-podnety/matematika_a_praca_s_informaciami.pdf)

Učebnice informatiky k tematickej oblasti Algoritmické riešenie problémov a programovanie pre 2. stupeň základnej školy a gymnáziá

SCRATCH. <https://scratch.mit.edu/>,

Scratch CUP. <http://www.edu.fmph.uniba.sk/ScratchCup/>

Blaho, A. 2018: Učebnica Pythonu pre stredné školy. <https://input.sk/ucebnica/>, <https://abcpython.input.sk/>

Jacková, J., Majherová, J.: Didaktika informatiky 2 (DidINF2), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=92>

Tkáčová, Z., Hanesz, A., Tomcsányiová, M., Tomcsányi, P., Trajtel, Ľ., Jacková, J. Lovászová, G., Cápaj, M., Michaličková, V. Zbierka inovatívnych metodík z Informatiky pre 2. stupeň základných škôl a stredné školy Bratislava: Centrum vedecko-technických informácií SR, 2020. ISBN 978-80-89965-60-1. <https://vzdelavanie.itakademia.sk/vystupy/zim-inf-zs-ss.pdf>

Zborníky konferencie DidInfo <http://didinfo.net/predchozi-rocniky>

Turek, I.: Didaktika. 3.vyd. Wolters Kluwer, 2014.

**Language of instruction:**

Slovak

**Notes:****Course evaluation:**

Assessed students in total: 1

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

<b>Name of lecturer(s):</b> Ing. Jana Jacková, PhD.
<b>Last modification:</b> 06.12.2022
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD213A/22	<b>Course title:</b> Didactics of Informatics 3
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 / 2 <b>hours per semester:</b> 26 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Continuous assessment: partial activities of the subject according to the semester assignment, paper (50%), Final assessment: submission, presentation and defense of the methodology of the selected topic from the informatics curriculum (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the course: To become familiar with the current issues of teaching informatics, to apply knowledge from the didactics of informatics 1 and 2, to know current trends in the teaching of the subject of informatics at primary and secondary schools, to apply the rules for creating thematic plans and didactic tests, to design teaching procedures with the support of modern technologies. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - knows the current rules of the computer science matriculation exam, - can design a didactic test for a selected thematic area of informatics, - can create a time-thematic plan for individual grades, - can identify topics that belong to the area of caring for gifted students and model work with gifted students, - can create and project the popularization of basic IT concepts among students of individual types of schools, - can define the role of informatics in the process of informatization of schools, new approaches in teaching and the application of digital technologies in the information society,	

knows the basics of pedagogical research, can identify basic research questions and apply methods used in various research projects in the field of computer science teaching.

**Course contents:**

High school graduation in computer science - legislation, target requirements for knowledge and skills of high school graduates in computer science, structure of high school graduation exam and evaluation, preparation of high school graduation tasks, preparation of students for high school graduation in computer science, application of graduates in practice and other possibilities of studying computer science. Control and verification of knowledge, evaluation and classification in the teaching of informatics - learning tasks in informatics education (goals, design and preparation), creation of didactic materials for the evaluation of student work, didactic tests in informatics. Creation of a time-thematic plan for the subject of computer science. History of teaching informatics, modern trends in education, important figures in informatics. Key competences and their formation in informatics classes, digital literacy, IT thinking. Pupil's personality and work (teaching styles, gifted pupils, inclusion, pupil's extracurricular conditions). Modern teaching methods in the subject of computer science. Innovation of the educational system. The profession of computer science teacher (teaching style, professional competences, professional development, further education). Pedagogical research in the teaching of informatics - basic concepts (research and investigation, methods, research strategies), examples of research, proposal of a pedagogical research project and preparation for its implementation. Popularization of informatics and its basic theoretical concepts in different types of schools. Report. Didactic project. Presentations of the methodology of the selected topic.



**Recommended or required literature:**

Maturitné skúšky. <https://www.statpedu.sk/sk/maturitne-skusky/>  
 Blaho, A., Kučera, P., Hanulová, E.: Maturita z informatiky. Bratislava, 2011.  
[https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/maturita\\_z\\_informatiky.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/maturita_z_informatiky.pdf)  
 Inovovaný Štátny vzdelávací program <https://www.statpedu.sk/sk/svp/inovovany-statny-vzdelavaci-program/>  
 Guniš, J., Šnajder, L.: Tvorba úloh a hodnotenie žiakov v predmete informatika. Bratislava, 2009. [https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/tvorba\\_uloh\\_a\\_hodnotenie.pdf](https://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/tvorba_uloh_a_hodnotenie.pdf)  
 Turek, I.: Kapitoly z didaktiky. Didaktické testy. Bratislava: Metodické centrum, 1995. ISBN 8085185962  
 Turek, I.: Didaktika. 3.vyd. Wolters Kluwer, 2014.  
 Petlák, E. a kol.: Kapitoly so súčasnej didaktiky, Iris 2005, ISBN 80-89018-89-0  
 Petty, G.: Moderní vyučování. Portál, 2013.  
 Kalhous, O. a kol.: Školní didaktika, Portál 2009, ISBN 978-80-7367-571-4  
 Jacková, J., Majherová, J.: Didaktika informatiky 3 (DidINF3), študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=1048>  
 Učebnice informatiky pre 2. stupeň základnej školy a gymnáziá  
 Inovatívne metodiky. CVTI, 2022. <https://itakademia.sk/inovativne-metodiky/>  
 Publikácie projektu ĎVUi. <https://www.statpedu.sk/sk/o-organizacii/projekty/projekt-dvui/publikacie/>  
 Kalaš. I. a kol.: Základy pedagogického výskumu. Bratislava, 2011. [http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/zaklady\\_pedagogickeho\\_vyskumu.pdf](http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/zaklady_pedagogickeho_vyskumu.pdf)  
 Gavora, P. a kol.: Elektronická učebnica pedagogického výskumu. Bratislava : Univerzita Komenského, 2010. ISBN 978-80-223-2951-4. <http://www.e-metodologia.fedu.uniba.sk/>  
 Jacková, J. Mastery Learning - od teórie k praxi. Ružomberok: Katolícka univerzita v Ružomberku. VERBUM - vydavateľstvo KU, 2020. ISBN 978-80-561-0768-3.  
 Zborníky konferencie DidInfo <http://didinfo.net/predchozi-rocniky>  
 Regionálne školstvo. <https://www.minedu.sk/regionalne-skolstvo/>  
 Vzdelávanie pre 21. storočie. <https://vzdelavanie21.statpedu.sk/>

