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# Baseline Curricula Report

## Version 2.0

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### Short Description:

This document contains the baseline report about the currently held courses and implemented laboratories in the information security domain at Serbian HEIs (both partner and non-partner institutions).

### Keywords:

Information Security, Courses, Laboratories

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## 1 Introduction

This document contains an overview of existing courses and laboratories currently used in supporting higher education in the information security domain.

The ISSES team defined the following templates for collecting information about existing courses and laboratories:

### 1. Table Existing course details

<b>Course title (in English)</b>	
<b>Course title (in Serbian)</b>	
<b>BSc/MSc/PhD/Spec level of studies</b>	
<b>ECTS credit points</b>	
<b>Higher education institution (HEI)</b>	
<b>City</b>	
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	
<b>Professor(s) – name, title, organization, email</b>	
<b>Included in study programs</b>	
<b>Number of students 2016/2017</b>	
<b>Number of students 2017/2018</b>	
<b>Number of students 2018/2019</b>	

### 2. Table Existing laboratory details

<b>Laboratory name (in English)</b>	
<b>Laboratory name (in Serbian)</b>	
<b>Higher education institution (HEI)</b>	
<b>City</b>	
<b>Laboratory exercises – short descriptions for each</b>	



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<b>Professional services offered – short descriptions for each<sup>1</sup></b>	
<b>Responsible person – name, title, organization, email</b>	
<b>Current equipment listing</b>	
<b>Planned equipment acquisition(s)</b>	

The four HEIs involved in the ISSES project made an effort to cover other HEIs in Serbia, both universities and colleges which offer courses in information security. The list of covered HEIs was the following:

- University of Belgrade – ISSES consortium member
- University of Novi Sad – ISSES consortium member
- University of Nis – ISSES consortium member
- Subotica Tech – ISSES consortium member
- University of Kragujevac – 4<sup>th</sup> largest HEI in Serbia
- The Academy of Criminalistic and Police Studies – IMPRESS Erasmus+ CBHE project coordinator
- Belgrade Metropolitan University – a private HEI, offering a mostly web-based, remote-learning MSc program in Information Security.

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<sup>1</sup> If the laboratory is used to perform court expert examinations or to offer other professional services, then list them here



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## 2 University of Belgrade – School of Electrical Engineering (ETF)

### 2.1 Computer Security

<b>Course title (in English)</b>	Computer Security
<b>Course title (in Serbian)</b>	Zaštita podataka
<b>ECTS</b>	6
<b>Level of studies</b>	Bachelor degree – software engineering, computer engineering
<b>Higher education institution (HEI)</b>	University of Belgrade – School of Electrical Engineering (UB-ETF)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Availability, Authentication, Authorization,</li> <li>• Confidentiality, Integrity, and Access Control.</li> <li>• OTP, Stream Ciphers (RC4),</li> <li>• Block Ciphers (DES, AES),</li> <li>• Asymmetric Algorithms (DH, RSA),</li> <li>• Hash Functions (SHA-512).</li> <li>• Authentication Applications (Kerberos),</li> <li>• Key Management (X.509),</li> <li>• Secure Web Connections (SSL),</li> <li>• Electronic Payments (SET).</li> <li>• Passive Attacks,</li> <li>• Active Attacks,</li> <li>• Malicious Software.</li> <li>• DDoS. Firewalls.</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	PhD Zoran Jovanovic, Full Professor, UB-ETF, zoran@rcub.bg.ac.rs PhD Zarko Stanisavljevic, Assistant Professor, UB-ETF, zarko@etf.rs PhD Pavle Vuletic, Assistant Professor, UB-ETF, pavle.vuletic@etf.bg.ac.rs



