هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

# Course Specification
## (Bachelor)

| | |
|---|---|
| **Course Title:** | Discrete Structures for Cybersecurity |
| **Course Code:** | SEC1201 |
| **Program:** | BSc in Cybersecurity |
| **Department:** | Cybersecurity Department |
| **College:** | College of Computing |
| **Institution:** | Umm Al-Qura University |
| **Version:** | Version 1.0 |
| **Last Revision Date:** | 15 December 2024 |

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## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: ( 4 )** | | | | | |
| 4-0-4 | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
| **B.** | ☒ Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: ( 1st year – level 1)** | | | | | |
| **4. Course General Description:** | | | | | |
| This course covers essential concepts in mathematics and computer science relevant to cybersecurity. It includes sets, relations, functions, number theory, and counting principles crucial for cryptography. Students will study graph theory to understand networks and trees as hierarchical structures. This course enhances problem-solving and logical reasoning skills, key for effective algorithm design and analysis in cybersecurity design and analysis. | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| N/A | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| N/A | | | | | |
| **7. Course Main Objective(s):** | | | | | |
| The main objective of this course is to introduce students with the concepts and methodologies of discrete mathematics that are extensively used in comuting and cybersecurity fields. This course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving problems with an emphasis on applications in cybersecurity. | | | | | |

## 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 60 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

## 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | 60 |
| 2. | **Laboratory/Studio** | 0 |
| 3. | **Field** | 0 |
| 4. | **Tutorial** | 0 |
| 5. | **Others (specify)** | 0 |
| **Total** | | 60 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | Construct the theoretical mathematical framework underlying key concepts in cybersecurity. | **K1** | **Lectures, Tutorials** | **Quizzes, Exams, Assignments** |
| 1.2 | Explain the properties of sets, relations, and functions. | **K1** | **Lectures, Tutorials** | **Quizzes, Exams, Assignments** |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| 1.3 | Explain the properties of different types of graphs and hierarchical structures. | **K1** | **Lectures, Tutorials** | **Quizzes, Exams, Assignments** |
| **2.0** | **Skills** | | | |
| 2.1 | Apply mathematical concepts (e.g., number theory, graph theory) to solve specific computing and cybersecurity problems. | **S3** | **Lectures, Tutorials** | **Quizzes, Exams, Assignments** |
| 2.2 | Apply counting principles in various contexts. | **S1** | **Lectures, Tutorials** | **Quizzes, Exams, Assignments** |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | Demonstrate appreciation and understanding for the role of mathematics principles and approaches in cybersecurity. | **V1** | **Lectures, Tutorials** | **Tutorial Assignments** |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | **Logic** | **8** |
| 2. | **Sets, Functions and Relations** | **12** |
| 3. | **Counting** | **10** |
| 4. | **Number Theory** | **16** |
| 5. | **Graph Theory** | **8** |
| 6. | **Trees** | **6** |
| **Total** | | **60** |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | **Tutorial Assignments** | 1-15 | **20%** |
| 2. | **Quizzes** | 1-15 | **20%** |
| 3. | **Midterm Exam** | Midterm Weeks | **20%** |
| 4. | **Final Exam** | 17-18 | **40%** |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| **Essential References** | Rosen, Kenneth. Discrete Mathematics and Its Applications. 8th edition, McGraw-Hill, ISBN 978-1-259-67651-2 |
| **Supportive References** | N/A |
| **Electronic Materials** | Shoup, Victor. A Computational Introduction to Number Theory and Algebra (Version 2). https://shoup.net/ntb/ntb-v2.pdf |
| **Other Learning Materials** | **N/A** |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | Lecture room with:<br>* at least 40 seats<br>* White board |
| **Technology equipment**<br>(projector, smart board, software) | * A data show projector connected to a PC preferably with Internet connection<br>* Umm Al Qura e-learning system containing teaching resources (Slides, assignment papers, etc.) |
| **Other equipment**<br>(depending on the nature of the specialty) | N/A |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Students | Indirect |
| Effectiveness of Students assessment | Faculty | Direct |

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Quality of learning resources | Faculty | Direct |
| The extent to which CLOs have been achieved | Development and Quality Committee | Direct |
| Other | | |

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

## G. Specification Approval

| | |
|---|---|
| **COUNCIL /COMMITTEE** | **CYBERSECURITY DEPARTMENT COUNCIL** |
| **REFERENCE NO.** | **THE 16TH MEETING FOR THE ACADEMIC YEAR 1446H** |
| **DATE** | **22/04/2025** |