**Language of instruction:**

Slovak

**Notes:**

It is advisable to link the methodology of the chosen topic from the informatics curriculum with teaching on a continuous pedagogical practice or with a diploma thesis.

**Course evaluation:**

Assessed students in total: 4

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

**Name of lecturer(s):** Ing. Jana Jacková, PhD.**Last modification:** 06.12.2022**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
 doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD201C/22	<b>Course title:</b> Information Systems Security
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture <b>Recommended study range:</b> <b>hours weekly:</b> 1 <b>hours per semester:</b> 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, the student demonstrates his theoretical knowledge in the areas of security in information systems in the form of processing a short partial work and a final work. Final assessment: total percentage gain from the written partial work on security issues (30%) obtained during the semester and the final work (70%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> The aim of the subject is to provide students with theoretical knowledge in the field of security in information systems, analysis of security problems and the design of a basic solution in the field of antivirus protection and security of information systems. Learning outcomes (knowledge, skills and competences): - The student will be able to define and explain the basic rules for ensuring security in information systems. - Will be able to analyze simple problems and propose basic solutions in the field of antivirus protection, information and computer security. - He will be able to propose basic conceptual solutions for ensuring security in information systems. Verification of the level of acquired knowledge, skills and competences: The verification is carried out on the basis of processed partial theoretical works during the semester teaching of the subject and the final thesis.	
<b>Course contents:</b> 1. Symmetric and asymmetric ciphers used in PS, hash, digital signature. 2. PKI – public key infrastructure - principles of operation. 3. Certification authority, encryption of transmissions. 4. Firewall and LAN protection, principles of operation.	

5. Models, LAN traffic monitoring. 6. Possible ways of detecting intrusions into the network. 7. Principles of antivirus protection, means used in applications. 8. Backup as a prevention against data loss or unavailability. 9. Security of Microsoft-type networks. 10. Security and management of user profiles. 11. System policies, access to shared resources. 12. Secure connection to the Internet.					
<b>Recommended or required literature:</b> DOSTÁLEK, L. and VOHNOUTOVÁ, M. 2010. Big guide to PKI infrastructure. 2nd ed. Prague, Computer press, 544 p. ISBN 978-80-2512-619-6. DOSTÁLEK, L. 2001. The Big Guide to TCP/IP Protocols - Security. Computer press, Prague, 2001, ISBN: 80-7226-513-X. NORTHCUTT, S. et al. 2005. Security of computer networks. Computer Press, 592 p. ISBN 978-80-251-0697-6. OPPLIGER, R. 2002 Internet & Intranet Security, 2nd edition, Artech House, January 15, 2002, 500 pp., ISBN: 1580531660. AUSTIN, T. 2000. PKI : A Wiley Tech Brief, 1 edition, John Wiley & Sons; December 15, 2000, 288 pp., ISBN: 0471353809 JENČO, M.: Electronic study support for teaching the subject Security in information systems, moodle.pf.ku.sk					
<b>Language of instruction:</b>					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 1					
A	B	C	D	E	FX
0.0	100.0	0.0	0.0	0.0	0.0
<b>Name of lecturer(s):</b> doc. Ing. Michal Jenčo, PhD.					
<b>Last modification:</b> 27.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD201A/22	<b>Course title:</b> Information and Communication Systems 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 1 <b>hours per semester:</b> 13 / 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Conditions for completing the course: 3 written tests during the semester + final oral exam. Subject evaluation: A – 100%-93.3% B – 90%-86.7% C – 83.3%-76.7% D – 73.3%-66.7% E – 63.3%-53.3% Fx – 50%- 0%	
<b>Learning outcomes of the course:</b> Objective of the course: to acquaint students with the basics of information communication systems, with the aim of emphasizing the common starting points and elements of communication systems and information systems, to understand the OSI model in the context of IKS, IDN, ISDN, B-ISDN networks, their structure, properties, services, private and intelligent networks, network management, apply network analysis tasks and solve optimization tasks in telecommunication networks	
<b>Course contents:</b> <ol style="list-style-type: none"> <li>1. Application of the OSI reference model to communication networks.</li> <li>2. Digital network concept with integrated N-ISDN services.</li> <li>3. Intelligent networks and private communication networks.</li> <li>4. Basic characteristics and description of B-ISDN, network architecture and functional arrangement of ATM.</li> <li>5. Management of telecommunication networks.</li> <li>6. Algorithms for finding the shortest paths in the network, paths, locations and flows in the network.</li> <li>7. Application of network analysis tasks in telecommunication networks.</li> <li>8. Principles of construction and evaluation of telecommunication network parameters.</li> <li>9. Modeling as a method of network optimization, optimization of telecommunication networks.</li> <li>10. Examples of the use of neural networks in the field of telecommunication network management.</li> <li>11. Communication and information system.</li> </ol>	