### 3 University of Belgrade – Faculty of Organizational Sciences (FON)

#### 3.1 Computer Systems Security

<b>Course title (in English)</b>	Computer Systems Security, Undergraduate studies – Information Systems and Technologies
<b>Course title (in Serbian)</b>	Zaštita računarskih sistema, osnovne akademske studije – Informacioni sistemi i tehnologije
<b>Higher education institution (HEI)</b>	Faculty of organizational sciences, University of Belgrade
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Basic terms in Computer Systems Security,</li> <li>• Security threats and risks,</li> <li>• Methods of Social Engineering,</li> <li>• Examples of computer viruses,</li> <li>• Security models,</li> <li>• Basic security mechanisms,</li> <li>• Digital signatures and digital certificates,</li> <li>• Authentication methods,</li> <li>• Network security</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Prof. Dejan Simić, Full Professor, Prof. Miroslav Minović, Associate Professor, Faculty of organizational sciences, <a href="mailto:dsimic@fon.bg.ac.rs">dsimic@fon.bg.ac.rs</a> , <a href="mailto:miroslav.minovic@fon.bg.ac.rs">miroslav.minovic@fon.bg.ac.rs</a>

#### 3.2 Security Techniques in Computer Networks

<b>Course title (in English)</b>	Security Techniques in Computer Networks, Master studies – Information Systems and Technologies
<b>Course title (in Serbian)</b>	Tehnike zaštite u računarskim mrežama, Master studijski program – Informacioni sistemi i tehnologije
<b>Higher education institution (HEI)</b>	Faculty of organizational sciences, University of Belgrade
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Network security concepts and policies,</li> <li>• Introduction into cryptography,</li> <li>• Applied cryptography,</li> <li>• SSL/TLS protocol,</li> <li>• IPSec,</li> <li>• Kerberos,</li> <li>• Intrusion prevention and detection systems,</li> <li>• Firewalls,</li> <li>• Nessus,</li> <li>• Public Key Infrastructure (PKI),</li> </ul>





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	<ul style="list-style-type: none"><li>• Applying smart cards in computer networks,</li><li>• Application security in computer networks</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Prof. Dejan Simić, Full Professor, Prof. Miroslav Minović, Associate Professor, Faculty of organizational sciences, <a href="mailto:dsimic@fon.bg.ac.rs">dsimic@fon.bg.ac.rs</a> , <a href="mailto:miroslav.minovic@fon.bg.ac.rs">miroslav.minovic@fon.bg.ac.rs</a>



## 4 University of Novi Sad – Faculty of technical sciences

### 4.1 E-Business Systems Security

<b>Course title (in English)</b>	E-Business Systems Security
<b>Course title (in Serbian)</b>	Bezbednost u sistemima elektronskog poslovanja
<b>BSc/MSc/PhD/Spec level of studies</b>	BSc
<b>ECTS credit points</b>	4
<b>Higher education institution (HEI)</b>	FTN - UNS
<b>City</b>	Novi Sad
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• cryptography;</li> <li>• PKI infrastructure;</li> <li>• XML and web services security;</li> <li>• smart card technology;</li> <li>• application of security concepts at the level of operating systems, databases, and computer networks;</li> <li>• authentication;</li> <li>• access control;</li> <li>• threat modeling</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Goran Sladić, associate professor, FTN – UNS, sladicg@uns.ac.rs

### 4.2 Security and Safety in Electric Power Systems

<b>Course title (in English)</b>	Security and Safety in Electric Power Systems
<b>Course title (in Serbian)</b>	Sigurnost i bezbednost u elektroenergetskim sistemima
<b>BSc/MSc/PhD/Spec level of studies</b>	BSc – 7 <sup>th</sup> semester – 3+1 week block, project (team)work Accredited on the MSc level under a different name, but inactive in school year 2017/2018
<b>ECTS credit points</b>	4
<b>Higher education institution (HEI)</b>	FTN – UNS
<b>City</b>	Novi Sad
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Introduction;</li> <li>• Personnel &amp; Physical Security;</li> <li>• Cryptography overview;</li> <li>• Secure communication channels (i.e. Network Security);</li> <li>• AAA;</li> <li>• Malware;</li> </ul>



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	<ul style="list-style-type: none"><li>• Secure Software Development;</li><li>• Privacy and Legal aspects;</li><li>• Information Security Policy;</li><li>• Information Security Organizations &amp; Standards;</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Imre Lendak, assistant professor, FTN – UNS lendak@uns.ac.rs



