

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

**Predmet:** Varnost in zavarovanje podatkov

**Course title:** Data security and protection

Študijski program in stopnja	Študijska smer	Letnik	Semester
Study programme and level	Study field	Academic year	Semester

Kibernetska varnost, magistrski študijski program druge stopnje	-	Prvi	Prvi
The second cycle masters study programme Cyber Security	-	First	First

**Vrsta predmeta / Course type**

Obvezni / Obligatory

**Univerzitetna koda predmeta / University course code:**

5-KV-MAG-VZP-2026-01-21

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samost. delo	ECTS
Lectures	Seminar	Tutorial	work	work	Individ. work	
40	/	20	/	/	120	6

**Nosilec predmeta / Lecturer:** izr. prof. dr. Igor Tomičič

**Jeziki / Predavanja / Lectures:** Slovenski, angleški / Slovene, English

**Languages: Vaje / Tutorial:** Slovenski, angleški / Slovene, English

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

**Prerequisites:**

Za vključitev v delo je potrebno, da študent pozna temeljne koncepte mreženja, kriptografije, podatkovnih baz in informacijske varnosti.

Za pristop k izpitu mora študent pripraviti in predstaviti projektno nalogo.

It is required for a student to be familiar with the fundamental concepts of networking, cryptography, databases, and information security.

To attend the exam, a student has to prepare and present a project assignment.

### Vsebina:

- Klasifikacija podatkov in povezana tveganja
- Viri podatkov, vrste shranjevanja
- Elementi sistema varstva podatkov
- Uporabna kriptografija
- Kontrole dostopa do podatkov
- Varnostno kopiranje podatkov, obnovitev, arhivi
- Odpravljanje podvajanja
- Metode obnovitve po nesreči
- Varnost podatkov v neprekinjenem poslovanju
- Zaščita baz podatkov
- Tradicionalne in sodobne rešitve za varstvo podatkov
- Varnostni vidiki podatkov v oblaku
- Varnostni vidiki velikih podatkov
- Zasebnost in pravni vidiki varstva podatkov

### Content (Syllabus outline):

- Data classification and associated risks
- Data sources, storage types
- Elements of data protection system
- Applied cryptography
- Data Access controls
- Data backup, recovery, archives
- Deduplication
- Disaster recovery methods
- Data security in business continuity
- The protection of databases
- Traditional and modern data protection solutions
- Security aspects of Data in Cloud
- Security aspects of Big Data
- Privacy and legal considerations of data protection

### Temeljni literatura in viri / Readings:

- Preston, W. C. (2021). *Modern Data Protection: Ensuring Recoverability of All Modern Workloads*. O'Reilly Media.
- De Guise, P. (2020). *Data protection: Ensuring data availability* (2nd ed.). Auerbach Publications.
- Yang, P., Xiong, N., & Ren, J. (2020). *Data security and privacy protection for cloud storage: A survey*. IEEE Access, 8, 131723-131740.
- Alsulbi, K., Khemakhem, M., Basuhail, A., Eassa, F., Jambi, K. M., & Almarhabi, K. (2021). *Big Data Security and Privacy: A Taxonomy with Some HPC and Blockchain Perspectives*. International Journal of Computer Science & Network Security, 21(7), 43-55.

### Cilji in kompetence:

#### Splošne kompetence:

- Razumevanje pomena kibernetске varnosti.

### Objectives and competences:

#### General competences:

- Understanding the importance of cyber security.

- Poznavanje pravnih in etičnih vidikov varovanja podatkov in informacij.
- Sposobnost fleksibilne uporabe pridobljenega znanja o kibernetiki varnosti v praksi.

**Predmetno-specifične kompetence:**

- Sposobnost razločevanja in kategorizacije različnih vrst podatkov, ki jih najdemo v organizaciji.
- Razumevanje možnih ranljivosti in tveganj za varnost podatkov.
- Sposobnost uporabe učinkovitih kriptosistemov v različnih primerih uporabe.
- Razumevanje elementov sistema varstva podatkov.
- Sposobnost izvajanja učinkovitih sistemov za varnostno kopiranje, obnovitev in arhiviranje.
- Sposobnost predlaganja učinkovitih sistemov za nadzor dostopa do podatkov.
- Razumevanje pomena deduplikacije.
- Sposobnost uporabe ustreznih metod zaščite baze podatkov.
- Razumevanje neprekinjenega poslovanja, zasebnosti in pravnih vidikov v kontekstu varstva podatkov.
- Sposobnost prepoznavanja in argumentiranja o možnostih, priložnostih in tveganjih podatkov v oblaku.

