1.	Course title	Network System Security
2.	Course number	1901908
3.	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4.	Prerequisites/corequisites	N/A
5.	Program title	Computer Science
6.	Year of study and semester (s)	
7.	Final Qualification	PhD degree
8.	Other department (s) involved in teaching the course	None
9.	Language of Instruction	English
10.	Date of production/revision	February 21, 2023
11.	Required/ Elective	Elective

12. Course Coordinator:

Dr. Khair Eddin Sabri
Office numbers: KASIT 117, Phone number: 22557
Office hours:
Mon: 11:30-12:30
Tue, Thursday: 11:30 – 12:30,
Email addresses: k.sabri@ju.edu.jo

13. Other instructors:

N/A

14. Course Description:

Topics discussed in this course include: attacks on networked systems, tools and techniques for detection and protection against attacks including firewalls and intrusion detection and protection systems, authentication and identification in distributed systems, cryptographic protocols for IP networks, security protocols for emerging networks and technologies, privacy enhancing communication. Legal and ethical issues will be introduced as necessary. Research papers of high impact published recently in the literature will be provided as reading assignments.

15. Course aims and outcomes:

Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

1. *Basic Understanding of Security: Symmetric encryption, Public Key encryption, Encryption mode, hash functions, PKI, Web security, Authorization, and Authentication.*
2. *Number theory and algebraic structures*
3. *Analyze and design encryption algorithms*
4. *Cryptographic protocols analysis and design*
5. *Apply AI and machine learning to cybersecurity*
6. *Design a system based on blockchain.*
7. *Read and analyze security papers.*
8. *Present a work related to security.*

16. Topic Outline and Schedule:

Topic	Week	ILO	Teaching methods and evaluation
Computer and Network Security Concepts	1 28-2	1	T: Lecture L: Reading [1] A: Midterm, Final
Symmetric Encryption • Analysis and Design of Encryption Algorithms • Encryption Mode • Algebraic Structures and Number Theory	2 7-3	1, 2, 3, 7	T: Lecture and discussion L: Reading [1] and research papers A: Midterm, Final and discussion
Public Key Encryption • Analysis and Design of Encryption Algorithms • Algebraic Structures and Number Theory	3 14-3	1, 2, 3, 7	T: Lecture and discussion L: Reading [1] and research papers A: Midterm, Final and discussion
Key Distribution and PKI • Analyze several key distribution schemes. • PKI: digital certificates, Trust Models and Validity Models	4 21-3	1, 7	T: Lecture and discussion L: Reading [2] and research papers A: Midterm, Final and discussion
Cryptographic Protocols • Analysis and Design of Cryptographic protocols	5 28-3	1, 4, 7	T: Lectures and discussion L: Reading [3] A: Midterm, Final
Verification of Cryptographic	6	1, 4, 7	T: Lecture and discussion L: Reading [3] and research

Protocols • BAN Logic • State Machine	4-4		papers A: Midterm, Final and discussion
IoT Systems • Analyze Lightweight algorithms and protocols	7 11-4	1, 4, 7	T: Lectures and discussion L: Reading research papers A: Midterm, Final and discussion
Cloud and Edge Computing • Cloud security requirements • Analyze architectures	8 18-4	1, 4, 7	T: Lecture and discussion L: Reading research papers and class notes A: Midterm, Final and discussion
AI in Cybersecurity • IDS, Firewall, Malware Analysis and Machine Learning	9 25-4	1, 5, 7	T: Lecture and discussion L: Reading research papers and class notes A: Final and discussion
Midterm Exam	10 2-5		
AI in Cybersecurity • Authorization and Logic	11 9-5	1, 5, 7	T: Lecture, and discussion L: Reading research papers and class notes A: Final and discussion
Blockchain and Smart Contracts • The main concepts and security requirements	12 16-5	1, 6	T: Lecture and discussion L: Reading [4] A: Final
Blockchain and Smart Contracts • Analyze applications based on blockchain such as Metaverse.	13 23-5	1, 6, 7	T: Lecture and discussion L: Reading research papers and class notes A: Final and discussion
Students' Presentations	14 30-5	8	
Students' Presentations	15 6-6	8	
Final Exam	16 15-6		

17. Evaluation Methods and Course Requirements (Optional):

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

There will be several assessment methods of evaluation the performance of the students such as attending and class participation, analyze papers, assignments; midterm, the final exam, presentation and writing a research paper.

18. Course Policies:

A- Attendance policies:
Deliberate abstention from attending 1901908 classes and any other similar acts will lead to student deprivation from the course according to the UJ regulations

B- Absences from exams and handing in assignments on time:

If you miss the midterm or the short test, then a makeup exam will not be provided unless you submit a valid absence excuse, within three days from the midterm, to your lecturer. This excuse must be signed and stamped from the UJ hospital in order to be valid. If your lecturer accepts the excuse then you will be able to take the makeup. You need to follow up the departmental announcements regarding the makeup date and time. Please note that the lecturer may either accept or reject your excuse based on UJ regulations

C- Health and safety procedures:

N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:

All students in this course must read the University policies on plagiarism and academic honesty
http://registration.ju.edu.jo/RegRegulations/Forms/All_Regulations.aspx

E- Grading policy:

- *Midterm Exam:* *30%*
- *Assignments and/or class participants* *10%*
- *Presentation and writing a research paper* *20%*
- *Final Exam:* *40%*

F- Available university services that support achievement in the course:

N/A

G- Statement on Students with disabilities

Students with Disabilities: Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.

19. Required equipment:

Class rooms with data shows

20. References:

Recommended books, materials, and media:

1. *Cryptography and Network Security Principles and Practices, William Stallings, Pearson: Prentice Hall, 7th Edition, 2016.*
2. *Introduction to Public Key Infrastructure, Johannes A. Buchmann, Evangelos Karatsiolis, and Alexander Wiesmaier, 2013.*
3. *Protocols for Authentication and Key Establishment Colin Boyd and Anish Mathuria, 2003.*
4. *Mastering Bitcoin Programming the Open Blockchain, Andreas M. Antonopoulos, 2017*
5. *Network Security Essentials Applications and Standards, William Stallings, Pearson: Prentice Hall, Fourth Edition, 2010.*
6. *Applied Cryptography: Protocols, Algorithms, and Source Code in C, Bruce Schneier, Second Edition 1996.*
7. *Practical Cryptography, Niels Ferguson and Bruce Schneier, Wiley, 2003.*

21. Additional information:

Course website:
elearning.ju.edu.jo

Date: ----------

Name of Course Coordinator: ----------Signature: ----------

Head of curriculum committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- -Signature: ----------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File