



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Osnove računalniških omrežij
Course title:	Principles of Computer Networks

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Matematika		3.	6.
Mathematics		3.	6.

Vrsta predmeta / Course type

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
45			30		105	6

Nosilec predmeta / Lecturer:

Jeziki / Languages:	Predavanja / Lectures:	SLOVENSKO/SLOVENE
	Vaje / Tutorial:	SLOVENSKO/SLOVENE

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

Algoritmi, Podatkovne strukture, Računalniški praktikum

Vsebina:

Matematične osnove in teorija računalniških omrežij: teorija grafov, usmerjevalni postopki, dodeljevanje frekvenc.
Referenčna modela OSI in TCP/IP.
Spoznavanje omrežij z vidika različnih slojev po referenčnem modelu.
Varnost v omrežjih.
Zaščita vsebine prenosa podatkov: standardne kriptografske metode, kriptografija z javnim ključem.
Medomrežno povezovanje in zaščita: varnostni

Prerequisites:

Algorithms, Data structures, Programming practicum

Content (Syllabus outline):

Mathematical principles and theory of computer networks: graph theory, routing algorithms, frequency assignment.
Reference models OSI and TCP/IP.
Different layers of a network reference model.
Network security.
Secure data transmission: standard data cryptography methods, public key

zid.

cryptography.

Inter-network communications and security:
firewall.

Temeljni literatura in viri / Readings:

T. Vidmar: Računalniška omrežja in storitve, Atlantis, 1997

A. S. Tanenbaum: Computer Networks, Prentice-Hall, 2003.

B. Schneier: Applied cryptography: protocols, algorithms, and source code in C, Wiley and Sons, 1996

O. Goldreich: Modern cryptography, probabilistic proofs and pseudorandomness, Berlin, Springer, 1999.

S. Garfinkel: Practical UNIX and Internet Security, Bonn, O'Reilly, 1996.

W. Mao: Modern cryptography : theory and practice, Upper Saddle River, Prentice-Hall, 2004.

Cilji in kompetence:

Spoznati matematične osnove, teorijo in temeljne koncepte računalniških omrežij.
Nadgraditi znanja pridobljena pri drugih predmetih (diskretne matematiki, algoritmih,...) za potrebe računalniških omrežij.

Objectives and competences:

Know mathematical theory and fundamental concepts of computer networks. Upgrade the knowledge obtained with other subjects (algorithms, discrete mathematics, ...) for computer networks.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumeti matematične principe in teorijo
- Spoznati algoritme za usmerjanje ter algoritme za dodeljevanje frekvenc.
- Spoznati osnove varnosti in zaščite podatkov v računalniških omrežjih

Prenosljive/ključne spretnosti in drugi atributi:

- Pridobljena znanja se prenašajo na druge z računalništvom povezane predmete.

Intended learning outcomes:

Knowledge and Understanding:

- To understand mathematical principles and theory
- To know routing algorithms and frequency assignment algorithms.
- To know basics of network security

To understand secure data transmission methods

Transferable/Key Skills and other attributes:

- The obtained knowledge is transferable to the other computer science oriented subjects.

Metode poučevanja in učenja:

- Predavanja
- Računalniške vaje

Learning and teaching methods:

- Lectures
- Computer exercises

Načini ocenjevanja:**Assessment:**

<p><u>Izpit:</u> Pisni izpit – praktični del Ustni izpit – teorija</p> <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p> <p>Opravljen pisni izpit – praktični del je pogoj za pristop k ustnemu izpitu.</p>	<p>Delež (v %) / Weight (in %)</p> <p>50%</p> <p>50%</p>	<p><u>Exams:</u> Written exam – practical part Oral exam – theory</p> <p>Each of the mentioned commitments must be assessed with a passing grade.</p> <p>Passing grades of written exam – practical part is required for taking the oral exam.</p>
<p>Reference nosilca / Lecturer's references:</p>		

1. SHAO, Zehui, VESEL, Aleksander, XU, Jin. The k-distance independence number and 2-distance chromatic number of Cartesian products of cycles. Bulletin of the Malaysian Mathematical Society, ISSN 0126-6705, 2016, str. 1-15, doi: [10.1007/s40840-016-0397-0](https://doi.org/10.1007/s40840-016-0397-0).
2. SHAO, Zehui, VESEL, Aleksander, XU, Jin. Frequency assignment problem in networks with limited spectrum. Central European Journal of Operations Research, ISSN 1435-246X, 2016, 1-15 str., doi: [10.1007/s10100-016-0462-7](https://doi.org/10.1007/s10100-016-0462-7).
3. VESEL, Aleksander. Regular coronoids and 4-tilings. Discrete applied mathematics, ISSN 0166-218X. [Print ed.], 2016, str. 1-11, doi: [10.1016/j.dam.2016.07.022](https://doi.org/10.1016/j.dam.2016.07.022).
4. RHO, Yoomi, VESEL, Aleksander. Linear recognition of generalized Fibonacci cubes Q_n^h (111). Discrete mathematics and theoretical computer science, ISSN 1365-8050, 2016, vol. 17, no. 3, str. 349-362. <https://www.dmtcs.org/dmtcs-ojs/index.php/dmtcs/article/view/2756/4766.html>.
5. VESEL, Aleksander. Linear recognition and embedding of Fibonacci cubes. Algorithmica, ISSN 0178-4617, 2015, vol. 71, no. 4, str. 1021-1034, doi: [10.1007/s00453-013-9839-3](https://doi.org/10.1007/s00453-013-9839-3).