

PROG C7017: Operating Systems and Virtualization

| Module Details | |
|--------------------------|---|
| Module Code: | PROG C7017 |
| Full Title: | Operating Systems and Virtualization APPROVED |
| Valid From: | Semester 1 - 2019/20 (June 2019) |
| Language of Instruction: | English |
| Duration: | 2 Semesters |
| Credits: | 10 |
| Module Owner:: | Elizabeth Rooney |
| Departments: | Unknown |
| Module Description: | <p>This module aims to provide a theoretical understanding of process management, memory management, file systems, computer security and to develop the student's shell problem-solving skills.</p> <p>The aim of this module is to provide students with the required knowledge and skills to successfully plan, install, configure and manage virtualization software to meet a variety of computing needs. In addition, students are required to produce a project plan and technical documentation for work produced.</p> |

| Module Learning Outcome | |
|---|---|
| On successful completion of this module the learner will be able to: | |
| # | Module Learning Outcome Description |
| MLO1 | Explain how an operating system manages processes and computer hardware. |
| MLO2 | Compare and contrast different memory management algorithms. |
| MLO3 | Explain how different file storage schemes in major operating systems are implemented. |
| MLO4 | Analyse the main goals of computer security and preventive measures against threats. |
| MLO5 | Manipulate the main features and capabilities of bash shell scripting. |
| MLO6 | Demonstrate an understanding of the terminology, architecture, virtualization software and technologies used in business today. |
| MLO7 | Design, install and configure a virtualized solution for a real world scenario using appropriate tools. |
| MLO8 | Manage, maintain and secure the virtualized solution using the command line and scripting tools. |
| Pre-requisite learning | |
| <p>Module Recommendations <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i></p> | |
| No recommendations listed | |

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|---|----------|
| Module Indicative Content | |
| Memory Management Memory leaks, Memory Access, Logical address, Physical address, Fixed Partitioning, Dynamic Partitioning, Paging, Segmentation, Virtual Memory, Translation Lookaside Buffer. | |
| Process Management Process, Interrupt, System Call, Process states, Process Scheduling Algorithms, Thread, Race Conditions, Mutual Exclusion, Deadlock. | |
| File System Management Storage Devices, Sector, Block, Device Driver, Master Boot Record, File Access Methods, File Storage Schemes, Free Space Management Schemes, FAT, NTFS, EXT. | |
| Security Confidentiality, Integrity, Availability, Authentication, Packet Sniffers, Probes, Spyware and Malware, Anti-viral software, Firewalls, Cryptography. | |
| Shell Scripting Environmental, user defined variables, Script Parameters, Input Redirection, Mathematical Operators, Boolean expressions, String Manipulation, Loops, Scheduling tasks. | |
| Introduction to Virtualization Technologies Overview of Virtualization and Virtualization Software. | |
| Virtualization Infrastructure, Technology and Terminology Virtualization Infrastructure Diagram, Technology and Terminology Explanation. | |
| Installation and Configuration of Virtualization Solution Installation and Configuration of Virtual Machines, Storage and Networking. | |
| Management and Maintenance of Virtualization Solution Management and Maintenance of Virtualization solution using command line and GUI. | |
| Security of Virtualization Environment Security of host computer; Virtual Machines; Configuration Files, and Virtual Machine Data. | |
| Implementing High Availability High Availability (load balancing and failover clusters). | |
| Module Assessment | |
| Assessment Breakdown | % |
| Course Work | 100.00% |
| Module Special Regulation | |
| | |

Assessments

Full Time

| Course Work | | | |
|--|------------------------|-------------------------|-----------|
| Assessment Type | Continuous Assessment | % of Total Mark | 15 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Every Second Week | Learning Outcome | 5 |
| Duration in minutes | 0 | | |
| Assessment Description On-going lab quizzes | | | |
| Assessment Type | Class Test | % of Total Mark | 10 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 8 | Learning Outcome | 1,2,3,4 |
| Duration in minutes | 60 | | |
| Assessment Description Closed book test examining lecture material. | | | |
| Assessment Type | Class Test | % of Total Mark | 25 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 13 | Learning Outcome | 1,2,3,4,5 |
| Duration in minutes | 120 | | |
| Assessment Description Formal Test - Examining all of the learning outcomes from delivery period 1 | | | |
| Assessment Type | Continuous Assessment | % of Total Mark | 15 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Every Second Week | Learning Outcome | 6,7,8 |
| Duration in minutes | 0 | | |
| Assessment Description Students will be required to complete weekly lab tasks based on real world scenarios. Students will also be expected to document their weekly tasks including problems and solutions, using a WIKI. | | | |
| Assessment Type | Short Answer Questions | % of Total Mark | 10 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 25 | Learning Outcome | 6,8 |
| Duration in minutes | 60 | | |
| Assessment Description Individual Written Tests to assess students understanding of the theory and concepts delivered. | | | |
| Assessment Type | Short Answer Questions | % of Total Mark | 10 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 28 | Learning Outcome | 6,8 |
| Duration in minutes | 60 | | |
| Assessment Description Individual Written Tests to assess students understanding of the theory and concepts delivered. | | | |
| Assessment Type | Open-book Examination | % of Total Mark | 15 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 30 | Learning Outcome | 6,7,8 |
| Duration in minutes | 120 | | |
| Assessment Description Individual Practical Lab Test which will test students ability to solve problems in an exam based setting. | | | |
| No Project | | | |
| No Practical | | | |
| No Final Examination | | | |
| Part Time | | | |