**Recommended or required literature:**

1. BLUNÁR, K. – DIVIŠ, Z.: Telekomunikačné siete I. Žilina, ŽU, EF 2000.
2. POŘÍZEK, R. - PUŽMAN, J.: Riadenie komunikácie v sieťach výpočtovej techniky. Bratislava, Alfa, 1982.
4. JENČO, M. - ČERNÁK, I.: Telekomunikačné siete V.: Riadenie telekomunikačných sietí, Umelá inteligencia v telekomunikáciách, Skriptá: VA v Liptovskom Mikuláši, vydané v roku 2003, 134 strán, ISBN 80-8040-198-5
5. ČERNÁK, I. – KÚTNA, A. – ROJČEK, M.: Študijná elektronická podpora pre výučbu predmetu Informačné a komunikačné systémy 1, moodle.pf.ku.sk

**Language of instruction:****Notes:****Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
0.0	0.0	0.0	33.33	33.33	33.33

**Name of lecturer(s):** doc. Ing. Igor Černák, PhD.

**Last modification:** 31.08.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok					
<b>Faculty:</b> Faculty of Education					
<b>Course code:</b> KIN/In-MD208A/22		<b>Course title:</b> Information and Communication Systems 2			
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 3 <b>hours per semester:</b> 13 / 39 <b>Teaching method:</b> on-site					
<b>Credits:</b> 4		<b>Working load:</b> 100 hours			
<b>Recommended semester/trimester:</b> 2.					
<b>Level of study:</b> II.					
<b>Prerequisites:</b>					
<b>Requirements for passing the course:</b>					
<b>Learning outcomes of the course:</b>					
<b>Course contents:</b>					
<b>Recommended or required literature:</b>					
<b>Language of instruction:</b>					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 4					
A	B	C	D	E	FX
25.0	25.0	25.0	25.0	0.0	0.0
<b>Name of lecturer(s):</b> doc. Ing. Igor Černák, PhD.					
<b>Last modification:</b> 26.04.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD211A/22	<b>Course title:</b> Internet and multimedia
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 3 / 2 <b>hours per semester:</b> 39 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 5	<b>Working load:</b> 125 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Final assessment: final test (50%) and semester thesis with its defense (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: Familiarity with the basic technologies in the field of computer processing of sound, image, video, animations and the use of the Internet in this area, communication protocols, basic Internet services, computer security, multimedia systems and the Internet, processing of audiovisual materials, the basics of digital photography and its presentation, basics video processing and creation. Learning outcomes (knowledge, skills and competences): - The student will have theoretical knowledge of multimedia used on the Internet as well as outside it and practical skills in creating it. - Specifically, he will know the basics of digital photography and will have practical experience with photography in individual categories. - He will be able to create and edit his own teaching video at a high technical and pedagogical level. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competences of the student is carried out on the basis of theoretical and practical examinations at the end of the semester teaching of the subject.	
<b>Course contents:</b> 1. History of the Internet. 2. Communication protocols, client - server. 3. Basic internet services, 4. Computer security, firewall.	

5. Search services and marketing on the Internet. 6. Internet in terms of its use in multimedia systems. 7. Multimedia information systems, basic components. 8. Aspects of the use of multimedia information. 9. Processing of audio-visual materials. 10. Basics of digital photography and its presentation. 11. Basics of video processing and creation.					
<b>Recommended or required literature:</b> 1. GATCUM CHRIS: Complete Photos, Zoner Press 2018, 400 pages, ISBN: 9788074133787 2. ŠALMON, TOMÁŠ: (Un)secure internet, Lindeni 2021, 292 pages, ISBN: 9788056619414 3. ČERNÁK, IGOR; MAŠEK, EDUARD.: Fundamentals of electronic education. University textbook 2007, 350 pages ISBN: 978-80-8084-171-3 4. ROJČEK, MICHAL.: Study electronic support for teaching the subject Internet and multimedia, available online at: <a href="https://moodle.pf.ku.sk">https://moodle.pf.ku.sk</a> .					
<b>Language of instruction:</b> Slovak language					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 4					
A	B	C	D	E	FX
50.0	50.0	0.0	0.0	0.0	0.0
<b>Name of lecturer(s):</b> PaedDr. Michal Rojček, PhD., doc. Ing. Michal Jenčo, PhD.					
<b>Last modification:</b> 06.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					



## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD215A/22	<b>Course title:</b> Modelling and Simulation
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 2 <b>hours per semester:</b> 13 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 4	<b>Working load:</b> 100 hours
<b>Recommended semester/trimester:</b> 4.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, the student proves his theoretical knowledge in the fields of modeling and simulation in the form of a written test. Subsequently, he demonstrates practical skills by solving and creating partial models and simulation projects. Final assessment: cumulative percentage gain from the written test (20%) and practical skills in creating models acquired during the semester and answers to the semester exam (80%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> The aim of the subject is to provide students with theoretical knowledge of modeling in management and management systems, modeling and simulation procedures, possibilities of using simulation environments, as well as providing practical skills for creating simple models. Learning outcomes (knowledge, skills and competences): - The student will be able to define and explain the theoretical foundations and rules for creating and applying models. - Will have basic skills in creating simple analytical and simulation models. - Will be able to solve problems in model creation, work with the model, create and verify simulation models - He will be able to design and build simple models for solving practical tasks. Verification of the level of acquired knowledge, skills and competences: The verification is carried out on the basis of theoretical and practical checks during the semester teaching of the subject.	
<b>Course contents:</b> 1. System, model, modeling, simulation, types of systems. 2. Management and management systems.	

