Title	Linux Administration
Long Title	Linux Administration
Credits	**5**
NFQ Level	**7**
Module Author	**David Murphy**

Module Description:

Linux has grown into an industry-leading software and service delivery platform that is used for everything from super computers and Web servers to virtualised systems and your Android phone. This growth creates a high demand for qualified Linux professionals. In this module students will acquire the skills and knowledge you need to successfully configure, manage and troubleshoot Linux systems. This module covers topics such as file management and manipulation,advanced command line use, package management, filesystems, logging, performance evaluation, hardware, creating a custom kernel and more.

Learning Outcomes

On successful completion of this module the learner will be able to:

LO1	Implement performance monitoring, task scheduling and logging capabilities in a Linux system.
LO2	Administer and appraise essential system services at different runlevels.
LO3	Develop sophisticated bash scripting capabilities to perform complex system administrative tasks.
LO4	Build partitions for various linux filesystems and employ associated administration tasks.
LO5	Develop and configure a custom Linux kernel including essential services.

Indicative Content

Performance, Scheduling and Logging

Monitor performance in memory; CPU utilization, tuning, processor speed, fixing bottlenecks. Process priorities: PR + nice values. Use tools such as at and cron to run tasks at a future time and periodically; e.g. backup. Process monitoring commands such as sar, iostat & mpstat. syslog, syslog levels, log categories, securing log data.

Services

Implement services such as NFS, ssh & xinedt. Changing run-levels. Start and stop daemons, add and remove services to automatically load at boot time (in different run-levels); develop a simple daemon and add to a run-level directory.

Advanced Bash Scripting

Regular expressions, I/O redirection, process substitution, streams, pipes, indirect referencing, function complexities, aliases, zeros and nulls, debugging.

Filesystems

Create partitions and filesystems, maintain the integrity of filesystems, control mounting and unmounting of filesystems, manage disk quotas, manage file permissions and ownership, create and change hard and symbolic links, find system files and place files in the correct location.

Building a Custom Kernel

Preparing virtual kernel file-systems, essential Files and symlinks, filesystem creation, package manager creation, essential bootscripts, bootscript configuration, creating login shell capability, creating default filesystem mount points, setting up the boot process. Setting up a custom linux distribution such as gentoo.

Course Work

Assessment Type	Assessment Description	Outcome Addressed	% of Total	Assessment Date
Multiple Choice Questions	Multiple Choice Questions assessing the theoretical content delivered in class.	1, 2, 3	20.0	Week 5
Practical/Skills Evaluation	In lab practical test assessing students bash scripting to automate tasks and knowledge and application of theory on filesystem on a linux OS.	2, 3, 4	40.0	Week 12
Project	Student is expected to develop and deploy a custom Linux distribution, e.g. gentoo.	4, 5	40.0	Sem End

No End of Module Formal Examination

Assessment Breakdown

	%
Coursework	100

Re-Assessment Requirement

Coursework Only

This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.

Workload – Full Time

Workload Type	Workload Description	Hours	Frequency	Average Weekly Leaner Workload
Lecture	Weekly lectures covering essential theory.	2.0	Every Week	2.00
Lab	Weekly labs to support lectures.	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Weekly student independent learning.	3.0	Every Week	3.00

Total Hours		7.00
Total Weekly Learner Workload		7.00
Total Weekly Contact Hours		4.00

Workload – Part Time

Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Leaner Workload*
Lecture	Weekly lectures covering essential theory.	2.0	Every Week	2.00
Lab	Weekly labs to support lectures.	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Weekly student independent learning.	3.0	Every Week	3.00

Total Hours		7.00
Total Weekly Learner Workload		7.00
Total Weekly Contact Hours		4.00

Recommended Book Resources

- **Christopher Negus 2015, *Linux Bible*, 9th Edition Ed., John Wiley & Sons [ISBN: 9781118999875]**

Supplementary Book Resources

- **Daniel J Barrett 2016, *Linux Pocket Guide*, 3rd Ed., O?Reilly Press [ISBN: 9781491927571]**

- **Arnold Robbins 2016, *Bash Pocket Reference*, 2nd Ed., O'Reilly Press [ISBN: 9781491941591]**

- **Sam R. Alapati 2017, *Modern Linux Administration: How to Become a Cutting-Edge Linux Administrator*, O'Reilly [ISBN: 9781491935958]**

- **Evi Nemeth, Garth Snyder, Trent Hein, Ben Whaley and Dan Macklin 2017, *Unix and Linux System Administration Handbook*, 5th edition Ed., Prentice Hall [ISBN: 9780134277554]**

- **Jason Cannon 2016, *Linux Administration: The Linux Operating System and Command Line Guide for Linux Administrators*, CreateSpace [ISBN: 9781523915958]**

- **Yang Lixiang 2014, *The Art of Linux Kernel Design*, Routledge [ISBN: 9781466518032]**

This module does not have any article/paper resources

Other Resources

- **Website: *Getting Started with Linux*, Digital Ocean**
  https://www.digitalocean.com/community/t utorial_series/getting-started-with-linu x

- **Website: *Learn Linux System Administration*, IBM**
  https://www.ibm.com/developerworks/libra ry/l-lpic1-map/index.html

- **Website: *Linux From Scratch***
  http://www.linuxfromscratch.org

- **Website: *The Ultimate Linux Newbie Guide***
  https://linuxnewbieguide.org/overview-of -chapters/

- **Website: *Learning the Shell***
  http://linuxcommand.org/lc3_learning_the _shell.php

- **Website: *Linux Kernel Newbies***
  https://kernelnewbies.org/

- **Website: *Linux Questions Community***
  http://www.linuxquestions.org/questions/

- **Website: *LPI Linux Certification***
  https://en.wikibooks.org/wiki/LPI_Linux _Certification

- **website:** *Gentoo Kernel Upgrade*

  https://wiki.gentoo.org/wiki/Kernel/Upgrade