AUTO C3601: Network Programmability and Automation

Module Title:	Network Programmability and Automation
Language of Instruction:	English

Credits:	5

NFQ Level:	7

Module Delivered In	5 programme(s)

Teaching & Learning Strategies:	Combination of lectures and practical laboratory sessions. Lectures will take the form of traditional theory and tutorials. Laboratory sessions take the form of individual & group work.

Module Aim:	To provide the student with: 1. the skills necessary to automate and program networks. 2. apply software-defined networking principles. 3. Apply DevOps principles to network management

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Relate how automation impacts network management and compare DevOps techniques to traditional techniques, such as SNMP and CLI
LO2	Identify characteristics of RESTful based APIs (CRUD, HTTP verbs, data encoding), interpret and manipulate JSON encoded data.
LO3	Classify and employ DevOps tools for IT automation.
LO4	Relate Cloud, Virtualisation and Containerisation as the foundation for Software-Defined Networking (SDN)
LO5	Build Controller-based Software-Defined Networks and compare to traditional networks.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
Python programming and GNU/Linux system administration

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Module Content & Assessment

Indicative Content
DevOps and network automation How network automation impacts network management. Syntax, JavaScript Object Notation (JSON), Extensible Markup Language (XML), YAML Ain't Markup Language (YAML), Object representation, Key/Value pairs.
RESTful APIs Client/server, Stateless, Cacheable. Uniform Resource Identifier (URI) representation, HTTP methods. Authentication. Create, Read, Update, Delete (CRUD) .
Configuration Management Tools Ansible, Chef, Puppet, Python modules such as the Netmiko Library for SSH access, NETCONF.
Virtualisation and Containerisation Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Virtual Machines, Containers, Hypervisor, Virtual Switches, Virtual Network Infrastructure (VNI)
Software-Defined Networking (SDN) Data, Control, and Management Planes, SDN Controllers, North-Bound Interface (NBI), South-Bound Interface (SBI), OpenFlow, Mininet, Cisco Application Centric Infrastructure (ACI).

Assessment Breakdown	%
Continuous Assessment	40.00%
Project	20.00%
Practical	40.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Multiple Choice Questions	MCQ 1: The students will be given an MCQ to assess their knowledge of DevOps, RESTful API and JSON.	1,2,3	20.00	n/a
Multiple Choice Questions	MCQ 2: The students will be given an MCQ to assess their knowledge of SDN and SDN programmability.	4,5	20.00	n/a

Project

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	Each learner will receive a Scenario-based problem to solve and describe their solution via presentation and demonstration.	1,2,3,4,5	20.00	n/a

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Two practical examinations to demonstrate the achievement of the learning outcomes.	1,2,3,4,5	40.00	n/a

No End of Module Formal Examination

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Multiple Choice Questions	MCQ 1: The students will be given an MCQ to assess their knowledge of DevOps, RESTful API and JSON.	1,2,3	20.00	n/a
Multiple Choice Questions	MCQ 2: The students will be given an MCQ to assess their knowledge of SDN and SDN programmability.	4,5	20.00	n/a

Project

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Project	Each learner will receive a Scenario-based problem to solve and describe their solution via presentation and demonstration.	1,2,3,4,5	20.00	n/a

Practical				
Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Two practical examinations to demonstrate the achievement of the learning outcomes.	1,2,3,4,5	40.00	n/a

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	3.00
Laboratory	Every Week	2.00
Independent Learning Time	Every Week	5.00
	Total Hours	10.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEBEE_B	Bachelor of Engineering (Honours) in Biomedical Electronics	6	Elective
CW_EESYS_B	Bachelor of Engineering (Honours) in Electronic Engineering	6	Elective
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	6	Elective
CW_EEBEE_D	Bachelor of Engineering in Biomedical Electronics	6	Mandatory
CW_EEROO_D	Bachelor of Engineering in Robotics and Automated Systems	6	Mandatory