

**Course specification**  
(4104 Computer Security)

<b>Faculty:</b>	<i>HICIT- Higher Institute for Computers &amp; Information Technology-El Shorouk Academy</i>
<b>Programme(s) on which the course is given:</b>	Under graduate program in Computer Science
<b>Major or minor element of programme:</b>	Compulsory
<b>Department offering the programme</b>	Department of Computer Science
<b>Department offering the course:</b>	Department of Computer Science
<b>Year / Class</b>	4 <sup>th</sup> Year – 1 <sup>st</sup> semester
<b>Date of specification approval</b>	1/8/2022

**A- Basic Information**

<b>Title: Computer Security</b>	<b>Code: 4104</b>		
<b>Weekly Hours:</b>			
<b>Lecture: 3</b>	<b>Exercise: -</b>	<b>Practical :3</b>	<b>Total: 6</b>

**B- Professional Information**

**1- Course Aims:**

- The objective of CS4104 is to survey the fundamentals of computer security systems to give the student the knowledge and practice of how to secure various components of the computer system.
- After completing this course, the student should be able to identify the various threats to the computer system and information exchanged over the network, and how to counter them, to be aware of various cryptosystems.

**2- Program ILOs Covered by Course**

<i>Program Intended Learning Outcomes</i>			
<b>Knowledge and understanding</b>	<b>Intellectual Skills</b>	<b>Professional and practical skills</b>	<b>General and Transferable skills</b>
<b>A10, A18, A19</b>	<b>B1, B2, B16</b>	<b>C6, C9</b>	<b>D5, D8</b>

### 3- Intended learning outcomes of course (ILOs)

#### a. Knowledge and Under-Standing:

- a1. Explain the definition of the various threats, security services, and protection techniques over the exchanged information [A10, A18].
- a2. Clarify the definition of the symmetric-key cryptosystems, asymmetric-key cryptosystems, and hybrid cryptosystems [A18, A19]

#### b. Intellectual Skills:

- b1. Evaluate the computer assets and define security requirements [B1, B16]
- b2. Think over the security problems and schemes in various cryptosystems (symmetric-key cryptosystems, asymmetric-key cryptosystems, and hybrid cryptosystems) [B2, B16]

#### c- Professional and practical skills

- c1. Specify basic security issues [C6]
- c2. Apply countermeasures for information exchange threats [C6, C9]

#### d- General and transferable skills

- d1. Work effectively as an individual and as a member of a team [D5, D8].
- d2. Write Structural Report [D5].

### 4- Contents

Topic	Hours	Lec.	Exc/Lab
Introduction to computer security/database /program /O.S., network, and physical security.	12	6	6
Security threats, protection services, and protection mechanisms.	18	9	9
Symmetric-key Cryptosystems: Classical techniques/ Modern techniques	18	9	9
Public-key Cryptosystems	12	6	6
Hybrid Cryptosystems	15	6	9
Selected topic	3	3	---

### 5- Teaching and learning methods

Teaching and learning methods	Used
Active Learning	
Lectures	√
Tutorial Exercises (online learning)	√
Practical Lab (blending learning– online learning)	√
Exercises	√
Discussions.	√
Self – Learning strategy	
Reading material	√
Websites search	√
Research and reporting	√

Self-studies	√
Experimental strategy	
Group work	-
Presentation	-
Problem-solving strategy	
Problem-solving/problem-solving learning based	√
Case study	-
Synchronous E-Learning	
Virtual lab	-
Virtual class	-
Chat Room	-
Video lectures	-
Asynchronous E-Learning	
E-Learning	√

## 6- Student assessment methods

Methods	Assessment	Used
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (Online on e-learning hub)	√
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.	√
Course Project	To allow students to work in teams, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub, FTF)	--
Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills. (Online on e-learning hub)	√
Practical Exam	to measure the ability of students to design and implement a software program (FTF).	--
Participation	To assess the knowledge and understanding achieved by the student during the previous weeks.	√

## Assessment Schedule

Assessment	Week #
<b>Participation</b>	<b>3-14</b>
<b>Electronic Mid-Term Exam</b>	<b>8</b>
<b>Final Exam</b>	<b>16</b>
<b>Electronic/ hard copy Course Work &amp; Quizzes</b>	<b>2-14</b>
<b>Practical Exam</b>	<b>--</b>

## Assessment Weight

Assessment	Weight %
Participation	10%
Electronic Mid-Term Exam	
Final Exam	80%
Electronic/ hard copy Course Work & Quizzes	10%
Total	100

- Course Work & Quizzes:
  - o Short Exams, Assignments, Research, Reports, and Presentations on the e-learning hub
  - o Class/Project discussion in a virtual classroom