## 5 University of Nis – Faculty of Electronic Engineering

### 5.1 Information Security

<b>Course title (in English)</b>	Information Security
<b>Course title (in Serbian)</b>	Zaštita informacija
<b>Higher education institution (HEI)</b>	Faculty of Electronic Engineering, University of Niš
<b>City</b>	Niš
<b>Level of Study</b>	Bachelor, 4 <sup>th</sup> year of study (7 <sup>th</sup> semester)
<b>Type</b>	Elective
<b>Number of ECTS allocated</b>	6
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Historical overview of the field and the simplest implementation of the algorithm coding.</li> <li>• General analysis coders, data flows, and implementation of algorithms A5, A5 / 1 and RC-4.</li> <li>• Feistel coder.</li> <li>• Implementation of the encoder data blocks DES, TDES, AES, TEA.</li> <li>• Encoder modes.</li> <li>• Asymmetric encryption, RSA algorithm implementation and Knapsack.</li> <li>• Calculating the CRC value.</li> <li>• Tiger hash.</li> <li>• Analysis and implementation of the MD and SHA family of cryptographic hash function.</li> <li>• Methods for cryptanalysis.</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	<p>Dr. Vladan Vučković, professor, vladan.vuckovic@elfak.ni.ac.rs</p> <p>Dr. Petar Rajković, teaching assistant, petar.rajkovic@elfak.ni.ac.rs</p> <p>Faculty of Electronic Engineering, University of Niš</p>

### 5.2 Computer Network Security

<b>Course title (in English)</b>	Computer Network Security
<b>Course title (in Serbian)</b>	Bezbednost računarskih mreža
<b>Higher education institution (HEI)</b>	Faculty of Electronic Engineering, University of Niš
<b>City</b>	Niš
<b>Level of Study</b>	Master, 1 <sup>st</sup> year of study
<b>Type</b>	Elective
<b>Number of ECTS allocated</b>	4
<b>Information security domains and concepts (5-15 elements covered by</b>	<ul style="list-style-type: none"> <li>• The objectives of security: data protection, data integrity, authentication.</li> </ul>



<b>the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Cryptographic algorithms: public and shared keys.</li> <li>• Key exchange protocols.</li> <li>• Digital signature.</li> <li>• The security aspects of different network layers.</li> <li>• Protocols and techniques for protection against specific types of attacks.</li> <li>• Application of security protocols in data protection.</li> <li>• Protecting data integrity and authentication (Kerberos, SSL / TLS. IPSec, VPN, PK).</li> <li>• Application tools and firewall for system level protection.</li> <li>• Attacks.</li> <li>• Computer viruses.</li> <li>• Security of wireless networks.</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr. Vladimir Ćirić, associate professor, vladimir.ciric@elfak.ni.ac.rs Faculty of Electronic Engineering, University of Niš

### 5.3 Cryptography

<b>Course title (in English)</b>	Cryptography
<b>Course title (in Serbian)</b>	Kriptografija
<b>Higher education institution (HEI)</b>	Faculty of Electronic Engineering, University of Niš
<b>City</b>	Niš
<b>Level of Study</b>	Master, 1 <sup>st</sup> year of study
<b>Type</b>	Elective
<b>Number of ECTS allocated</b>	4
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• History and overview of cryptography.</li> <li>• Mathematical background.</li> <li>• Basic symmetric-key encryption.</li> <li>• Stream ciphers.</li> <li>• Block ciphers.</li> <li>• DES – The Data Encryption Standard.</li> <li>• AES – The Advanced Encryption Standard.</li> <li>• Asymmetric cryptography using public-private key pair.</li> <li>• Hash Functions and Data Integrity.</li> <li>• Digital signature schemes. RSA signatures. The "Hash-and-Sign" Paradigm.</li> <li>• Certificates and Public-Key Infrastructures.</li> <li>• Secure Socket Layer (SSL) and Transport Layer Security (TLS) standards.</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr. Dejan Rančić, professor, dejan.rancic@elfak.ni.ac.rs Dr. Vladan Vučković, professor, vladan.vuckovic@elfak.ni.ac.rs