3. Modeling and simulation, generation of pseudorandom numbers.
4. Mathematical description of control systems, system operation algorithm.
5. Characteristics of continuous control systems, transient and impulse characteristics.
6. Analysis of management systems.
7. Synthesis of management systems.
8. Z transformation, discrete transfer, algebra of discrete transfers.
9. Standard languages in modeling and specialized applications.
10. Modeling of discrete and continuous systems.
11. Creation of real analytical and simulation models.
12. Fuzzy sets, characteristic function, membership function, basic operations with fuzzy sets, fuzzy system.
13. Communication of fuzzy systems, structure of fuzzy system, fuzzification, inference, defuzzification.

**Recommended or required literature:**

VOLNER, R.: Modeling and simulation. Ružomberok: Verbum, 2014.  
 ŠPIRKO, Š., KŘUPKA, J. 2008. Basics of technical cybernetics, M.R. Armed Forces Academy. Štefánika Liptovský Mikuláš.  
 ŠPIRKO, Š., KŘUPKA, J., KRÁLÍK, V. 2009. Technical Cybernetics, M.R. Armed Forces Academy. Štefánika Liptovský Mikuláš.  
 Špirko Š., Pastorek, Zs., Králík, V. 2010. Solved examples from cybernetics, Technical Cybernetics, M.R. Armed Forces Academy. Štefánika Liptovský Mikuláš.  
 HEBÁK, Mr. et al. 2007. Multivariate statistical methods. Prague: Information center.  
 NEUSCHL, Š. et al. 1988. Modeling and Simulations. Bratislava: ALFA.  
 JENČO, M. Electronic study support for teaching the subject Modeling and simulation, moodle.pf.ku.sk

**Language of instruction:**

**Notes:**

**Course evaluation:**

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

**Name of lecturer(s):** doc. Ing. Michal Jenčo, PhD.

**Last modification:** 25.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
 doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD203A/22	<b>Course title:</b> Pedagogical Software
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Continuous assessment: partial activities of the course according to the semester assignment, report (50%). Final evaluation: submission, presentation and defense of the project (50%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: Familiarize yourself with the types of pedagogical software and the principles of creating teaching programs, gain experience in assessing the characteristics of pedagogical software. Education results After completing the subject, the student will acquire the following knowledge, skills and competences: - master the basic concepts in the field of pedagogical software and its creation, - will acquire the necessary skills in working with selected types of pedagogical software, - can use the acquired knowledge in the creation of a pedagogical software project, - knows how to create a software didactic aid for a selected teaching subject with regard to psychological, technical and didactic aspects of creation, - can present the issue of pedagogical software and explain its design procedures in front of classmates.	
<b>Course contents:</b> Pedagogical software - definition, classification (types in relation to use in the teacher's work, types and examples, educational software (classification criteria, classification according to use in individual stages of the teaching process, properties, evaluation, selection, advantages/disadvantages of use in teaching), creation pedagogical software (main purpose, creation	

principles, life cycle, stages of development, development environments, hardware and software requirements). Use of ICT in teaching, programs supporting the teaching of informatics and other subjects. Didactic games. Trainers, helps, hypertexts. Test programs, electronic Collections of tasks. E-learning. Simulation and modeling on the computer. Authoring systems. Multimedia, virtual reality. Selection of the topic of the semester project, analysis and specification of requirements, proposal of a solution, preparation and implementation of the project, continuous record of project activities, testing, peer-review, documentation processing, presentation of the created project, project defense.

**Recommended or required literature:**

Krnáč, J., Sudolská, M., Trajtel', L.: Učiteľova dielňa. Bratislava, 2010. [http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/ucitelova\\_dielna.pdf](http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/ucitelova_dielna.pdf)

Krnáč, J., Sudolská, M., Trajtel', L.: Učiteľ s kompetenciami programátora. Bratislava, 2011. [http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/ucitel\\_s\\_kompetenciami\\_programatora.pdf](http://www.statpedu.sk/files/sk/o-organizacii/projekty/projekt-dvui/publikacie/ucitel_s_kompetenciami_programatora.pdf)

Jacková, J., Majherová, J., Petrušková, H., Mašek, E.: Pedagogický softvér (PedSW) , študijná elektronická podpora <https://moodle.pf.ku.sk/course/view.php?id=101>

**Language of instruction:**

slovak language

**Notes:**

**Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
66.67	0.0	0.0	0.0	0.0	33.33

**Name of lecturer(s):** Ing. Jana Jacková, PhD.

**Last modification:** 14.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD202C/22	<b>Course title:</b> Peripheral Computer Devices
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 <b>hours per semester:</b> 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> Final evaluation: The final evaluation will be based on the activity in the exercises (30%) and the results of the written exam at the end of the semester (70%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: Familiarize yourself with the specific hardware details of computer peripherals and interfaces used in PC-class computers. Learning outcomes (knowledge, skills and competences): - The student will know the principle of operation of specific computer peripheral devices. - He will be able to navigate the technologies used in peripheral devices based on an understanding of the physical principle of their operation. - He will know the basic principles of work and maintenance of peripheral devices as well as the implementation of minor repairs. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competencies of the student is carried out on the basis of theoretical and practical examinations during and at the end of the semester teaching of the subject.	
<b>Course contents:</b>	
<b>Recommended or required literature:</b>	
<b>Language of instruction:</b> Slovak language	
<b>Notes:</b>	