| Course Work | | | |
|--|------------------------|-------------------------|-----------|
| Assessment Type | Continuous Assessment | % of Total Mark | 15 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Every Second Week | Learning Outcome | 5 |
| Duration in minutes | 0 | | |
| Assessment Description On-going lab quizzes | | | |
| Assessment Type | Class Test | % of Total Mark | 10 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 8 | Learning Outcome | 1,2,3,4 |
| Duration in minutes | 0 | | |
| Assessment Description Closed book test examining lecture material. | | | |
| Assessment Type | Class Test | % of Total Mark | 25 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Week 13 | Learning Outcome | 1,2,3,4,5 |
| Duration in minutes | 60 | | |
| Assessment Description Formal Test - Examining all of the learning outcomes from delivery period 1 | | | |
| Assessment Type | Continuous Assessment | % of Total Mark | 15 |
| Marks Out Of | 100 | Pass Mark | 40 |
| Timing | Every Second Week | Learning Outcome | 6,7,8 |
| Duration in minutes | 0 | | |
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| Duration in minutes | 120 | | |
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| No Project | | | |
| No Practical | | | |
| No Final Examination | | | |

Module Workload

| Workload: Full Time | | | | | |
|-------------------------------|---------------------|---|------------------|--|--------------|
| <i>Workload Type</i> | <i>Contact Type</i> | <i>Workload Description</i> | <i>Frequency</i> | <i>Average Weekly Learner Workload</i> | <i>Hours</i> |
| Lecture | Contact | Student-centred lectures, 2 hours/ week during delivery period 1 (semester 1) in which theories are introduced and developed. This splits into 1 hour lecture and 1 additional hour lab in semester 2 | Every Week | 2.00 | 2 |
| Practical | Contact | Interactive lab based practicals, 2 hours/ week | Every Week | 2.00 | 2 |
| Independent Study | Non Contact | No Description | Every Week | 2.00 | 2 |
| Directed Reading | Non Contact | No Description | Every Week | 2.00 | 2 |
| Total Weekly Learner Workload | | | | | 8.00 |
| Total Weekly Contact Hours | | | | | 4.00 |
| Workload: Part Time | | | | | |
| <i>Workload Type</i> | <i>Contact Type</i> | <i>Workload Description</i> | <i>Frequency</i> | <i>Average Weekly Learner Workload</i> | <i>Hours</i> |
| Practical | Contact | Interactive lab based practicals, 2 hours/ week. | Every Week | 2.00 | 2 |
| Lecture | Contact | Student-centred lectures, 2 hours/ week during delivery period 1 (semester 1) in which theories are introduced and developed. This splits into 1 hour lecture and 1 additional hour lab in semester 2 | Every Week | 2.00 | 2 |
| Independent Study | Non Contact | No Description | Every Week | 2.00 | 2 |
| Directed Reading | Non Contact | No Description | Every Week | 2.00 | 2 |
| Total Weekly Learner Workload | | | | | 8.00 |
| Total Weekly Contact Hours | | | | | 4.00 |

Module Resources

Recommended Book Resources

- Ted Simpson, Jason Novak. (2018), Hands-On Virtual Computing, 3. [ISBN: 9781337101936].
- Leandro Carvalho, Charbel Nemnom, Patrick Lownds. (2017), Windows Server Hyper-V Cookbook - Second Edition, [ISBN: 9781785884313].
- Wiley. (2017), Mastering Windows Server Hyper-V, [ISBN: 978-111928618].
- Greg Tomsho. (2017), Guide to Operating Systems, 5th Edition, Cengage, [ISBN: 9781305107649].
- William Stallings. (2018), Operating Systems: Internals and Design Principles, 9th. Pearson Education Limited, [ISBN: 1292214295].

Supplementary Book Resources

- Silberschatz, Galvin & Gagne. (2018), Operating System Concepts, 10th. John Wiley & Sons, Inc., [ISBN: 978-1-118-063].
- S. Tanenbaum. (2006), Operating Systems: Design and Implementation, Prentice Hall, [ISBN: 0-13-142938-8].

Recommended Article/Paper Resources

- Dell Server Virtualization Technologies,
<https://www.dell.com/learn/us/en/555/virtual-data-center>
- HowStuffWorks,
<https://computer.howstuffworks.com/operating-system.htm>

Other Resources

- [Website], Microsoft Technet,
<https://docs.microsoft.com/en-us/windows-server/virtualization/virtualization>
- [Website], VMWare,
<https://www.vmware.com/>
- [Website], Xen Server,
<https://xenserver.org/>