Syllabus – Elective Course

Course title:

Cybersecurity Fundamentals

Credits:

6 ECTS credits

Teaching language:

English

Target students:

Undergraduate students from a scientific, engineering or computer science cursus wanting to have a hands-on introduction to the problems inherent to large-scale communication of digital systems and some of their technical solutions.

Teacher in charge of the course:

Olivier Cros, PhD, Gabriel Chênevert, PhD (Mathematics and Computer Science Department, ISEN Lille, Yncréa)

COURSE PRESENTATION

Prerequisite:

- Understand and speak academic level English.
- Mathematics: familiarity with polynomials, integers and vectors
- Computer science: Python or bash programming skills, basic networking knowledge

Content:

In a digital world where we continuously used connected devices, privacy, data security and integrity have become very sensitive topics.

This course provides an introduction to various aspects of cybersecurity through a wide set of interactive exercises. Course sessions may cover:

- Cryptography
  - Discrete logarithm problems
  - Password cracking analysis
- Web
  - Web client : XSS and CSRF leaks
  - Web server : Uploading and file control
  - Privacy
- Programming
  - Encoding : base64
  - Reverse shells
  - Memory forensics
Learning Outcomes:

Based on various cybersecurity domains (cryptography, steganography, pentesting, network analysis, programming, web), students will learn to analyze a basic security problem, its impacts, and potential technical solutions to address it.

WORKLOAD

French contact hours = 60 minutes (in some countries/institutions, 1 contact hour = 45-50 minutes)

<table>
<thead>
<tr>
<th>Form:</th>
<th>Number of hours</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>Lectures</td>
<td>12 hours</td>
<td></td>
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<tr>
<td>Practical labs / simulation</td>
<td>25 hours</td>
<td></td>
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<tr>
<td>Approximate personal work / homework</td>
<td>12 hours</td>
<td></td>
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<tr>
<td>Final exam</td>
<td>2 hours</td>
<td></td>
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<tr>
<td>Student total workload</td>
<td>50 hours</td>
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EDUCATIONAL METHODS

Problem solving, interactive class, lecture, case studies, presentations, projects, group work.

A class of maximum 25 students for interactive teaching based on a serious “capture the flag” game.

RESOURCES

All course materials will be supplied in class.

For a similar philosophy one may consult https://root-me.org.

ASSESSMENT

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<tr>
<th>Form</th>
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<th>Duration</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Continuous assessment (50%)</td>
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<td></td>
<td>Quizzes and challenges</td>
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<tr>
<td>Final exam (30%)</td>
<td>1</td>
<td>2 hours</td>
<td>Examination covering all aspects of course</td>
</tr>
<tr>
<td>Others (student participation...) (20%)</td>
<td></td>
<td></td>
<td>Attendance, participation, and contribution to group discussion</td>
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This syllabus is based on information available at the time of publication (December 2019). Changes may occur.

For updated information about course content, please contact us: lilleprograms@univ-catholille.fr