COURSE SYLLABUS

Academic year 2024 - 2025

1. Programme Information

1.1. Higher education institution	Lucian Blaga University of Sibiu
1.2. Faculty	Faculty of Science
1.3. Department	Mathematics and Informatics
1.4. Field of study	Informatics
1.5. Level of study[1]	Master
1.6. Programme of study/qualification	Cybersecurity

2. Course Information

2.1. Name of course	Programming Cryptographic Systems			Code	FSTI.MAI.CS.M.SO.2.1020.E-7.1
2.2. Course coordinator	Associate Prof. Nicolae Constantinescu				
2.3. Seminar/laboratory coordinator	Associate Prof. Nicolae Constantinescu				
2.4. Year of study[2]	1	2.5. Semester[3]	2	2.6. Evaluation form[4]	E
2.7. Course type[5]	R	2.8. The formative category of the course[6]			S

3. Estimated Total Time

3.1. Course Extension within the Curriculum – Number of Hours per Week				
3.1.a. Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	Total
1		2		**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum				
3.2.a. Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	Total[7]
14		28		**42**

Time Distribution for Individual Study[8]	**Hours**
Learning by using course materials, references and personal notes	36
Additional learning by using library facilities, electronic databases and on-site information	41
Preparing seminars / laboratories, homework, portfolios and essays	45
Tutorial activities[9]	6
Exams[10]	5
3.3. Total Individual Study Hours[11] *(NOSI$_{sem}$)*	**133**
3.4. Total Hours in the Curriculum (*NOAD$_{sem}$*)	**42**
3.5. Total Hours per Semester[12] (*NOAD$_{sem}$ + NOSI$_{sem}$*)	**175**
3.6. No. of Hours / ECTS	**25**
3.7. Number of credits[13]	**7**

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum)[14]	Security of Information Systems
4.2. Competencies	-

5. Conditions (where applicable)

5.1. For course/lectures[15]	Classroom, equipped with blackboard, computer, video projector and software
5.2. For practical activities (lab/sem/pr/app) [16]	Laboratory room equipped with computers

6. Specific competencies acquired[17]

Number of credits assigned to the discipline[18]		7	Credits distribution by competencies[19]
6.1. Professional competencies	PC1	Define the technical requirements	2
	PC2	Run software tests	1
	PC3	Apply reverse engineering	1
	PC4	Use scripting	1
26.2. Transversal competencies	TC1	Presents test results reports	1
	TC2	Keep up with the latest IT solutions	1

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	The accumulation of necessary knowledge for the particularities of the software models used in the programming of data security applications in the three possible states of the information sets.
1.1. Specific course objectives	Understanding the programming models used in the construction and initial and continuous improvement of security systems.

8. Content

8.1. Lectures[20]	**Teaching methods[21]**	**Hours**
Structures of software security systems	Lecture, use of video projector, discussions with students	2
Programming models of security systems for the first state of information. Design, implementation, testing, dynamic refactoring	Lecture, use of video projector, discussions with students	2
Programming models of security systems for the second state of information. Design, implementation, testing, dynamic refactoring	Lecture, use of video projector, discussions with students	2
Programming models of security systems for the third state of information. Design, implementation, testing, dynamic refactoring	Lecture, use of video projector, discussions with students	2

Programming models of local cryptographic libraries. Design, implementation, testing, dynamic refactoring	Lecture, use of video projector, discussions with students	2
Programming models of remote cryptographic libraries. Design, implementation, testing, dynamic refactoring	Lecture, use of video projector, discussions with students	2
Structuring information security assurance systems. Implementation and testing of the security level of the data flow	Lecture, use of video projector, discussions with students	2
	Total lecture hours:	**14**

8.2. Practical activities (8.2.a. Seminar[22]/ 8.2.b. Laboratory[23]/ 8.2.c. Project[24])	**Teaching methods**	**Hours**
Defining and optimization of information security application specifications	Use of video projector, discussions with students	4
Definition, structuring and implementation models of hardware and software systems for the protection of the first stage of information	Use of video projector, discussions with students	4
Definition, structuring and implementation models of hardware and software systems for the protection of the second stage of information	Use of video projector, discussions with students	4
Definition, structuring and implementation models of hardware and software systems for the protection of the third stage of information	Use of video projector, discussions with students	4
Implementation of local cryptographic libraries. Analysis of the performance and degree of risk of the implementation models	Use of video projector, discussions with students	4
Implementation of remote cryptographic libraries. Analysis of the performance and degree of risk of the implementation models	Use of video projector, discussions with students	4
Implementation models of data flow analysis software and definition of their vulnerabilities	Use of video projector, discussions with students	4
	Total seminar/laboratory hours:	28

9. Bibliography

9.1. Recommended Bibliography	1. S. Guo, D. Zeng, Cyber-Physical Systems - Architecture, Security and Application, Springer 2019 2. S. Parkinson, A. Crampton, R. Hill, Guide to Vulnerability Analysis for Computer Networks and Systems, Springer 2021 3. Saqib Ali et all, Cyber Security for Cyber-Physical Systems, Springer 2019
9.2. Additional Bibliography	1. K. Mitnick, The art of invisibility, IKP 2017 2. C. Hadnagy, Social Engineering: The Science of Human Hacking, Wiley 2018

3. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program[25]

It is done through regular contacts with the representatives of the companies. Cybersecurity topic is actual and is of great interest in existing software companies on the local, national and global market.

4. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Obs.[26]
11.4a Exam / Colloquy	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester[27]:	%	50% (minimum 5)	CEF
		Homework:	%		
		Other activities[28]:	%		
		Final evaluation:	50%		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		5% (minimum 5)	nCPE
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Written questionnaire • Oral response • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		5% (minimum 5)	nCPE
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate justification of the chosen solutions	• Self-evaluation, project presentation • Critical evaluation of a project		40% (minimum 5)	nCPE
11.5 Minimum performance standard[29] To pass the exam, the candidate must have a basic knowledge of the programming cryptographic systems					

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_0_|_5_| / |_0_|_9_| / |_2_|_0_|_2_|_4_|

Department Acceptance Date: |_0_|_6_| / |_0_|_9_| / |_2_|_0_|_2_|_4_|

	Academic Rank, Title, First Name, Last Name	Signature
Course Teacher	Associate Prof. Nicolae Constantinescu	
Study Program Coordinator	Lecturer PhD. Daniel Hunyadi	
Department Head	Professor PhD. Mugur Acu	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-3 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.37.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, etc.*
[17] *Competences from the Grids related to the description of the study program, adapted to the specifics of the discipline*
[18] *From the curriculum*
[19] *The credits allocated to the course are distributed across professional and transversal competences according to the specifics of the discipline*
[20] *Chapter and paragraph titles*
[21] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[22] *Discussions, debates, presentations and/or analyses of papers, solving exercises and problems*
[23] *Practical demonstration, exercise, experiment*
[24] *Case study, demonstration, exercise, error analysis, etc.*
[25] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[26] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[27] *The number of tests and the weeks in which they will be taken will be specified*
[28] *Scientific circles, professional competitions, etc.*
[29] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*