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	Faculty of Electronic Engineering, University of Niš
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## 5.4 Secure Software Design and Implementation

<b>Course title (in English)</b>	Secure Software Design and Implementation
<b>Course title (in Serbian)</b>	Projektovanje i implementacija sigurnog softvera
<b>Higher education institution (HEI)</b>	Faculty of Electronic Engineering, University of Niš
<b>City</b>	Niš
<b>Level of Study</b>	Master, 1 <sup>st</sup> year of study
<b>Type</b>	Elective
<b>Number of ECTS allocated</b>	4
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Passwords</li> <li>• Pseudorandom numbers</li> <li>• Pseudorandom generators</li> <li>• Buffer Overflow</li> <li>• Safety increase techniques</li> <li>• Shared resources deadlock problems</li> <li>• Input validation</li> <li>• Cryptography</li> <li>• Authentication protocols</li> <li>• Software configurability</li> <li>• Processing sensitive data</li> <li>• Memory management</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	<p>Dr. Dragan Janković, professor, dragan.jankovic@elfak.ni.ac.rs</p> <p>Dr. Petar Rajković, teaching assistant, petar.rajkovic@elfak.ni.ac.rs</p> <p>Faculty of Electronic Engineering, University of Niš</p>

## 5.5 Digital Forensics

<b>Course title (in English)</b>	Digital Forensics
<b>Course title (in Serbian)</b>	Digitalna forenzika
<b>Higher education institution (HEI)</b>	Faculty of Electronic Engineering, University of Niš
<b>City</b>	Niš
<b>Level of Study</b>	Master, 1 <sup>st</sup> year of study
<b>Type</b>	Elective
<b>Number of ECTS allocated</b>	4
<b>Information security domains and concepts (5-15 elements covered by</b>	<ul style="list-style-type: none"> <li>• Identification, preservation and analysis of digital evidence.</li> <li>• Basic principles, policies and methodologies of digital forensics.</li> </ul>



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<b>the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• The legal component of digital forensics.</li><li>• Preparation and presentation of digital evidence in court in a proper procedure in forensic properly.</li><li>• Recovery of lost data.</li><li>• Password cracking and decryption of data.</li><li>• Forensics software.</li><li>• Forensics of operating system and file system.</li><li>• Forensics of digital devices.</li><li>• Network forensics.</li><li>• Forensics of mobile devices.</li><li>• Software and hardware tools for digital forensics (EnCase, Toolkit - FTK, VMware, ...).</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr. Dejan Rančić, professor, <a href="mailto:dejan.rancic@elfak.ni.ac.rs">dejan.rancic@elfak.ni.ac.rs</a> Dr. Teufik Tokić, professor, <a href="mailto:teufik.tokic@elfak.ni.ac.rs">teufik.tokic@elfak.ni.ac.rs</a> Dr. Bratislav Predić, assistant professor, <a href="mailto:bratislav.predic@elfak.ni.ac.rs">bratislav.predic@elfak.ni.ac.rs</a> Faculty of Electronic Engineering, University of Niš



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## 6 Subotica Tech

### 6.1 Computer Network Administration

<b>Course title (in English)</b>	Computer network administration
<b>Course title (in Serbian)</b>	Administriranje računarskih mreža
<b>Higher education institution (HEI)</b>	Subotica Tech
<b>City</b>	Subotica
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• asymmetric coding - is a family of entropy coding methods ,</li> <li>• https - protocol for secure communication over a computer network,</li> <li>• ssh - Secure Shell is a cryptographic network protocol for operating network services securely over an unsecured network</li> <li>• firewalls - network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules</li> <li>• malware, virus – introduction to the most common softwares with malicious intent</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Pletl Szilveszter, PhD, Subotica Tech, pszilvi@vts.su.ac.rs

