



## MODULE DESCRIPTION FORM

### نموذج وصف المادة الدراسية

| Module Information                 |                                    |                               |                                                                                                                                                                                                                                                     |
|------------------------------------|------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                    |                               |                                                                                                                                                                                                                                                     |
| Module Title                       | Software Security                  |                               | Module Delivery                                                                                                                                                                                                                                     |
| Module Type                        | Core                               |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | CYS258                             |                               |                                                                                                                                                                                                                                                     |
| ECTS Credits                       | 4                                  |                               |                                                                                                                                                                                                                                                     |
| SWL (hr/sem)                       | 100                                |                               |                                                                                                                                                                                                                                                     |
| Module Level                       | 2                                  | Semester of Delivery          |                                                                                                                                                                                                                                                     |
| Administering Department           | Dept. of Cybersecurity             | College                       | College of Information Technology                                                                                                                                                                                                                   |
| Module Leader                      | Asst. Prof. Dr. Omar Salah Shareef | e-mail                        | omar.alshareef@uofallujah.edu.iq                                                                                                                                                                                                                    |
| Module Leader's Acad. Title        | Asst. Prof.                        | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |
| Module Tutor                       | Asst. Prof. Dr. Omar Salah Shareef | e-mail                        | omar.alshareef@uofallujah.edu.iq                                                                                                                                                                                                                    |
| Peer Reviewer Name                 | Asst. Prof. Dr. Ahmad AlSabhany    | e-mail                        | Ahmad.alsabhany@uofallujah.edu.iq                                                                                                                                                                                                                   |
| Scientific Committee Approval Date | 25-5-2026                          | Version Number                | 1.0                                                                                                                                                                                                                                                 |

| Relation with other Modules       |      |          |  |
|-----------------------------------|------|----------|--|
| العلاقة مع المواد الدراسية الأخرى |      |          |  |
| Prerequisite module               | None | Semester |  |
| Co-requisites module              | None | Semester |  |

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Module Objectives</b><br/>أهداف المادة الدراسية</p>                | <ol style="list-style-type: none"> <li>1. Understanding Security Concepts: The course aims to provide students with a solid understanding of the fundamental concepts and principles of software security. This includes knowledge of common security threats, vulnerabilities, and attacks that software systems can face.</li> <li>2. Developing Secure Coding Skills: The course aims to equip students with the necessary skills to develop secure software. Students will learn about secure coding practices, including techniques to prevent and mitigate common coding vulnerabilities such as injection attacks, buffer overflows, and crosssite scripting.</li> <li>3. Implementing Secure Software Development Practices: The course aims to familiarize students with secure software development methodologies and processes. Students will learn about the secure software development life cycle (SSDLC) and how to integrate security considerations into each phase of the software development process.</li> <li>4. Designing Secure Software Architecture: The course aims to teach students about secure software architecture design principles and patterns. Students will learn how to identify and address security risks at the architectural level, including considerations for secure deployment and configuration management.</li> <li>1. 5. Enhancing Security Testing and Risk Assessment Skills: The course aims to enhance students' skills in security testing and risk assessment. Students will learn various techniques and tools for security testing, including penetration testing and vulnerability scanning. They will also gain knowledge about threat modeling and risk assessment methodologies to identify and prioritize security risks in software systems.</li> </ol> |
| <p><b>Module Learning Outcomes</b><br/>مخرجات التعلم للمادة الدراسية</p> | <ol style="list-style-type: none"> <li>1. Overview of software security principles and goals</li> <li>2. Common security threats and attacks</li> <li>3. Introduction to secure software development life cycle (SSDLC)</li> <li>4. Identifying security requirements for software systems</li> <li>5. Risk assessment methodologies and threat modeling</li> <li>6. Security metrics and measuring security effectiveness</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>Indicative Contents</b><br/>المحتويات الإرشادية</p>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | Software security refers to the practice of implementing measures and techniques to protect software applications and systems from unauthorized access, data breaches, and malicious attacks. It involves ensuring the confidentiality, integrity, and availability of software and its associated data. |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Student Workload (SWL)

### الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |   |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 63  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 4 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 37  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 2 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 100 |                                                                           |   |