<b>Course evaluation:</b>					
Assessed students in total: 0					
A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0
<b>Name of lecturer(s):</b> PaedDr. Michal Rojček, PhD.					
<b>Last modification:</b> 30.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD207A/22	<b>Course title:</b> Practical applications of Internet of Things 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 / 2 <b>hours per semester:</b> 26 / 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 5	<b>Working load:</b> 125 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student must master the theoretical knowledge of the subject and also prepare and defend a practical cooperative final thesis. Fulfillment of both conditions is demonstrated in the form of a final exam. Final assessment: total percentage gain from mastering theoretical knowledge (50%) and practical final work (50%).	
<b>Learning outcomes of the course:</b> - The student will gain knowledge and practical experience with the basic possibilities of complex use of microcontrollers, single-board computers, sensors and databases in the Internet of Things environment and in various areas of our lives. - Understands and manages a cooperative approach to problem analysis and design of sustainable hardware and software solutions in terms of UI/UX, security, testing, updating, use of sensors, databases, online services and cloud. - He will deepen his digital competences required on the labor market.	
<b>Course contents:</b> 1. Analysis of the problem area 2. Naming the issue 3. Analysis of the problem 4. Proposal of possible ways to solve the problem 5. Choosing the optimal solution 6. Design of hardware and software security 7. UI/UX design 8. Development and programming of the prototype 9. Debugging and Testing 10. Proposal of the final solution 11. CD/CI 12. Sustainability of the project	

<b>Recommended or required literature:</b> PILLÁR, J. 2021. <a href="https://moodle.pf.ku.sk/">https://moodle.pf.ku.sk/</a> - electronic support for the subject. Specialized web portal of the KEGA Internet of Things project: <a href="https://UNIoT.sk">https://UNIoT.sk</a> JAKAB, F. et al. 2020. Internet of Things. TU, Košice, 2020. ISBN: 978-80-553-3680-0.					
<b>Language of instruction:</b>					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 1					
A	B	C	D	E	FX
0.0	0.0	0.0	100.0	0.0	0.0
<b>Name of lecturer(s):</b> doc. Ing. Ján Pillár, PhD.					
<b>Last modification:</b> 10.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					



## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD203C/22	<b>Course title:</b> Practical applications of Internet of Things 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student must be able to work in a team, process and defend a practical cooperative final thesis. Fulfillment of the condition is demonstrated in the form of a final exam. Final assessment: percentage gain from the defense of the practical final thesis (100%).	
<b>Learning outcomes of the course:</b> - The student will gain knowledge and practical experience with the basic possibilities of complex use of microcontrollers, single-board computers, sensors and databases in the Internet of Things environment and in various areas of our lives. - Understands and manages a cooperative approach to problem analysis, project solution and design of sustainable hardware and software solutions in terms of UI/UX, security, testing, updating, use of sensors, databases, online services and cloud. - He will deepen his digital competences required on the labor market.	
<b>Course contents:</b> 1. Analysis of the problem area 2. Naming the issue 3. Analysis of the problem 4. Proposal of possible ways to solve the problem 5. Choosing the optimal solution 6. Design of hardware and software security 7. UI/UX design 8. Development and programming of the prototype 9. Debugging and Testing 10. Proposal of the final solution 11. CD/CI 12. Sustainability of the project	
<b>Recommended or required literature:</b> PILLÁR, J. 2021. <a href="https://moodle.pf.ku.sk/">https://moodle.pf.ku.sk/</a> - electronic support for the subject. Specialized web portal of the KEGA Internet of Things project: <a href="https://UNIoT.sk">https://UNIoT.sk</a> JAKAB, F. et al. 2020. Internet of Things. TU, Košice, 2020. ISBN: 978-80-553-3680-0.	

<b>Language of instruction:</b>					
<b>Notes:</b>					
<b>Course evaluation:</b>					
Assessed students in total: 0					
A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0
<b>Name of lecturer(s):</b> doc. Ing. Ján Pillár, PhD.					
<b>Last modification:</b> 10.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD201B/22	<b>Course title:</b> Presentation Software 1
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 1 <b>hours per semester:</b> 13 / 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student can get 100 points from the seminar work, where he solves a selected, agreed task from the given topics. Additional points can be earned for completing assigned tasks during the semester. The maximum number of points that can be obtained from a given subject is 100. The minimum number of points obtained for a satisfactory assessment of the student's knowledge is 60. Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Course objective: The objective of the course is to teach students how to create complex presentations through office applications. Create simple html presentations and publish them on the web. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - knowledge and experience needed to compile presentations - knowledge that will enable students to present the task - knowledge and experience necessary for choosing suitable tools for presenting the given tasks	
<b>Course contents:</b> 1. Principles of creating presentations 2. Interactive presentations 3. Work with the MS PowerPoint application. 4. Creating a presentation – graphic schemes, template, formatting, 5. Creating a presentation outline, objects, animations, launching presentations. 6. Animations in presentations. 7. Communication between MS Office applications (OLE) - use in PowerPoint.	

**Recommended or required literature:**

1. Ľubovoľná literatúra týkajúca sa aplikácie Power Point 2007 a vyššej
2. Mašek, E., Lajciak, P.: Prezentacný softvér I, PF KU, Ružomberok, 2005
3. Staníček, P.: CSS Kaskádové styly, Kompletní průvodce, Computer Press, Brno 2003
4. Václavek, P.: JavaScript, Hotová řešení, Computer Press, Brno, 2004

**Language of instruction:**

Slovak language

**Notes:****Course evaluation:**

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

**Name of lecturer(s):** RNDr. Štefan Tkačík, PhD.

**Last modification:** 14.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD203B/22	<b>Course title:</b> Presentation Software 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 3	<b>Working load:</b> 75 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student can get 100 points from the final project, where he solves and later presents a selected agreed task in LaTeX. Additional points can be earned for completing assigned tasks during the semester. The maximum number of points that can be obtained from a given subject is 100. The minimum number of points obtained for a satisfactory assessment of the student's knowledge is 60. Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> Objective of the subject: The objective of the subject is to provide basic information about the principles of typesetting documents and their application in the typographical system LaTeX (TeX, XeLaTeX), Knowledge of the LaTeX language. overview of various formatting languages, systems and programs intended for creating documents in the form of presentations and documents. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - knowledge and understanding necessary for correct mathematical type - they get basic information about the principles of typing documents containing mathematical formulas	
<b>Course contents:</b> 1. Introduction to typographic systems, text and language structure. 2. Principles of typing documents containing mathematical formulas. 3. Typesetting of simple text, special text symbols. 4. Setting the parameters determining the appearance of the pages. 5. Type of mathematical formulas in the text, grouping in mathematical mode. 6. Titles, chapters and sections, cross references, footnotes, index - index.	

