



COURSE DESCRIPTION

1. Program Information

1.1 University	“Al.I.Cuza” University of Iași
1.2 Faculty	Faculty of Computer Science
1.3 Department	Computer Science
1.4 Study Domain	Computer Science
1.5 Study Cycle	Undergraduate
1.6 Study Program / Qualification	Informatics / Bachelor in Computer Science

2. Course Information

2.1 Course Name	SMART CARDS and APPLICATIONS						
2.2 Course Teacher	LECTURER CĂTĂLIN BÎRJOVEANU, PHD						
2.3 Seminary Teacher	LECTURER CĂTĂLIN BÎRJOVEANU, PHD						
2.4 Study Year	III	2.5 Semester	2	2.6 Evaluation	E	2.7 Course Status	OP

* OB – Compulsory / OP – Optional

3. Total estimated hours (hours per semester and didactic activities)

3.1 Hours per week	4	in which: 3.2 course	2	3.3 seminary/laboratory	2
3.4 Hours in curriculum	56	in which: 3.5 course	28	3.6 seminary/laboratory	28
Time Distribution					hours
Manual study, Course support, Bibliography, and others					14
Supplementary Documentation in library, in electronic forums, and on the field					14
Seminaries/laboratories preparation, homeworks, reports, portfolios and essays					28
Tutoring					
Evaluation					-
Other activities (consultations per student)					4
					-
3.7 Total hours individual study					56
3.8 Total hours per semester					116
3.9 Credits					5

4. Preconditions (if necessary)

4.1 Of Curriculum	Advanced Programming, Algebraic Foundations of Computer Science
4.2 Of Skills	Basic Java skills, Basic cryptography notions

5. Conditions (if necessary)

5.1 For Course Operation	-
5.2 For Seminary/Laboratory Operation	Compulsory attendance at laboratory



6. Specific Skills Acquired

Professional Skills	C1. Capability to know the need for smart cards and identify the requirements of smart card applications. C2. Capability to use the platforms needed to develop multiple smart card applications. C3. Ability to develop smart card applications.
Transversal Skills	CT1. Capability to design applications using smart cards in various areas. CT2. Ability to use cryptography, security, operating systems in smart card technology.

7. Course Objectives (from the grid of specific skills acquired)

7.1 General Objectives	Understanding the application of smart card technology in making payments in banking/financial systems. Understanding the application of smart card technology in telecommunication systems, e-passports, pay-TV, transport, health insurance systems. Identifying different types of attack on smart cards, countermeasure analysis. Developing smart card applications using Java Card.
7.2 Specific Objectives	On successful completion of this discipline, students will be able to: <ul style="list-style-type: none">▪ Explain the need of smart cards▪ Describe the main features and areas of use of smart cards▪ Use Java Card for smart card application design▪ Test developed Java Card applications

8. General Description

8.1	Course	Teaching Methods	Observations (hours and bibliographic references)
1.	Smart Cards Introduction	Exposure	2
2.	Communicating with Smart Cards	Exposure	2
3.	Smart Card File System and Security Architecture	Exposure	2
4.	ISO 7816 Smart Card Commands and Authentication	Exposure	2
5.	Java Card	Exposure	2



6.	Secure Messaging	Exposure	2
7.	Smart Card Operating Systems and Platforms	Exposure	2
8.	Smart Cards in Payment Systems. EMV basics	Exposure	2
9.	EMV	Exposure	2
10.	Bank Card Attacks	Exposure	2
11.	3-D Secure	Exposure	2
12.	Smart Cards in Telecommunication Systems	Exposure	2
13.	Smart Cards in e-passports, ID,pay-TV, health insurance, transportation	Exposure	2
14.	Smart Card Attacks	Exposure	2

Bibliography

- Wolfgang Rankl and Wolfgang Effing, Smart Card Handbook, Fourth Edition, John Wiley & Sons, 2010.
- Keith Mayes, Konstantinos Markantonakis, Smart Cards, Tokens, Security and Applications, Second Edition, Springer, 2017.
- Konstantinos Markantonakis, Keith Mayes, Secure Smart Embedded Devices, Platforms and Applications, Springer, 2014.
- ISO/IEC 7816
- Java Card Classic Platform Specification 3.0.5
- EMV Book 1 - Application Independent ICC to Terminal Interface Requirements, 2011.
- EMV Book 2 - Security and Key Management, 2011.
- EMV Book 3 - Application Specification, 2011.
- Verified by Visa: Acquirer and Merchant Implementation Guide, 2011.

8.2	Seminary / Laboratory	Teaching methods	Observations (hours and bibliographic references)
1.	Electronic payment schemes	Experiment, case studies, problem-solving, exercises	2
2.	Project 1: implementation of an electronic payment scheme	Experiment, case studies, problem-solving, exercises	2
3.	Project 1: implementation of an electronic payment scheme	Experiment, case studies, problem-solving, exercises	2
4.	Project 1: evaluation	Interview	2
5.	Java Card Classic Development Kit 3.0.5 Installation	Experiment, case studies, problem-solving, exercises	2
6.	Java Card Classic Development Kit environment description and tools	Experiment, case studies, problem-solving	2



7.	Java Card Applet Structure	Experiment, case studies, problem-solving	2
8.	Wallet Applet	Experiment, case studies, problem-solving	2
9.	Project 2: Loyalty Applet	Interview	2
10.	Project 2: Loyalty Applet	Experiment, case studies, problem-solving, exercises	2
11.	Project 2: evaluation	Experiment, case studies, problem-solving, exercises	2
12.	Project 3: Cardholder Verification	Experiment, case studies, problem-solving	2
13.	Project 3: Cardholder Verification	Experiment, case studies, problem-solving	2
14.	Project 3: evaluation	Interview	2

Bibliography:

Java Card Classic Development Kit 3.0.5

**9. Course content synchronization with the expectations of the community representatives, professional associations and employers from the program domain**

The content of the discipline is corroborated with the requirements of companies developing smart card solutions.

10. Evaluation

Activity Type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 The weight of each evaluation form (%)
10.4 Course	Understanding the application of smart card technology in banking/ financial systems, telecommunication, e-passports, pay-TV, transport	Written Test	40%
10.5 Seminary/ Laboratory	Ability to develop smart card applications using Java Card.	Exercises during the laboratories + 3 Projects	60%
10.6 Minimal performance standards The following conditions must be met simultaneously: Written Test ≥ 5 , Laboratory ≥ 5			

Date
May 7, 2018

Course Teacher
Lecturer
Cătălin Bîrjoveanu, Ph.D.

Seminary/Laboratory Teacher
Lecturer
Cătălin Bîrjoveanu, Ph.D.

Department Date of Approval

Director of the Department