

UČNI NAČRT PREDMETA/COURSE SYLLABUS	
Predmet	Algoritmi in podatkovne strukture
Course title	Algorithms and Data Structure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Poslovna informatika 1	Poslovna informatika	2.	3.
Business Informatics 1	Business informatics	2 nd	3 rd

Vrsta predmeta/Course type obvezni/obligatory

Univerzitetna koda predmeta/University course code

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30			45		75	6

Nosilec predmeta/Lecturer: dr. Borut Čampelj, pred.

Jezik/
Languages: **Predavanja/Lectures:** slovenski/Slovenian
Vaje/Tutorial: slovenski/Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: **Prerequisites:**

<ul style="list-style-type: none"> Pogoj za vključitev v delo je vpis v 2. letnik študija. Študent mora pred izpitom pripraviti in javno predstaviti seminarsko nalogo. 	<ul style="list-style-type: none"> The prerequisite for participation is enrolment in the second year of study. Students have to successfully prepare and present a seminar paper before the examination.
---	---

Vsebina:

Content (Syllabus outline):

<ul style="list-style-type: none"> <i>Uvod.</i> Osnovni principi reševanja problemov, algoritem, psevdokoda in abstraktni podatkovni tipi; pomen poznavanja osnovnih tipov in algoritmov. <i>Analiza algoritmov.</i> Časovna in prostorska zahtevnost algoritmov, velikostni red časovne zahtevnosti, modeliranje dejanskega časa izvajanja, razlike med razredi zahtevnosti. <i>Seznami in preslikave.</i> Abstraktni podatkovni tipi in njihove implementacije: enosmerni in dvosmerni seznam, množica, vrsta in sklad, zgoščevalna tabela. Primerjava in analiza različnih tipov in implementacij. <i>Slovar.</i> Definicija abstraktnega 	<ul style="list-style-type: none"> <i>Introduction.</i> Basic principles of solving problems, algorithm, pseudo code and abstract data types; the importance of the basic types and algorithms knowledge. <i>Analysis of algorithms.</i> Time and space complexity of algorithms, order of magnitude of time complexity, modelling of the actual time of implementation, differences among complexity classes. <i>Lists and mapping.</i> Abstract data types and their implementation: one-way linked list and two-way linked list, group, queue and stack, hash table. Comparison and analysis of different types and ways of implementation. <i>Glossary.</i> Definition of abstract data type, glossary, search tree, binary tree,
--	---

<p>podatkovnega tipa slovar, iskalna drevesa, binarno drevo, AVL drevo, B drevesa. Prednosti in slabosti različnih dreves, primerjava in analiza različnih implementacij.</p> <ul style="list-style-type: none"> • <i>Prioritetna vrsta</i> kot abstraktni podatkovni tip, implementacija z delno poravnanim drevesom. • <i>Metode načrtovanja algoritmov</i>. Preiskovanje prostora stanj, dinamično programiranje, požrešno iskanje. • <i>Graf</i> kot abstraktni podatkovni tip s primeri metod načrtovanja algoritmov. Analiza kritične poti, minimalno vrpto drevo in iskanje najkrajših poti kot primeri požrešnih algoritmov in dinamičnega programiranja. • <i>Urejanje</i>. Pregled osnovnih metod. Urejanje z vstavljanjem in mehurčki, s kopico, hitro sortiranje in radix sort. Analiza časovne zahtevnosti in pogled z vidika metod načrtovanja algoritmov. 	<p>AVL tree, B trees. Advantages and disadvantages of different trees, comparison and analysis of different ways of implementation.</p> <ul style="list-style-type: none"> • <i>Priority queue</i> as an abstract data type, implementation with a partially aligned tree. • <i>Methods of planning algorithms</i>. State space searching, dynamic programming, greedy search. • <i>Graph</i> as an abstract data type with examples of methods of planning algorithms. Analysis of critical path, minimum spanning tree and search for the shortest path as examples of greedy algorithms and dynamic programming. • <i>Arranging</i>. Review of the basic methods. Arranging with insertion and bubbles, heap, quick sort and radix sort. Analysis of time complexity and the viewpoint from the perspective of methods of planning algorithms.
--	---

Temeljna literatura in viri/Readings:

Cormen, T. H. et al. (2009). Introduction to Algorithms. 3.izdaja. Cambridge, Massachusetts London, England: MIT Press.
Kononenko, I. in sod. (2008). Programiranje in algoritmi. Ljubljana: Založba FE in FRI.
Kononenko, I. in Robnik Šikonja, M. (2004). Osnove algoritmov in podatkovnih struktur II. Založba FE in FRI, Ljubljana.
Sedgewick, R. (2003). Algorithms in Java, Parts 1-3. Addison Wesley.