7. Creating tables and figures. 8. Specialties: Definitions, theorems and proofs in a mathematical document. 9. Contents, bibliography, document sections. 10. Pictures					
<b>Recommended or required literature:</b>					
<b>Language of instruction:</b> Slovak language					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 0					
A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0
<b>Name of lecturer(s):</b> RNDr. Štefan Tkačík, PhD.					
<b>Last modification:</b> 14.07.2022					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD204B/22	<b>Course title:</b> Programming 1M
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 1 <b>hours per semester:</b> 13 / 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 3	<b>Working load:</b> 75 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student must master the theoretical knowledge of the subject and also prepare and defend a practical final thesis. Fulfillment of both conditions is demonstrated in the form of a final exam. Final assessment: total percentage gain from mastering theoretical knowledge (50%) and practical final work (50%).	
<b>Learning outcomes of the course:</b> <ul style="list-style-type: none"> <li>- The student will know the possibilities, basic components, advantages and disadvantages of developing multiplatform applications using the selected frameworks (FLUTTER/DART, IONIC, JAVA).</li> <li>- Acquires knowledge and practical skills from the use of selected frameworks.</li> <li>- Can handle basic commands and syntax of the chosen language/framework.</li> <li>- Practically designs, programs and debugs the application for the selected system (ANDROID, iPHONE, WINDOWS ...), including its production deployment.</li> </ul>	
<b>Course contents:</b> <ol style="list-style-type: none"> <li>1. Application for Android, iPhone, web and desktop.</li> <li>2. Application structure, cross-platform.</li> <li>3. Basics of the language and data types.</li> <li>4. Cycles, conditions, fields and strings.</li> <li>5. OOP - objects, classes, inheritance, polymorphism...</li> <li>6. Input-output information and error handling.</li> <li>7. UI/UX and application components.</li> <li>8. Design and development of a mobile application.</li> <li>9. Use of WEB API.</li> <li>10. Use of local and external databases.</li> <li>11. Practical design, programming and production deployment of the selected application.</li> </ol>	

**Recommended or required literature:**

PILLÁR, J. 2021. <https://moodle.pf.ku.sk/> - electronic support for the subject.  
Specialized web portal of the KEGA project: <https://UNIoT.sk>  
DART programming language online: <https://dart.dev/>  
Framework FLUTTER online: <https://flutter.dev/>  
PECINOVSKÝ, R. 2009. We think object-wise in the JAVA language. Grada, Prague, 2009.  
Framework IONIC online: <https://ionicframework.com/>  
Powell, T. A. 2004. Web design-Complete guide, Computer Press, Brno, 2004.  
Brian, P.H. 2011. HTML5 and CSS3, Computer Press, Brno, 2011.  
Croft, J., Lloyd, I., Rubin, D. 2007. Masters in CSS, Computer Press, Brno, 2007.

**Language of instruction:****Notes:****Course evaluation:**

Assessed students in total: 1

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

**Name of lecturer(s):** doc. Ing. Ján Pillár, PhD.

**Last modification:** 10.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
doc. Ing. Igor Černák, PhD.



## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD202B/22	<b>Course title:</b> Special Information Systems Design 1.
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 2 <b>hours per semester:</b> 26 <b>Teaching method:</b> on-site	
<b>Credits:</b> 3	<b>Working load:</b> 75 hours
<b>Recommended semester/trimester:</b> 2.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, the student demonstrates his theoretical knowledge in the field of designing special information systems in the form of processing short written tasks and presenting them at the exercise. Subsequently, he demonstrates practical skills by solving partial tasks of the project activity and processing the final project Final assessment: total percentage gain from the presentation of the completed assignments (30%) and the final project (80%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> The aim of the course is to provide students with theoretical knowledge of the basics of system design and special information systems design, as well as selected practical skills in system design. Learning outcomes (knowledge, skills and competences): - The student will be able to define and explain the theoretical foundations and rules of system design. - Will have basic skills from performing simple project activities. - Will be able to solve simple problems in system project management. - Will be able to develop a simple project. Verification of the level of acquired knowledge, skills and competences: The verification is carried out on the basis of the presentation of theoretical knowledge and the development of the final project.	
<b>Course contents:</b> 1. System, project activity. 2. General approaches to the development of special IS in education. 3. General theory of systems.	

4. Systemic approach in analyzing systems.
5. Options for describing systems (graph, structure, matrix).
6. Information system, definition, classification.
7. Design of systems, design process, design phases.
8. Project, basic terms (phase, life cycle, processes).
9. Project management, project team..
10. Support software for project management.
11. Design of a special IS in the field of education (evaluation system, e-learning system)
12. Prospective technologies for the construction of information systems in education.

