
Academic Year: (2021 / 2022)

Review date: 26-07-2020

Department assigned to the subject: Department of Computer Science and Engineering

Coordinating teacher: PASTRANA PORTILLO, SERGIO

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Recommended, but not mandatory, to have taken a course on cryptography.

OBJECTIVES

Basic competences:

- Understand and analyze principles and methods for information and system security.
- Apply and assess network security mechanisms.
- Know trends and challenges in network security.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Cyberthreats
 - 1.1. Origins
 - 1.2. Cyberattacks galore
 - 1.3. A brief history of malware
 - 1.4. Welcome to the underground economy
 - 1.5. The cyberthreat landscape 2013-2018
 - 1.6. Trends
2. Security in smart devices
 - 2.1. Smart devices
 - 2.1. Security models in current smart devices
 - 2.2. Malware in smart devices
 - 2.3. Threat detection and analysis
 - 2.4. Open security problems
3. Coordinated attacks and denial of service
 - 3.1. Coordinated attacks
 - 3.2. Collaborative Intrusion Detection Systems
 - 3.3. Existing classifications of CIDS
 - 3.4. Integrated solutions for CIDS
4. Traffic analysis
 - 4.1. Introduction
 - 4.2. Military roots
 - 4.3. Civil traffic analysis
 - 4.4. Contemporary computer and communications security
 - 4.5. Exploiting location data
 - 4.6. Resisting traffic analysis in Internet
 - 4.7. Data retention
5. Botnets
 - 5.1. Introduction
 - 5.2. Structure and functions
 - 5.3. Detection techniques
 - 5.4. Defense techniques
 - 5.5. New trends/platforms
 - 5.6. Challenges

LEARNING ACTIVITIES AND METHODOLOGY

Activities:

- Lectures
- Mandatory readings of paper assigned by the lecturer
- Debates and participative group activities

Methodology:

- Lectures using whiteboard and slide projector to develop the main concepts and discuss bibliographic references.
- Critical reading of texts recommended by the lecturer, including but not limited to: scientific papers, reports, news in press, and book chapters. This will serve as basis for further discussion in class or to extend/consolidate concepts learnt in this module.
- Solve practical cases and problems proposed by the lecturer, either individually or in small groups.
- Prepare essays and final reports, either individually or in small groups, and present them in class.

ASSESSMENT SYSTEM

(1) Attendance and participation during lectures

Constitutes 20% of the final mark and encompasses reading the papers suggested by the lecturer and participation in debates/activities.

(2) Final assignment

Each student must prepare a final assignment previously discussed with the lecturer on a topic related to the course contents. A short presentation will be also expected.

For the extraordinary exam the student will choose between two options:

- Keep the grade obtained during the term in the continuous assessment process and sit an exam for the remaining 80% of the final grade; or
- Sit an exam for 100% of the final grade.

% end-of-term-examination:	80
% of continuous assessment (assignments, laboratory, practicals...):	20

BASIC BIBLIOGRAPHY

- Matt Bishop Computer Security: Art & Science, Addison-Wesley Professional, 2015
- W. Stallings Cryptography and Network Security (7th Edition), Pearson, 2016

ADDITIONAL BIBLIOGRAPHY

- C. Sanders, J. Smith Applied Network Security Monitoring: Collection, Detection, and Analysis, Syngress, 2013
- Rebecca G. Bace Intrusion Detection, Sams Publishing, 2000
- Stephen Northcutt, Judy Novak Network Intrusion Detection (3rd Edition), Sams Publishing; 3 edition, 2002

BASIC ELECTRONIC RESOURCES

- Chenfeng Vincent Zhou, Christopher Leckie, Shanika Karunasekera . A survey of coordinated attacks and collaborative intrusion detection: <http://dx.doi.org/10.1016/j.cose.2009.06.008>
- G. Suarez-Tangil, J.E. Tapiador, P. Peris, A. Ribagorda. . Evolution, Detection and Analysis of Malware in Smart Devices: <http://dx.doi.org/10.1109/SURV.2013.101613.00077>
- George Danezis and Richard Clayton . Introducing Traffic Analysis: <https://www.cl.cam.ac.uk/~rnc1/TAIntro-book.pdf>
- Sérgio S.C. Silva, Rodrigo M.P. Silva, Raquel C.G. Pinto, Ronaldo M. Salles . Botnets: A survey: <http://dx.doi.org/10.1016/j.comnet.2012.07.021>