UNITED INTERNATIONAL UNIVERSITY

Department of Computer Science and Engineering (CSE)

Course Syllabus

1	**Course Title**	Computer Security
2	**Course Code**	CSE 4531
3	**Trimester and Year**	Spring2024
4	**Pre-requisites**	Computer Networks (CSE 3711)
5	**Credit Hours**	3.00
6	**Section**	B
7	**Class Hours**	Sunday and Wednesday: 08:30AM – 09:50 AM
8	**Classroom**	Room: 0308
9	**Instructor's Name**	Mir Moynuddin Ahmed Shibly
10	**Email**	moynuddin@cse.uiu.ac.bd
11	**Office**	536(C)
12	**Counselling Hours**	
13	**Textbook**	1. Computer Security Principles and Practice: William Stallings and Lawrie Brown 3rd/4th Edition
14	**Reference**	1. William Stallings. Network Security Essentials. 4th/5th Edition 2. Computer Networking A Top Down Approach 6th Edition By Kurros and Ross
15	**Course Contents (approved by UGC)**	Fundamental concepts: confidentiality, integrity and availability, assurance, authenticity and anonymity; threats and attacks, security principles; Encryption, symmetric and asymmetric key encryption; Security: OS access control, Web and

DAY	8:30AM-9:50AM	9:51AM-11:10AM	11:11AM-12:30PM	12:31PM -1:50PM	1:51PM -3:10PM	3:11PM-4:30PM
SAT	CnH	CnH	CSE 1116(J) – 529		CnH	CSE 2215(J) – 401
SUN	CSE 4531(B) – 308	CnH	CnH	CSE 1111(J) – 630	CnH	CnH
MON						
TUE	CSE 1116(E) – 528		CSE 1116(B) – 522		CnH	CSE 2215(J) – 401
WED	CSE 4531(B) – 308	CnH	CnH	CSE 1111(J) – 630	CnH	CnH

		mobile application security, software security, hardware security, memory protection, database security; Security Attacks: malware, DDoS, Trojan and backdoors, buffer overflow, social engineering
16	**Course Outcomes (COs) and Mapping**	

CO	Statement	Bloom's Domain	Program Outcome	Knowledge Profile	Complex Problem	Engineering Activities
CO1	Identify common Computer security vulnerabilities/attacks	C	**b** (Problem Analysis)	Mathematics (K2) Engineering fundamentals (K3) Specialist Knowledge (K4)	Depth of Knowledge (P1)	**-**
CO2	Explain the foundations of Cryptography and Computer security	C				
CO3	Understand security threats, apply principles and practices of computer security to solve them	C				
CO4	Analyze security requirements and Design and Implement secure systems	P, A	**d** (Investigation) **i** (Individual and Teamwork) **j** (Communication)	Research Literature (K8)	Depth of Knowledge (P1) Conflicting Requirements (P2)	**A2 (Level of Interactions)**

17	**Teaching Methods**	Lecture, Case Studies.
18	**CO with Assessment Methods**	

CO	Assessment Method	(%)
-	Attendance	5
-	Assignment	5
CO4	Project	30
	Class Tests	20
CO1, CO2, CO3	Final exam	40

19 **Lecture Outline**

Class	Topics/Assignments	Cos	Reading Reference	Lecture Outcomes/Activities
1	Introduction to computer security, CIA TRIAD	C01	L, Q/A, CT	Students will be introduced to the realm of computer security
2	Threats and Attacks, examples of passive and active attacks	C01	L, Q/A, CT	Students will have an overall idea of security attacks
3	Principles of modern cryptography	CO1	L, Q/A, CT	Students will have an idea of cryptography
4	Symmetric Key Cryptography (Block cipher, Stream cipher)	C02	L, Q/A, CT	Introduction to symmetric cryptography concepts
5	Public-key Encryption/ Asymmetric Key Cryptography (RSA)	C02	L, Q/A, A	Introduction to asymmetric key cryptography
6	Class Test 1 Syllabus: Contents covered in class 1-5 **Project Proposal Submission**	**CO4**	**Presentation, Report**	-
7	Public Key Algorithms (Diffie-Hellman)	C02	L, Q/A, CT	Introduction to asymmetric key cryptography
8	Message Integrity and Digital Signatures (Cryptographic Hashing, Message Authentication Code)	C02	L, Q/A, CT	Apply basic cryptography techniques to authentication
9	Message Integrity and Digital Signatures (Digital Signature, PKI)	C02	L, Q/A, CT	Introduction to Digital Signature and Public Key Infrastructure
10	Class Test 2 Syllabus: Contents covered in class 6-9	-	-	-

11	Availability, User Authentication Kerberos	C03	L, Q/A	Students will know about authentication techniques
12	Kerberos Overview of Mid Term Syllabus	-	-	Students will know about authentication techniques
	Mid-Term Project Progress Reporting	**CO4**	**Report, Presentation**	
13	Anonymity	C03	L, Q/A, CT	Introduction to anonymity
14	IP Security	C03	L, Q/A, CT	Introduction components of Network Security
15	OS access control	C03	L, Q/A, CT	How security is provided in Operating Systems
16	Class Test 3 Syllabus: Contents covered in class 13-15	-	-	-
17	Web and Mobile Application Security	C03	L, Q/A, CT	Basic idea of Web and Mobile Application Security
18	Software Security	CO3	L, Q/A, CT	Introduction to Software Security
19	Database and Cloud Security	C03	L, Q/A, CT	Students will know about database security
20	Class Test 4 Syllabus: Contents covered in class 17-19	-	-	-
21	Security Attacks (Malicious Software)	CO1	L, Q/A, CT	Introduce Malware, Trojan, buffer-overflow, social engineering
22	Hardware Security and Memory Protection	C03	L, Q/A, CT	Introduce Hardware Security
23	**Project Submission**	**CO4**	**Presentation, Report**	

	24	Overview on Final Exam	-	-	-

Appendix 1: Assessment Methods

Assessment Types	Marks
Attendance	5%
Assignment	5%
Project	30%
Class Tests*	20%
Final Exam	40%

* 3 out of 4 will be counted

Appendix 2: Grading Policy

Letter Grade	Marks %	Grade Point	Letter Grade	Marks%	Grade Point
A (Plain)	90-100	4.00	C+ (Plus)	70-73	2.33
A- (Minus)	86-89	3.67	C (Plain)	66-69	2.00
B+ (Plus)	82-85	3.33	C- (Minus)	62-65	1.67
B (Plain)	78-81	3.00	D+ (Plus)	58-61	1.33
B- (Minus)	74-77	2.67	D (Plain)	55-57	1.00
			F (Fail)	<55	0.00

Appendix-3: Program outcomes

POs	Program Outcomes
PO a	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.
PO b	Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)

PO c	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)
PO d	Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO e	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations. (K6)
PO f	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (K7)
PO g	Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7)
PO h	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)
PO i	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO j	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO k	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO l	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Appendix-4: Knowledge Profile

Knowledge Profile
K1 – natural sciences
K2 – mathematics
K3 – engineering fundamentals
K4 – specialist knowledge
K5 – engineering design
K6 – engineering practice
K7 – comprehension
K8 – research literature

Appendix-5: Complex Engineering Problem

Attribute	Complex Engineering Problems have characteristic P1 and some or all of P2 to P7:
Depth of knowledge required	**P1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	**P2:** Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	**P3:** Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	**P4:** Involve infrequently encountered issues
Extent of applicable codes	**P5:** Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stake-holder involvement and conflicting requirements	**P6:** Involve diverse groups of stakeholders with widely varying needs
Interdependence	**P7:** Are high level problems including many component parts or sub-problems