**Recommended or required literature:**

PAVLÍČEK, J. 2003. Systems and their design, PF OU in Ostrava, Ostrava 2003, study support.  
 JENČO, M. 2017. Organizational information systems. Ružomberok: Verbum, 289 p. ISBN 978-80-561-0500-9.  
 KUCEROVÁ, H.: Projecting information systems. VOŠIS, Prague 2007, Syllabus.  
 MOLNÁR, Z. 1992. Modern methods of managing information systems. Prague: Grada, ISBN 80-85623-07-02.  
 VOLNER, R. 2014. Modeling and simulation. Ružomberok: Verbum.  
 Support software documentation.  
 JENČO, M. Electronic study support for teaching the subject Projecting of special information systems 1, moodle.pf.ku.sk

**Language of instruction:**

**Notes:**

**Course evaluation:**

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

**Name of lecturer(s):** doc. Ing. Michal Jenčo, PhD.

**Last modification:** 27.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
 doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD205B/22	<b>Course title:</b> Special Information Systems Design 2
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 <b>hours per semester:</b> 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 3.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> During the semester, the student demonstrates his theoretical knowledge in the areas of designing special information systems in the form of their application in solving the tasks of project activity. Subsequently, he demonstrates practical skills by solving partial tasks of the project activity using selected methods. Final assessment: cumulative percentage gain from solving exercises during the semester (30%) and final written or practical test (70%). Subject evaluation: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
<b>Learning outcomes of the course:</b> The aim of the course is to provide students with additional theoretical knowledge from the design of special information systems, as well as selected practical skills in the design of systems and the application of methods. Learning outcomes (knowledge, skills and competences): - The student will be able to define and explain the theoretical foundations and rules for designing systems. - Will have skills in using the basic methods used in project management. - Will be able to solve problems while managing a smaller system project. - Will be able to apply selected methods used in project management. . Verification of the level of acquired knowledge, skills and competences: The verification is carried out on the basis of the completion of the tasks in the exercises and the final written or practical test.	
<b>Course contents:</b> 1. Components, functions, architecture of information and management systems. 2. System integration in the development of automated systems.	

3. Principles of software development.
4. Basic and object-oriented methods of analysis and design.
5. Functions and content of products for computer support of software engineering.
6. Quality of the software.
7. Quality models of software development processes.
8. Operation of automated information and control systems.
9. Designing projects of management systems.
10. Network analysis and detailed planning of control systems projects.
11. Implementation of management systems projects.
12. Team work and organization of teams in the implementation of management systems.
13. Risk analysis of automated control systems projects.

**Recommended or required literature:**

LACKO, B. 2006. Designing management systems, Brno: BUT Brno FSI UAI, 2006, study support.

JENČO, M. 2017. Organizational information systems. Ružomberok: Verbum, 289 p. ISBN 978-80-561-0500-9.

KUCEROVÁ, H.: Projecting information systems. VOŠIS, Prague 2007, Syllabus.

MOLNÁR, Z. 1992. Modern methods of managing information systems. Prague: Grada, ISBN 80-85623-07-02.

VOLNER, R. 2014. Modeling and simulation. Ružomberok: Verbum.

Support software documentation.

JENČO, M. Electronic study support for teaching the subject Projecting of special information systems 2, moodle.pf.ku.sk

**Language of instruction:**

**Notes:**

**Course evaluation:**

Assessed students in total: 4

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

**Name of lecturer(s):** doc. Ing. Michal Jenčo, PhD.

**Last modification:** 27.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok					
<b>Faculty:</b> Faculty of Education					
<b>Course code:</b> KIN/In-MD200S/22		<b>Course title:</b> State final exam - Informatics			
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> <b>Recommended study range:</b> <b>hours weekly:</b> <b>hours per semester:</b> <b>Teaching method:</b> on-site					
<b>Credits:</b> 16		<b>Working load:</b> 400 hours			
<b>Recommended semester/trimester:</b> 3., 4..					
<b>Level of study:</b> II.					
<b>Prerequisites:</b>					
<b>Requirements for passing the course:</b>					
<b>Learning outcomes of the course:</b>					
<b>Course contents:</b>					
<b>Recommended or required literature:</b>					
<b>Language of instruction:</b>					
<b>Notes:</b>					
<b>Course evaluation:</b> Assessed students in total: 141					
A	B	C	D	E	FX
65.25	17.73	7.09	4.96	4.96	0.0
<b>Name of lecturer(s):</b>					
<b>Last modification:</b>					
<b>Supervisor(s):</b> Person responsible for the delivery, development and quality of the study programme: doc. Ing. Igor Černák, PhD.					

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD200B/22	<b>Course title:</b> Web Design 1M
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Lecture / Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 / 1 <b>hours per semester:</b> 13 / 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 2	<b>Working load:</b> 50 hours
<b>Recommended semester/trimester:</b> 1.	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student must master the theoretical knowledge of the subject and also prepare and defend a practical final thesis. Fulfillment of both conditions is demonstrated in the form of a final exam. Final assessment: total percentage gain from mastering theoretical knowledge (50%) and practical final work (50%).	
<b>Learning outcomes of the course:</b> <ul style="list-style-type: none"> <li>- The student will know an overview of editorial systems (CMS = Content Management System) and electronic stores available on the market and the possibilities of their use.</li> <li>- Gain knowledge and practical skills in the installation, configuration and management of an editorial system (WordPress, Joomla, Drupal ...) and e-commerce (Prestashop, Magento ...).</li> <li>- He can handle SEO issues, systems for analyzing web access, conversions, etc.</li> <li>- Practically installs, configures, debugs and prepares the selected editorial system or electronic store for production deployment.</li> </ul>	
<b>Course contents:</b> <ol style="list-style-type: none"> <li>1. Basic characteristics and overview of editorial systems (WordPress, Joomla, Drupal, ...)</li> <li>2. Selection and installation of a specific editorial system</li> <li>3. Inserting content into the editorial system</li> <li>4. Administration of the editorial system</li> <li>5. Editing selected UI templates and creating your own</li> <li>6. Expanding the editorial system (modules, components, plug-ins, etc.)</li> <li>7. Electronic commerce and the possibilities of using ready-made solutions (Prestashop, Magento, ...)</li> <li>8. Selection and installation of e-commerce</li> <li>9. Insertion of goods and store maintenance</li> <li>10. Cooperation with product comparators</li> <li>11. Conversions, website statistics, SEO</li> </ol>	

**Recommended or required literature:**

PILLÁR, J. 2021. <https://moodle.pf.ku.sk/> - electronic support for the subject.