### 6.2 E-commerce

<b>Course title (in English)</b>	E-commerce
<b>Course title (in Serbian)</b>	Elektronsko poslovanje
<b>Higher education institution (HEI)</b>	Subotica Tech – College of Applied Sciences
<b>City</b>	Subotica
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• HTTP headers and methods</li> <li>• Security of web forms and safe data processing</li> <li>• SQL injections.</li> <li>• Cryptographic algorithms</li> <li>• Captcha method</li> <li>• Security of sessions and safe usage of cookies</li> <li>• Safety file upload to web server</li> <li>• Safe registration and login system</li> <li>• Web authentication</li> <li>• Hot link protection</li> <li>• Usage of robots.txt file</li> </ul>





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<b>Professor(s) – name, title, organization, email</b>	Zlatko Čović, prof. dr, Subotica Tech – College of Applied Sciences, <a href="mailto:chole@vts.su.ac.rs">chole@vts.su.ac.rs</a>
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## 7 University of Kragujevac – Faculty of technical sciences

### 7.1 Data Protection

<b>Course title (in English)</b>	Data Protection
<b>Course title (in Serbian)</b>	Zaštita podataka
<b>Higher education institution (HEI)</b>	University of Kragujevac, Faculty of Technical Sciences
<b>City</b>	Čačak
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• Cryptography,</li><li>• Access Control,</li><li>• Filesystem security,</li><li>• Database security,</li><li>• Operation systems security</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Vladimir Mladenović,

### 7.2 Networks Security and Protection

<b>Course title (in English)</b>	Networks Security and Protection
<b>Course title (in Serbian)</b>	Bezbednost i zaštita mreža
<b>Higher education institution (HEI)</b>	University of Kragujevac, Faculty of Technical Sciences
<b>City</b>	Čačak
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• Cryptography,</li><li>• Web Security,</li><li>• Authentication systems,</li><li>• Network security protocols,</li><li>• Security of wireless networks,</li><li>• Organizational aspects of security,</li><li>• Protection of typical web applications,</li><li>• Network analysis,</li><li>• Attack in local networks</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Marjan Milošević

### 7.3 Protection of Computer Systems

<b>Course title (in English)</b>	Protection of Computer Systems
<b>Course title (in Serbian)</b>	Zaštita računarskih sistema
<b>Higher education institution (HEI)</b>	University of Kragujevac, Faculty of Technical Sciences



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<b>City</b>	Čačak
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• Operating systems security,</li><li>• Advanced web security,</li><li>• Applied Cryptography,</li><li>• IoT security,</li><li>• Cloud security,</li><li>• Intrusion detection systems</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Marjan Milošević



## 8 The Academy of Criminalistic and Police Studies (KPA)

### 8.1 Cryptology

<b>Course title (in English)</b>	Cryptology
<b>Course title (in Serbian)</b>	Криптологија
<b>BSc/MSc/PhD/Spec level of studies</b>	BSc / 4 <sup>th</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• cryptology</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

### 8.2 Data and information security

<b>Course title (in English)</b>	Data and information security
<b>Course title (in Serbian)</b>	Безбедност података и информација
<b>BSc/MSc/PhD/Spec level of studies</b>	BSc / 5 <sup>th</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• data security</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

### 8.3 Authentication systems

<b>Course title (in English)</b>	Authentication systems
<b>Course title (in Serbian)</b>	Системи за аутентификацију



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<b>BSc/MSc/PhD/Spec level of studies</b>	BSc / 7 <sup>th</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• authentication systems</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

#### 8.4 Advanced systems for biometric identification

<b>Course title (in English)</b>	Advanced systems for biometric identification
<b>Course title (in Serbian)</b>	Напредни системи за биометријску идентификацију
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 2 <sup>nd</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>• biometric identification</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

#### 8.5 Digital forensics

<b>Course title (in English)</b>	Digital forensics
<b>Course title (in Serbian)</b>	Дигитална форензика
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 1 <sup>st</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade



<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>digital forensics</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

## 8.6 Detection of network attacks

<b>Course title (in English)</b>	Detection of network attacks
<b>Course title (in Serbian)</b>	Детекција напада на мрежи
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 2 <sup>nd</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>network security</li> <li>network attacks</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

## 8.7 Anti-hacking tools

<b>Course title (in English)</b>	Anti-hacking tools
<b>Course title (in Serbian)</b>	Антихакерски алати
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 2 <sup>nd</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"> <li>anti-hacking tools</li> </ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