## Module Evaluation

### تقييم المادة الدراسية

|                             |                     | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
|-----------------------------|---------------------|-------------|------------------|----------|---------------------------|
| <b>Formative assessment</b> | <b>Assignments</b>  | 2           | 10% (10)         | 5 and 10 | All                       |
|                             | <b>Quiz</b>         | 1           | 10% (10)         | 4        | LO #1 - #2                |
|                             | <b>Quiz</b>         | 1           | 10% (10)         | 9        | LO #4 - #6                |
|                             | <b>Lab</b>          | 1           | 10% (10)         | 13       | All                       |
| <b>Summative assessment</b> | <b>Midterm Exam</b> | 2hr         | 10% (10)         | 7        | LO #1 - #3                |
|                             | <b>Final Exam</b>   | 3hr         | 50% (50)         | 16       | All                       |
| <b>Total assessment</b>     |                     |             | 100% (100 Marks) |          |                           |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

|               | Material Covered                                   |
|---------------|----------------------------------------------------|
| <b>Week 1</b> | Introduction to Software Security                  |
| <b>Week 2</b> | Software Security Requirements and Risk Assessment |
| <b>Week 3</b> | Secure Coding Practices                            |
| <b>Week 4</b> | Web Application Security                           |
| <b>Week 5</b> | Secure Software Development Life Cycle (SSDLC)     |

|         |                                                           |
|---------|-----------------------------------------------------------|
| Week 6  | Secure Software Architecture                              |
| Week 7  | Secure Data & Database Management                         |
| Week 8  | Midterm Examination                                       |
| Week 9  | Software Security Testing                                 |
| Week 10 | Authentication & Access Control                           |
| Week 11 | Third-Party & Open-Source Risks                           |
| Week 12 | Secure Software Deployment                                |
| Week 13 | Social Engineering and Human Factors in Software Security |
| Week 14 | Incident Response                                         |
| Week 15 | Preparatory week before the final exam                    |
| Week 16 | Final Exam                                                |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                                                                                                                                           |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                         | Material Covered                                                                                                                          |
| Week 1                                                                  | Lab Environment Setup (Visual Studio Code, Git, OWASP Juice Shop/DVWA demonstration, Secure Development Tools)                            |
| Week 2                                                                  | Identifying Software Assets, Threats, and Basic Risk Assessment Exercises                                                                 |
| Week 3                                                                  | Secure Coding in Practice (Input Validation, Error Handling, Secure Coding Standards)                                                     |
| Week 4                                                                  | Web Application Security Lab (SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF) Demonstrations and Prevention) |
| Week 5                                                                  | Applying Security Throughout the Software Development Life Cycle (Requirements, Design Review, Code Review Checklist)                     |
| Week 6                                                                  | Secure Software Architecture (Layered Architecture, Least Privilege, Separation of Duties, Secure Design Principles)                      |
| Week 7                                                                  | Secure Data and Database Protection (Password Hashing, Encryption Basics, Secure Database Queries using Prepared Statements)              |
| Week 8                                                                  | Midterm Practical Examination                                                                                                             |
| Week 9                                                                  | Static and Dynamic Software Security Testing (Basic SAST and DAST Tools)                                                                  |
| Week 10                                                                 | Implementing Authentication and Role-Based Access Control (RBAC)                                                                          |
| Week 11                                                                 | Identifying Vulnerabilities in Third-Party Libraries and Software Dependencies                                                            |
| Week 12                                                                 | Secure Software Deployment (Configuration Management, Environment Variables, Secrets Management, HTTPS Configuration)                     |
| Week 13                                                                 | Secure Software Practices Against Social Engineering (Secure User Interface Design, Phishing Awareness for Developers)                    |
| Week 14                                                                 | Incident Response Exercise (Log Analysis, Error Investigation, Security Event Reporting and Recovery Procedures)                          |
| Week 15                                                                 | Comprehensive Practical Review and Project Demonstration                                                                                  |

## Learning and Teaching Resources

| مصادر التعلم والتدريس |                                                                                                                                                                                                                                     |                           |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                       | Text                                                                                                                                                                                                                                | Available in the Library? |
| Required Texts        | 1. Designing Secure Software: A Guide for Developers, Loren Kohnfelder ,2021                                                                                                                                                        | Yes                       |
| Recommended Texts     | 2. Web Application Security: Exploitation and Countermeasures for Modern Web Applications, Andrew Hoffman, O'Reilly Media; 1st edition 2020<br><br>3. Software Security: Building Security In, by Gary McGraw, Addison-Wesley, 2006 | Yes                       |
| Websites              |                                                                                                                                                                                                                                     |                           |

| Grading Scheme: مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                         |                  |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade            | التقدير             | Marks %  | Definition                            |
| Success Group<br>(50 - 100)                                                                                                                                                                                                                                                                                                                                                          | A - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | B - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | C - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | D - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | E - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| Fail Group<br>(0 – 49)                                                                                                                                                                                                                                                                                                                                                               | FX – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | F – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
| <b>Note:</b> Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |                  |                     |          |                                       |