MODULE DESCRIPTOR

Module Title

Operating Systems & Virtualisation Security

Reference	CM2134	Version	1
Created	November 2023	SCQF Level	SCQF 8
Approved	April 2024	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

This module aims to provide students with knowledge and practical skills in Operating Systems and virtualization Security, encompassing benefits, fundamental principles, and proficiency in managing virtual systems. It explores security functions, isolation, and addresses the attacker model and related threats within the realm of Operating Systems and virtualization.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Report the business and environmental benefits associated with virtualisation.
2	Show proficiency in the fundamental principles of operating systems and virtualisation.
3	Write a description of the security issues affecting modern operating systems and virtualisation systems.
4	Show expertise in managing virtual machines, security domains, and isolation.
5	Undertake the practical application of security measures by using best practices for operating systems and virtual system hardening.

Indicative Module Content

Introduction to Operating Systems & Virtualisation; Role of operating systems: virtual machines,security domains,isolation; Attacker model:attack surface, threats to security for modern OSs; Explore the intersection of cloud computing with privacy and security considerations; Delve into OS security principles: e.g Biba model, Bell-LaPadula model, Saltzer and Schroeder's principles; Examine primitives designed for isolation and mediation within OSs. Investigate practices for OSs & Virtual systems hardening. Consider related areas such as virtual storage, software, hardware, virtual networks, outsourced databases, containers, and associated privacy and security concerns. Different OSs & virtualization technologies (e.g. VMware, Xen Server, Hypervisors, and Docker) will be explored in labs.

Module Delivery

Lectures introduce and illustrate key concepts, while practical skills are honed through a series of laboratory exercises.

Indicative Student Workload

	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	120	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4, 5

Description: Coursework consisting of both practical and theoretical elements covering all module learning outcomes.

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The calculation of the overall grade for this module is based on 100% weighting of Component 1. An overall minimum grade of D is required to pass this module.

Module Grade	Minimum Requirements to achieve Module Grade:
A	The student needs to achieve an A in Component 1
B	The student needs to achieve a B in Component 1
C	The student needs to achieve a C in Component 1
D	The student needs to achieve a D in Component 1
E	The student needs to achieve an E in Component 1
F	The student needs to achieve an F in Component 1
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1 Silberschatz, A., Galvin, P. B., & Gagne, G. (2018). Operating System Concepts, 10th Edition. Wiley.

2 Bugnion, E., Nieh, J., Tsafrir, D., & Martonosi, M. (2017).?Hardware and software support for virtualization?(p. 186). Morgan & Claypool.

3 Le, D. N., Kumar, R., Nguyen, G. N., & Chatterjee, J. M. (2018).?Cloud computing and virtualization. John Wiley & Sons.

4 Pujolle, G. (2020).?Software Networks: Virtualization, SDN, 5G, and Security. John Wiley & Sons.

5 Kaufman, C., Perlman, R., & Speciner, M. (2023). Network Security: Private Communication in a Public World. Pearson.

6 Rittinghouse, J. W., & Ransome, J. F. (2017).?Cloud computing: implementation, management, and security. CRC press.

7 Nayyar, A. (2019).?Handbook of Cloud Computing: Basic to Advance research on the concepts and design of Cloud Computing. BPB Publications.