Cilji in kompetence:

Učna enota prispeva k razvoju naslednjih splošnih in specifičnih kompetenc:

- usposobljenost za raziskovanje na področju informatike v upravljanju in poslovanju ter razvoj kritične in samokritične presoje;
- fleksibilna uporaba znanja v praksi;
- sposobnost za reševanje konkretnih delovnih problemov z uporabo znanstvenih metod in postopkov;
- zmožnost zapisa problema v obliki algoritma;
- poznavanje in razumevanje utemeljitve in zgodovine temeljnih disciplin s področja računalništva in informatike;
- razumevanje splošne strukture področja računalništva in informatike in povezanost s podpodročji, predvsem z informatiko v upravljanju in poslovanju;

Objectives and competences:

The learning unit contributes to the development of the following general and specific competences:

- the ability to carry out research in the field of informatics in business and management, the development of critical and self-critical assessment;
- flexible use of knowledge in practice;
- the ability to solve concrete work problems using scientific methods and procedures;
- the ability to record a problem in the form of an algorithm;
- knowledge and understanding of the reasons and history of the fundamental disciplines in the field of computing and informatics;
- understanding the general structure in the field of computing and informatics with

<ul style="list-style-type: none"> • razumevanje in uporaba metod kritične analize in razvoja teorij ter njihova uporaba pri reševanju konkretnih delovnih problemov; • znanje o načinih predstavitve, zapisa in modeliranja informacije; • razvoj programske opreme; • osveženost o zmožnostih in omejitvah informacijskih tehnologij. 	<p>their subfields, especially informatics in business and management;</p> <ul style="list-style-type: none"> • understanding and using the critical analysis methods and the development of theories as well as their use in solving concrete work problems; • knowledge of the methods of presenting, recording and modelling information; • development of software; • awareness of capabilities and limitations of information technologies.
---	--

Predvideni študijski rezultati:

Znanje in razumevanje:

Študent/Študentka:

- pozna različne principe reševanja problemov;
- razume pomen abstraktne predstavitve problema;
- pozna in razume pojme iz analize algoritmov;
- pozna in razume različne abstraktne podatkovne tipe in algoritme;
- pozna in razume različne metode načrtovanja algoritmov;
- pozna in razume delovanje različnih urejanj in algoritmov na grafih;
- uporablja pridobljeno znanje načrtovanja algoritmov pri analizi lastnih praktičnih problemov iz informatike in upravljanja;
- uporablja teorijo časovne zahtevnosti algoritmov za analizo praktičnih problemov iz informatike;
- reflektira in kritično ovrednoti različne praktične rešitve, ki so jih on in drugi uporabili pri izdelavi seminarских nalog;
- demonstrira in reflektira uporabnost različnih podatkovnih struktur in algoritmov na praktičnih problemih iz upravljanja in poslovanja;
- spremlja in uporablja spletne vire ter knjižnice algoritmov in podatkovnih struktur;
- aktivno uporablja sodobna programerska orodja;
- pisno in ustno poroča o analizi in reševanju praktičnih problemov s področja upravljanja in poslovanja.

Intended learning outcomes:

Knowledge and understanding:

Students:

- know various principles of solving problems;
- understand the importance of an abstract presentation of a problem;
- know and understand terms in the analysis of algorithms;
- know and understand abstract data types and algorithms;
- know and understand various methods of planning algorithms;
- know and understand the functioning of different ways of implementation and various algorithms in graphs;
- use the gained knowledge of planning algorithms in the analysis of one's own practical problems in informatics and business;
- use the theory of time complexity of algorithms for the analysis of practical problems in informatics;
- reflect and critically evaluate various practical solutions used by the student and others in the preparation of seminar papers;
- demonstrate and reflects the applicability of different data structures and algorithms in practical problems related to business and management;
- monitor and use Internet resources and libraries of algorithms and data structures;
- actively use modern software tools;
- report in written and spoken form on the analysis and solving practical problems in the field of business and management.

Metode poučevanja in učenja:**Learning and teaching methods:**

<ul style="list-style-type: none"> • <i>predavanja</i> z aktivno udeležbo študentov (razlaga, diskusija, vprašanja, primeri, reševanje problemov); • <i>seminarske vaje</i> v povezavi s praktičnimi problemi iz upravljanja in informatike (analiza in izbor primerne problema, projektno delo, diskusija, sporočanje povratne informacije, javna predstavitev in demonstracija, kritična refleksija in analiza lastnega dela in dela drugih); • individualne in skupinske <i>konzultacije</i> (diskusija, dodatna razlaga, obravnava specifičnih vprašanj); • <i>javni nastop z zgoščeno predstavitvijo</i> (opazovanje, analiza, refleksija, ocenjevanje in samoocenjevanje). 	<ul style="list-style-type: none"> • <i>lectures</i> with active participation of students (explanation, discussion, questions, examples, problem solving); • <i>tutorial</i> in connection with practical problems in management and informatics (analysis and selections of appropriate problem, project work, discussion, feedback, public presentation and demonstration, critical reflection and analysis of one' own work and work of others); • individual and group <i>consultations</i> (discussion, additional explanation, addressing specific issues); • <i>public performance with a concise presentation</i> (observation, analysis, reflection, assessment and self-assessment).
--	---

Delež (v %)

Načini ocenjevanja:

Weight (in %)

Assessment:

<p>Način (pisni izpit, ustno spraševanje, naloge, projekt):</p> <ul style="list-style-type: none"> • pisni (ustni) izpit • seminarska naloga s predstavitvijo in zagovorom 	<p>60 40</p>	<p>Types (written examination, oral examination, coursework, project):</p> <ul style="list-style-type: none"> • written (oral) exam • seminar presentation and defence
--	------------------	--