## 6 -List of references

Essential books (textbooks)	<ul style="list-style-type: none"> <li>• Stallings, W. (2022, June 6). <i>Cryptography and Network Security: Principles and Practice, Global Ed.</i> Pearson.</li> </ul>
Course notes	<ul style="list-style-type: none"> <li>- [<a href="https://ocw.mit.edu/courses/6-858-computer-systems-security-fall-2014/pages/lecture-notes/">https://ocw.mit.edu/courses/6-858-computer-systems-security-fall-2014/pages/lecture-notes/</a>]</li> <li>- [<a href="https://inst.eecs.berkeley.edu/~cs161/fa05/">https://inst.eecs.berkeley.edu/~cs161/fa05/</a>]</li> </ul>
Recommended books	<ul style="list-style-type: none"> <li>- Steinberg, J. (2022, March 21). <i>Cybersecurity for Dummies. For Dummies.</i></li> <li>- Sims, S., Baucom, M., Tejada, H., Fernandez, D., Frost, M., Harper, A., &amp; Linn, R. (2022, March 9). <i>Gray Hat Hacking: the Ethical Hacker's Handbook, Sixth Edition</i></li> <li>- Sci. (2021, February 9). <i>This Is How They Tell Me the World Ends : the Cyberweapons Arms Race: 6x9 Inches, 120 Simple Ruled Pages Reader's Notebook..</i></li> </ul>
Periodicals, website	<p><b>PowerPoint presentations of all course materials</b>  <b>All labs material</b>  <a href="https://moodle.sha.edu.eg/course/view.php?id=1371">[https://moodle.sha.edu.eg/course/view.php?id=1371]</a></p>

## 7- Required Facilities

To assess professional and practical skills given the following facilities:

- a. Tools & SW (Technologies facilities):
  - **CrypTool 2.1 (Stable Build 8186.5)**
  - **Microsoft TEAMS to create virtual classrooms for lectures, discussions for project**

- portal (MOODLE) to make electronic quizzes and electronic midterm exam
- portal (MOODLE) to upload project deliverables and assignment
- academy portal (MOODLE) to upload electronic material

b. Teaching facilities:

	<i>Lecture</i>	<i>class</i>	<i>Lab</i>
Whiteboard	used	-	used
Pc/laptop	used	-	used
Data show	used	-	used
Webinars	MS TEAMS	-	MS TEAMS
SocialMedia	---	-	Facebook Page for 4 <sup>th</sup> year
ChatRoom	ChatTeams	-	ChatTeams
Videos	Stream-MOODLE	-	Stream-MOODLE
Website	MOODLE	-	MOODLE

## 8- Course Matrices

### 8.1- Course Content/ILO Matrix

Course Contents	Knowledge & understanding				Intellectual skills				Professional and practical skills				General				
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4	d5
Introduction to computer security/database /program /O.S., network, and physical security.	x				x				x	x							
Security threats, protection services, and protection mechanisms.	x				x				x	x							
Symmetric-key Cryptosystems: Classical techniques/ Modern techniques		x			x	x			x	x							
Public-key Cryptosystems		x			x	x			x	x							
Hybrid Cryptosystems		x			x	x			x	x							
Selected topic				x	x	x	x	x									

### 8.2- Learning Method /ILOs Matrix

Learning Methods	Knowledge and understanding				Intellectual skills				Professional and practical skills				General			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Lectures	x	x			x	x			x	x						
Tutorial Exercises					x	x			x	x						
Reading material	x	x	x	x	x	x	x	x								
Websites search	x	x	x	x	x	x	x	x								
Research and reporting	x	x	x	x												
Problem-solving/problem-solving learning based							x	x								

Self -study	x	x	x	x	x	x			x	x						
Presentations																
Practical Lab					x	x		x	x							
Discussions.					x	x			x	x			x	x		

### 8.3 Assessment Methods /ILOs Matrix

Assessment Methods	Knowledge & understanding				Intellectual skills				Professional & practical skills				General				
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4	d5
Electronic Mid-Term Exam	x	x	x	x	x	x	x	x									
Final Exam	x	x	x	x	x	x	x	x									
Electronic Course Work & Quizzes	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

### 9. Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		Knowledge & understanding			Intellectual skills			Professional and practical skills		General	
		A10	A18	A19	B1	B2	B16	C6	C9	D5	D8
K&U	a1	√	√								
	a2		√	√							
Int.	b1				√	√	√				
	b2						√				
P. & P.	c1							√	√		
	c2								√		
General	d1									√	√
	d2									√	

**Course Coordinator:** Dr. Tarek Sobh ( )

**Head of Department:** Prof. Dr. Ahmed El-Abbassy ( )

**Date:** 1/8/2022