# Solent University Module Descriptor

## **Module Code: COM511 Module title: Network Systems Automation**

### **Why is this module important?**

Most companies are highly dependent on applications that run over a computer network which in turn can be highly dependent on an operating environment consisting of complex pre-requisites. Systems and services must be configured that are vital to the operation of applications and the network. Management tasks may be run remotely to centralise the control and configuration of systems and services. It is vital that the configuration of systems and devices should be centrally stored and updated so that in the event of system failure this can be quickly restored to the relevant part of the network. This is known as Configuration Management and is one of the methods used in a DevOps role, where an IT specialist has knowledge of application, the environment in which they run and the network. Centralised configuration also extends to the control of network devices such as routers and switches. A Software Defined Network (SDN) involves the use of a centralised SDN Controller to determine the routes taken by traffic rather than permitting switches or routers to autonomously decide where to send traffics. Some network functions can even be virtualised in software rather than hosted on physical devices. Data centres are using this paradigm to provide dynamic networks that respond much more fluidly to the changing demands of high bandwidth network traffic. Operating systems may be also be hosted using virtualisation in the form of virtual machines or containers. A good awareness of these network automation and configuration management technologies is essential for anyone involved with computer networks and administration or systems related to data centres or a DevOps role.

### **What you will learn on the module**

*Y*ou will be introduced to the following topics:

**Network System Principles, Services and Configuration**

Operating systems and kernels: overview of operating systems contrasting server based such as Windows and Linux, network device based such as WeOS and IOS, mobile device based such as Android and embedded systems such as Arduino. System services and server roles. Software Defined Networks with centralised control versus legacy networks with autonomous control. Industrial networks, provision for resilience and management.

**Applications and Management of Network Systems**

The principles of centralised network administration, management and automation, including DevOps. General considerations of security in management of network systems. Looking at case studies in production and industrial network environments. The role of Software Defined Networks in datacentres and the tools used to manage them, for example OpenDaylight. Introducing the methods used to provide resilience and the tools used to manage their configuration. Configuration management of production networks using tools such as Ansible or Chef. Tools used to monitor and manage networks, such as OpenNMS.

### **How you will learn**

Real world case studies will be introduced that will illustrate the relevance of the subject to the needs of business and industry. During preparation sessions you will study the customer requirements within a case study and under guidance you will investigate solutions that you will apply in theory and in practice when you engage in practical workshops. A student-centred approach will be adopted in which you will realise the implementation of solutions for yourself by means of directed learning.

**How much time the module requires**

You will need to attend and engage in 4 hours per week of timetabled practical workshops and tutorials for this module. You will also need to engage in an additional 12 hours each week of directed and independent learning outside of these sessions in order to work towards proficiency in this subject. This will include work on researching and preparing evidence for your report.

**How you will be assessed**

Tasks which help you to learn and prepares you for summative tasks (Formative):

You should maintain a record of solutions to a case study based on theoretical preparation and practical exercises. You should show this to your tutor at regular intervals.

**Tasks which count towards your degree (Summative):**

The summative assessment is based on a critical evaluation report. The report will contain an evaluation on each topic and evidence of how you have applied relevant technology to the needs of the case study in theory, underpinned by your research and preparation, and in practice, based on your practical laboratory work.  This should be properly referenced.

**When assessment does not go to plan**  
If you have not completed your critical evaluation report to a standard satisfactorily enough to pass the module you will be expected to conduct preparation and practical work based on the original assessment and to submit a report completed to at least a satisfactory standard according to the assessment criteria.

### **What you will be able to do after the module**

1. Discuss a wide range of aspects of network systems and the services that they provide to the network
2. Analyse techniques for automation of computers systems and networks
3. Implement, troubleshoot and manage network systems using appropriate tools and techniques.
4. Formulate and apply solutions to real world problems
5. Communicate information relating to network systems effectively.

### **How this relates to the dimensions of Solent’s Real-world curriculum framework**

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| --- | --- | --- |
| Dimensions | How students learn | How students are assessed |
| Students are challenged to think in critical, creative and applied ways | Students research solutions to a case study and implement them practically in a workshop | A weekly critical evaluation report that discusses their approach to theoretical and practical solutions to a problem |
| Students are inspired to do research through inquiry, curiosity and problem-solving | Students are tasked with investigating and preparing solutions | Students will present the results of their research and application of solutions in a critical evaluation report |
| Students experience an intellectually stimulating curriculum which inspires them to learn for life | Students will engage in workshops that will simulate real life problem solving within a realistic business environment | Students will provide evidence of solutions to the requirements of real-life problems documented in a critical evaluation report |
| Students reflect and grow inwardly, socially and ethically to be able to confront the challenges of the world | Students will acquire skills in promoting themselves as a professional practitioner | Students will be required to show evidence of how they have engaged in a professional manner with the process of developing solutions for case studies |
| Students face outward to the community, industry and the global environment | Students will need to engage with business and industry through engagement with industrial contacts, whether real or simulated through role playing | Students will need to reflect evidence of feedback and evaluation they have gained from engagement for both formative and summative assessments |
| Students learn from authentic, engaging and programmatic assessment | Students will be exposed to current industry practices in developing solutions to real world problems | Students should present their solutions based upon current practice and technology |

### Summative assessment details

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| AE1 | Weighting: | 100% |
|  | Assessment type: | Report |
|  | Aggregation: | N/A |
|  | Length/duration: | 3000 words plus appendices |
|  | Online submission: | Yes |
|  | Grade marking: | Yes |
|  | Anonymous marking: | No |

### Module Author: Neville Palmer

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| Module Title: Network Systems Automation | | | |
| Credit Points: | 20 | Module Code: | COM511 |
| FHEQ Level: | 5 | School/Service | SMAT |
| Module Delivery Model: | CD | Max/Min student numbers | 25 max |
| Module Leader: | Neville Palmer | | |
| HECOS code | 100365 | | |

### Module change history:

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| --- | --- | --- | --- |
| Module Approved/Year Implemented/Code | July 2019 | 2020/21 | COM511 |
| Module modified/Year Implemented/Code |  |  |  |
| Add extra rows as required |  |  |  |