- Knowledge of legal and ethical aspects of data and information protection.
- Ability to flexibly apply the acquired knowledge of cyber security in practice.

**Subject-specific competences:**

- Ability to discern and categorize various data types found in an organization.
- Understanding of potential vulnerabilities and risks to data security.
- Ability to apply effective crypto systems to various use-cases.
- Understanding of elements of data protection system.
- Ability to implement effective backup, recovery and archive systems.
- Ability to propose effective data access control systems.
- Understanding of the significance of deduplication.
- Ability to apply appropriate database protection methods.
- Understanding of business continuity, privacy and legal considerations in the context of data protection.
- Ability to recognize and argue about the possibilities, opportunities and risks of data in cloud.

**Predvideni študijski rezultati:**

Znanje in razumevanje:

- Študentje se bodo seznanili s teoretičnimi osnovami in praktičnimi navodili glede sodobnih vidikov varnosti in zaščite podatkov.
- Študentje bodo znali uporabiti nekatere sodobne elemente varnosti podatkov (šifriranje, metode varnostnega kopiranja / obnovitve, metode zaščite baze podatkov itd.) v različnih primerih uporabe.
- Študenti se bodo lahko pogovarjali in predlagali metode varnosti in zaščite

**Intended learning outcomes:**

Knowledge and understanding:

- The students will get acquainted with theoretical basics and practical instructions on modern data security and protection aspects.
- Students will be able to apply some of the modern data security elements (encryption, backup/restore methods, database protection methods, etc.) to various use-cases.
- Students will be able to argue about and propose data security and protection methods in the context of business continuity.

podatkov v okviru neprekinjenega poslovanja.

- Študentje se bodo lahko pogovarjali o varnostnih vidikih velikih podatkov in podatkov v oblaku ter o zasebnosti in pravnih vidikih varstva podatkov.

- Students will be able to argue about security aspects of big data and data in cloud, as well as privacy and legal aspects of data protection.

**Metode poučevanja in učenja:**

**Learning and teaching methods:**

- *Predavanja* z aktivnim sodelovanjem študentov (razlaga, razprava, vprašanja, primeri);
- *Vaje*, na katerih bodo študenti uporabljali različna orodja in sisteme za reševanje danih vaj (npr. Gpg4win, certutil, VeraCrypt, CrypTool, Cain&Abel, virtualni stroji, različne spletne storitve);
- *Vaje*, na katerih bodo študenti predstavili rezultate svojih projektov in vključili vse udeležence v konstruktivno razpravo in predhodno ocenjevanje.

- *Lectures with active participations by the students* (explanation, discussion, questions, cases);
- *Tutorials*, where students will use various tools and systems to solve given exercises (for example Gpg4win, certutil, VeraCrypt, CrypTool, Cain&Abel, virtual machines, various online services);
- *Tutorials*, where students will present the results of their projects and include all participants in a constructive discussion and preliminary assessment.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %) **Assessment:**

Projektna naloga	40 %	Project assignment
Pisni izpit	60 %	Written Exam

**Reference nosilca / Lecturer's references:**

- Tomičić, Igor; Grd, Petra; Bernik, Andrija. Advancing the Threat Intelligence with AI: An Overview, Taxonomy and Roadmap // Journal of universal computer science, 31 (2025), 10; 1102-1129. doi: 10.3897/jucs.137544
- Tomičić, Igor. Penetration Testing Roadmap for NIS2 Compliance in SMEs // 2025 MIPRO 48th ICT and Electronics Convention / Car, Željka; Babić, Snježana; Čičin Šain, Marina (ur.). Rijeka: IEEE, 2025. str. 806-812. doi: 10.1109/mipro65660.2025.11131909
- Tomičić, Igor; Grd, Petra. Towards the open ontology for IoT ecosystem's security // MIPRO 2020 43rd International Convention Proceedings / Skala, Karolj (ur.). Rijeka: Croatian Society for Information, Communication and Electronic Technology – MIPRO, 2020. str. 1308-1313.
- Jurišić, Marko; Tomičić, Igor; Grd, Petra. User Behavior Analysis for Detecting Compromised User Accounts: A Review Paper // Cybernetics and Information Technologies, 23 (2023), 3; 102-113. doi: 10.2478/cait-2023-0027
- Zekan, Marko ; Tomičić, Igor ; Schatten, Markus Low-sample classification in NIDS using the EC-GAN // Journal of universal computer science, 28 (2022), 12; 1330-1346. doi: 10.3897/jucs.85703