Specialized web portal of the KEGA project: <https://UNIoT.sk>

MC NULTY, S. 2009. WordPress: effective publishing on the web, Zoner Press, Brno, 2009.

RAHMEL D. 2010. Joomla - a detailed guide to web creation and management, Computer Press, Brno, 2010.

PRESTASHOP description and use online: <https://www.prestashop.com/>

MAGENTO description and use online: <https://magento.com/>

WORDPRESS description and use online: <https://wordpress.com/>

WORDPRESS online: <https://wordpress.org/>

Powell, T. A. 2004. Web design-Complete guide, Computer Press, Brno, 2004.

Brian, P.H. 2011. HTML5 and CSS3, Computer Press, Brno, 2011.

Croft, J., Lloyd, I., Rubin, D. 2007. Masters in CSS, Computer Press, Brno, 2007.

**Language of instruction:****Notes:****Course evaluation:**

Assessed students in total: 3

A	B	C	D	E	FX
33.33	33.33	0.0	0.0	33.33	0.0

**Name of lecturer(s):** doc. Ing. Ján Pillár, PhD.

**Last modification:** 10.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:

doc. Ing. Igor Černák, PhD.

## COURSE INFORMATION SHEET

<b>University:</b> Catholic University in Ružomberok	
<b>Faculty:</b> Faculty of Education	
<b>Course code:</b> KIN/In-MD200C/22	<b>Course title:</b> Web design - differential exam
<b>Type and range of planned learning activities and teaching methods:</b> <b>Form of instruction:</b> Seminar <b>Recommended study range:</b> <b>hours weekly:</b> 1 <b>hours per semester:</b> 13 <b>Teaching method:</b> on-site	
<b>Credits:</b> 1	<b>Working load:</b> 25 hours
<b>Recommended semester/trimester:</b> 1., 2..	
<b>Level of study:</b> II.	
<b>Prerequisites:</b>	
<b>Requirements for passing the course:</b> The student must master the theoretical knowledge of the subject and also prepare and defend a practical final thesis. Fulfillment of both conditions is demonstrated in the form of a final exam. Final assessment: total percentage gain from mastering theoretical knowledge (50%) and practical final work (50%).	
<b>Learning outcomes of the course:</b> <ul style="list-style-type: none"> <li>- The student will know the process of creating a web application using current modern technologies.</li> <li>- Can handle basic knowledge about analysis, design, development and testing of a web application, the process of designing and creating a web design with modern programming tools and frameworks.</li> <li>- Acquires a broader overview of new prospective web technologies and their support, as well as the ability to analyze the perspective of individual web technologies oriented towards commercial practice, to propose procedures for achieving set goals.</li> <li>- Practically designs, programs and publishes a modern web application using established tools, containerization, or devices and services of the Internet of Things.</li> </ul>	
<b>Course contents:</b> <ol style="list-style-type: none"> <li>1. Current technologies for creating web applications, static and dynamic web</li> <li>2. Design and programming of web portals using HTML, JS, PHP, XAMPP, VISUAL STUDIO VS CODE</li> <li>3. PHP language and working with a database (MySQL)</li> <li>4. Javascript, AJAX and site design modification (CSS3, Bootstrap)</li> <li>5. Multiplatform ASP.NET Core MVC application and page design</li> <li>6. ASP.NET Core WEB API and cooperation with web and mobile applications</li> <li>7. UI, UX and principles of working with text, colors, images and icons</li> <li>8. Versioning system and teamwork (GIT)</li> <li>9. Docker, Docker-compose and application containerization</li> <li>10. Microcontroller and single-board computer as web server (ESP32, Raspberry Pi)</li> <li>11. Publishing and updating web applications in real time (Cloud, Raspberry Pi)</li> <li>12. Practical development and deployment of a web application</li> </ol>	



**Recommended or required literature:**

PILLÁR, J. 2021. <https://moodle.pf.ku.sk/> - electronic support for the subject.  
PILLÁR, J. 2017. ASP.NET Core MVC - college textbook. KU, Ružomberok, 2017.  
Specialized web portal of the KEGA project: <https://UNIoT.sk>  
Powell, T. A. 2004. Web design-Complete guide, Computer Press, Brno, 2004.  
Brian, P.H. 2011. HTML5 and CSS3, Computer Press, Brno, 2011.  
Croft, J., Lloyd, I., Rubin, D. 2007. Masters in CSS, Computer Press, Brno, 2007.  
ASP.NET Core course online: <https://docs.microsoft.com/en-us/aspnet/core/>  
.NET Core tutorial online: <https://docs.microsoft.com/en-us/dotnet/core/tutorials/index>  
Course RAZOR pages online: [https://www.w3schools.com/asp/razor\\_intro.asp](https://www.w3schools.com/asp/razor_intro.asp)  
PHP course online, <https://www.w3schools.com/php/>  
PHP Course Online, <http://www.tutorialspoint.com/php/>  
LACKO, Ľ. 2005. PHP and MySQL - Ready solutions. Computer Press, Brno, 2005.  
Bootstrap course online, <http://getbootstrap.com>  
Docker containerization course online: <http://www.docker.com>

**Language of instruction:****Notes:****Course evaluation:**

Assessed students in total: 1

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

**Name of lecturer(s):**

**Last modification:** 10.07.2022

**Supervisor(s):**

Person responsible for the delivery, development and quality of the study programme:  
doc. Ing. Igor Černák, PhD.