## 8.8 High-tech criminal



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<b>Course title (in English)</b>	High-tech criminal
<b>Course title (in Serbian)</b>	Високотехнолошки криминал
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 2 <sup>nd</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• high-tech criminalistic activities</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic

## 8.9 Information system management and security

<b>Course title (in English)</b>	Information system management and security
<b>Course title (in Serbian)</b>	Управљање и заштита информационих система
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc / 2 <sup>nd</sup> semester
<b>ECTS credit points</b>	6
<b>Higher education institution (HEI)</b>	The Academy of Criminalistic and Police Studies (KPA)
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	<ul style="list-style-type: none"><li>• information system management</li><li>• system security</li></ul>
<b>Professor(s) – name, title, organization, email</b>	Dr Zvonimir Ivanovic



## 9 Belgrade Metropolitan University

### 9.1 Operation Systems Security

<b>Course title (in English)</b>	Operation Systems Security
<b>Course title (in Serbian)</b>	Bezbednost operativnih sistema
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	The aim of the course is preparing of the students for further study in the field of security of application software, computer systems and networks, as well as for qualifications for professional work on problems of electronic attack defense and information protection. The course studies the following topics: basics of computer hardware, elementary hardware operations during program execution, program behavior during execution, the image of computer processes in memory and flow of instructions, the cooperation of the program with the operating system and other programs, operating systems of zero protection, system programs in protected mode, memory protection and multitasking, virtual operating systems, system hardware security, system hardware administration, system initialization, system hardening, the administration of user accounts, controlling of file access, standard solutions, flexible control of file access, monitoring of system activities, users activities and application programs activities, system servicing and mending of defects, authority of certificates and public infrastructure of crypto key or PKI, the operating system on a computer network, Kerberos system for security of the operating system on the network, procedures and controls of catastrophic situations, etc.
<b>Professor(s) – name, title, organization, email</b>	Igor Franc, assistant professor, BMU <a href="mailto:igor.franc@metropolitan.ac.rs">igor.franc@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	

### 9.2 Security of Computer Networks

<b>Course title (in English)</b>	Security of Computer Networks
<b>Course title (in Serbian)</b>	Bezbednost računarskih mreža
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered)</b>	The course deals with various aspects of the security of computer networks. Understanding and ability to apply the knowledge acquired





<b>by the lectures and laboratory exercises)</b>	upon successful completion of the course is a necessary prerequisite for other courses in the program. The aim of this course is to familiarize students with the basic concepts and components that are necessary for the computer networks security such as firewalls, routers, switches, systems for detection and protection against unauthorized access to computer networks (intrusion detection and protection systems) and structures for the registration of events (logging infrastructure). During the semester, students will implement a project that will deal with the analysis and the use of critical components of network protection. This will better prepare students for further training in the area of security of computer networks.
<b>Professor(s) – name, title, organization, email</b>	Igor Franc, assistant professor, BMU <a href="mailto:igor.franc@metropolitan.ac.rs">igor.franc@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	

### 9.3 Cryptography and Crypto Technology

<b>Course title (in English)</b>	Cryptography and Crypto Technology
<b>Course title (in Serbian)</b>	Kriptografija i kripto tehnologija
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	Students get acquainted with the case study of cryptography. They get familiar with the different classes of cryptographic systems and basic levels of cryptanalytic attacks. The course provides the basics related to modular arithmetic and number theory and an overview of algorithms for factoring large numbers, thus the student acquires the necessary mathematical skills that are used in cryptography. Students learn about the basic characteristics of block cryptographic system with and without the key and techniques for forming a digital signature and key exchange.
<b>Professor(s) – name, title, organization, email</b>	Aca Aleksic, assistant professor, BMU <a href="mailto:aca.aleksic@metropolitan.ac.rs">aca.aleksic@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	

### 9.4 Safe Software Engineering

<b>Course title (in English)</b>	Safe Software Engineering
<b>Course title (in Serbian)</b>	Bezbedno softversko inženjerstvo
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8



