

Biomatics and Applied Artificial Intelligence Institute			Semester 1. of the curriculum 2025-26-1			
Name of the subject:	Code of the subject:	Credits:	Weekly hours:			
				lec	sem	lab
Automotive Cybersecurity	NBWAC1EBNF	4	full-time	2	0	1
Responsible person for the subject: Anna Bánáti-Baumann			Classification:			
Subject lecturer(s): Dániel Lakatos						
Prerequisites: -						
Way of the assessment: Midterm grade						
Course description						
Goal:	The goal of this course is to introduce students to the basics of cybersecurity within the automotive industry. Students will get an overview about cybersecurity management, cryptography, system, software, network and hardware security – using practical examples and case-studies from the automotive industry.					
Course description:	Introduction to automotive cybersecurity and its management. Introduction to wired and wireless automotive networks and their security. Application of cryptography within vehicles. Security of low-level languages (C, C++), secure coding. Security of (keyless) entry systems. Introduction to hardware-level security, analysis of programmable circuit boards (PCB), reverse engineering, case studies. The date and length of the lab sessions will vary.					

Lecture schedule	
Education week	Topic
1.	Introduction to Automotive Cybersecurity LECTURE: Introduction, Case Studies LAB: -
2.	Security of Wired Networks 1 LECTURE: Vehicle Architectures, CAN, UDS LAB: -
3.	Security of Wired Networks 2 LECTURE: - LAB: Interaction with CAN from CLI/Python
4.	Applied Cryptography LECTURE: Encryption, Digital Signatures, HSM LAB: Block Ciphers in Python
5.	Security of Low-Level Languages LECTURE: Introduction to C/C++, Attacks and Mitigations LAB: Buffer Overflow
6.	Security of Wireless Networks 1 LECTURE: V2X, RF, Bluetooth/BLE LAB: Bluetooth Attacks
7.	Security of Vehicle Access Systems LECTURE: Mechanical and Keyless Entry (RKE, PKE), UWB LAB: -
8.	Security of Wireless Networks 2 LECTURE: - LAB: Bluetooth/UWB, Distance Measurement

9.	Cybersecurity Management in the Automotive Industry LECTURE: Standards, Security Lifecycle, TARA, CVSS LAB: TARA	
10.	Hardware Security LECTURE: Embedded Security Features, Fault Injection, Side-Channel Attacks LAB: Side-Channel Attacks	
11.	Projectworks	
12.	Projectworks	
13.	Midterm	
14.	Midterm (re-take)	
Mid-term requirements		
Conditions for obtaining a mid-term grade/signature	<p>The final grade will be calculated based on the theoretical midterm test. The midterm will be mainly based on the materials of the theoretical lectures, but questions regarding laboratory tasks can be also expected.</p> <p>Students may collect extra points for completing the project work parts of the laboratory tasks (similarly to homework). These extra points are added to the points earned in the midterm, potentially raising the final grade (only applicable if the satisfactory grade (51%) is reached by the midterm test).</p> <p>Presence is required up to 70% at the contact sessions (lectures, labs or combined), which means that out of the 10 contact sessions presence at least on 7 is required.</p>	
Assessment schedule		
Education week	Topic	
13.	Theoretical test	
14.	Theoretical test (re-take)	
1. exam week	Theoretical test (second re-take)	
Method used to calculate the <i>mid-term grade</i>		
Test result needs to exceed 51%.		
Type of the replacement		
Type of the replacement of written test/mid-term grade/signature	In the case if the mid-term test does not reach 50%, the student can replace the test in the form of re-take test in the 14th week. Replacement of the mid-term mark: once in the first 10 working days of the examination period.	
Type of the exam (to be filled out only for subjects with exams)		
Calculation of the exam mark (to be filled only for subjects with exams)		
Final grade calculation methods:		
The final grade will be calculated using the following scale:		
	Achieved result	Grade
	89% - 100%	excellent (5)

	76%- 88%	good (4)	
	63% -75%	satisfactory (3)	
	51% - 62%	pass (2)	
	0 - 50 %	failed (1)	

References

Obligatory:	The slides presented at the lectures.
Recommended:	Craig Smith: The Car Hacker's Handbook CAN Bus Explained - A Simple Intro (https://www.csselectronics.com/pages/can-bus-simple-intro-tutorial)
Other references:	Materials and useful web links shared in Moodle.