<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	Course content: Historical overview of programming technology and software engineering. Review of existing technologies and tools. Modern object-oriented and object-based methods of analysis, design and programming. The dismissal of engineering conflict between the productivity of software development, execution efficiency and security requirements. UMLsec and security lifecycle of a software. Programmatic internal and system external solutions for software security problems. Java and .NET technologies, virtual machines for software execution and management of trust. Software certificate. Secure software distribution. Safety audits. Practical teaching includes a demonstration of software defects, weak points in software systems, as well as various mechanisms of cracking of the software. Shell programs, illegal entry into the application in the front and back doors, etc.
<b>Professor(s) – name, title, organization, email</b>	Ljubomir Lazic, full professor, BMU <a href="mailto:ljubomir.lazic@metropolitan.ac.rs">ljubomir.lazic@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	

## 9.5 Database Security

<b>Course title (in English)</b>	Database Security
<b>Course title (in Serbian)</b>	Bezbednost baza podataka
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	Databases are an integral part of every information system and they often contain sensitive information. Database security can be compromised by illegal access to sensitive data, by changing of the data, or by disabling access to databases. The course deals with the basic concepts and principles of the database security. It includes an analysis of the basic principles of security architecture, the basics of operating system security and use administration. Topics also include discretionary and mandatory control to the access of the systems for database management, construction methods for secure databases with security of data integrity, threats and weaknesses of a database, secure transaction processing and audit methods.
<b>Professor(s) – name, title, organization, email</b>	Igor Franc, assistant professor, BMU <a href="mailto:igor.franc@metropolitan.ac.rs">igor.franc@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	



## 9.6 Computer Forensics

<b>Course title (in English)</b>	Computer Forensics
<b>Course title (in Serbian)</b>	Računarska forenzika
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	The aim of the course is to prepare students for research in the field of systematic control of a computer system and its contents in order to collect evidence of a criminal act or other misuse for which the computer is used. After successful passing of the exam, the students will understand the role of computer forensics in criminal investigations and they will be able to apply the process of forensic analysis (detection and identification of digital evidence, digital evidence preservation, analysis, presentation of results of the analysis). Course content: Analysis of system files, NFTS concept and structure of the data, UFS and BSDFS concept and analysis, Forensics of the storage device Linux, Mobile phone Forensics, PDA device forensics, Persistence of deleted information, Forensic tools, Incident response, Evidence management and the Internet Crime Law.
<b>Professor(s) – name, title, organization, email</b>	Igor Franc, assistant professor, BMU <a href="mailto:igor.franc@metropolitan.ac.rs">igor.franc@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	

## 9.7 Analysis of Advanced Algorithms

<b>Course title (in English)</b>	Analysis of Advanced Algorithms
<b>Course title (in Serbian)</b>	Analiza naprednih algoritama
<b>BSc/MSc/PhD/Spec level of studies</b>	MSc level
<b>ECTS credit points</b>	8
<b>Higher education institution (HEI)</b>	Belgrade Metropolitan University - BMU
<b>City</b>	Belgrade
<b>Information security domains and concepts (5-15 elements covered by the lectures and laboratory exercises)</b>	The aim of the course is to provide an overview of the key theoretical topics that each master or doctoral student in computer science should know. The course deals with an advanced theory and is intended for students who have a common background knowledge in Mathematics at the level of undergraduate studies. Topics covered on the course: a fast Fourier transform, recursion – parsing, matroids and the greedy algorithms, finding the union in the amortized analysis, CPG parsing in dynamic programming, network flows, coincidence algorithms, NP-completeness, approximation algorithm, linear programming, distributed systems, competitiveness theory, cryptography,



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	cryptographic algorithms, complex structures, data structures, algorithms quantum.
<b>Professor(s) – name, title, organization, email</b>	Rale Nikolic, associate professor, BMU <a href="mailto:rale.nikolic@metropolitan.ac.rs">rale.nikolic@metropolitan.ac.rs</a>
<b>Number of students attending the course in 2016/2017</b>	
<b>Number of students attending the course in 2017/2018</b>	