



**Technological University Dublin – Tallaght**

**VALIDATION REPORT FOR**

***BACHELOR OF SCIENCE IN ENTERPRISE CLOUD COMPUTING  
(ADD-ON)***

**LEVEL 7**

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**School of: Science & Computing**

**Department of: Computing**

Panel Meeting date:	April 7 <sup>th</sup> 2022	
Decision:	Recommended	
<i>tick one only</i>	Recommended subject to modification	X
	Not recommended	

# EXTERNAL REVIEW PANEL REPORT

## PART 1

## GENERAL INFORMATION

<b>School</b>	Science & Computing
<b>Department</b>	Computing
<b>Date of panel meeting</b>	April 07 <sup>th</sup> 2022
<b>Programme evaluated</b>	Bachelor of Science in Enterprise Cloud Computing (add-on)
<b>National framework Qualification level</b>	7 (60 ECTS)
<b>Programme approved title</b>	Bachelor of Science in Enterprise Cloud Computing (add-on)
<b>Panel</b>	<ol style="list-style-type: none"><li>1. Dr Yvonne Kavanagh, Asst. Registrar, Institute of Technology Carlow (Chair)</li><li>2. Mr David Power, Lecturer in Computing, Waterford Institute of Technology</li><li>3. Olive Foley, Cloud Provision Architect, Microsoft</li></ol>
	Secretary: Dr Ken Carroll

## University STAFF

<b>Name</b>	<b>Grade / Responsibility</b>
Dr Barry Feeney	Head of Department of Computing
Dr David White	Lecturer in Computing, Programme Lead
Dr Kevin Bayliss	Lecturer in Computing
Dr Enda Lee	Lecturer in Computing
Mr Martin O'Connor	Lecturer in Computing
Dr Seam McHugh	Lecturer in Computing
Mr Eamon Hyland	Lecturer in Computing
Dr Gary Clynch	Senior Lecturer in Computing
Dr Pearse McCarthy	Lecturer in Computing

## **PART II RECOMMENDATION/COMMENT**

### **2.1 Commendations, Conditions and Recommendations:**

The External Review panel recommends the validation of the programme:

***Bachelor of Science in Enterprise Cloud Computing (add-on)***

***NFQ Level 7 for 60 ECTS***

for the purpose of the award of:

***Ordinary Bachelor Degree***

**Proposed Start Date:** 01<sup>st</sup> September 2022

**Mode of Delivery:** Full-time, Part-time, Blended

#### **Commendations:**

1. The Department of Computing is commended for its strong links with professional bodies, industry and other sectoral organizations, which are leveraged to very good effect in the continuous improvement of programme offerings and the creation of flexible opportunities for student placement and/or career progression.
2. The Department is further commended for the incorporation of routes to achieve Microsoft Security and Amazon industry certifications for programme participants which adds significant value to their learning portfolio and attractiveness to industry as graduates.

#### **Conditions**

- No conditions attached.

#### **Recommendations**

1. The Panel is happy to recommend for approval the proposed programme leading to the BSc in Enterprise Cloud Computing (add-on; 60 ECTS).
2. In the Akari Book of Modules for Programme for the programme, the panel recommends the following clarifications and/or amendments to the general information sections:
  - a. It is recommended that the section entitled 'Programme Structure/Module Choice Description' (page 3) requires clarification to clearly explain the design

- of the programme, its intended purpose (exit award or add-on ordinary degree or both), and the routes available to applicants in accessing and completing the programme.
- b. Minor typographical errors in the page 3 section 'Procedures for Non-Standard Applications' should be corrected.
  - c. The section on 'Programme Specific Assessment Regulations' (page 5) requires clarification and alignment with the listing of programme modules and the intended approved course schedule to explain how these modules will be delivered to learners from differing backgrounds e.g., student seeking an exit award versus those using the programme to build on prior qualifications or prior learning.
  - d. The section on 'Classification for each award type listed' (page 5) is to be amended to include BSc in Enterprise Cloud Computing with Pass. The programme title should also be amended to the approved title BSc in Enterprise Cloud Computing (not BSc in Cloud Computing).
  - e. The sections on 'Associated Modules' (page 7) and 'Curriculum Structure, Assessment Methods and Learning Outcomes' should be checked and aligned to ensure consistency with one another and with other programme documentation regarding the naming of proposed modules, and in particular, the General Elective modules 1, 2 and 3.
  - f. The operation of the Group Electives requires clarification and simplification to make it explicit for potential learners to understand what is required of them.
  - g. In the case of new modules, the indicative content module was not in the programme document due to an error in printing. This detail should be included in the final programme document. The Panel noted that the learning outcomes were provided with sufficient detail to reasonably allow one to understand the intent.
  - h. In the module descriptors, the 'indicative hour' for learner contact should be more clearly defined to discriminate between lectures, laboratories, direct student effort etc.
3. The programme Team should review the learning outcomes for each module to ensure the verbs used are all consistent with those appropriate to the NFQ Level 7 awards standards e.g., avoid use of 'understanding' (in Public Cloud Computing and maybe other modules) as a learning outcome.
  4. For certain modules e.g., Cloud Automation & Security, the modules, some LO's as stated are quite technical in nature but the proposed assessment methods rely on traditional examinations. The Programme Team should consider if the use of more laboratory or assignment-based assessment modes might be more appropriate.
  5. The Panel recommends that the Programme Team reconsider the presentation of the Group Electives to bring greater clarity to the relationship between them. As currently stated, it is difficult to understand and may be open to challenge. A re-framing of the alignment between the 20 ECTS Experiential Learning elective and the other two General Electives is needed.

6. The Panel expressed concern at the overall number of proposed assessments in each semester. It is recommended that the Programme Team review the overall assessment strategy and rebalance it as necessary whilst retaining alignment to the intended learning outcomes.
  - a. It is also recommended that the assessment schedule and assessment weightings be reviewed with students/graduates post-first delivery to inform any further re-balancing that may be required
7. In various module descriptors, the assessment section suggests having an assessment in week 1 (e.g., Practical skills for Operating Systems; Information Systems Process Automation) in some cases with a weighting of 20 to 25%. The intention, based on discussion with the Programme Team is to issue the assignment in week one; this should be clarified in the document.

## PART III FINDINGS OF THE VALIDATION PANEL

### INTRODUCTION

#### **Comment:**

The BSc in Enterprise Cloud Computing is a one-year add-on programme for practitioners seeking to upskill themselves and/or Higher Certificate holders in a cognate area seeking to advance their qualifications.

The External Programme Validation Panel led by Dr Kavanagh, conducted a rigorous, thoughtful review of the proposed programme, its rationale, structure, learning teaching and assessment strategy, provision for access, transfer and progression and module content.

### MEETING WITH MANAGEMENT AND STAFF

#### **Programme Title and Award Title.**

**Comment:** The panel was satisfied that the title of the programme is clear, accurate and fit for the purpose of informing prospective learners and other stakeholders. The panel was also satisfied that the proposed title of the programme reflects the related named award title.

The B.Sc. Enterprise Cloud Computing programme aims to support the personal development of students and equip graduates to work at a professional level in the IT industry demonstrating broad technical knowledge across the major fields of computing and with a particular focus on Cloud Computing. Graduates will also be equipped with an ability to engage in lifelong learning to allow them to up-skill in line with the dynamic demands of ICT sector.

**Recommendation:** Programme title Bachelor of Science in Enterprise Cloud Computing.

#### **Justification for the Programme**

**Comment:** The justification for the proposed programme was discussed and the panel was satisfied that there was a market for graduates of the proposed programme.

The proposed programme is intended to provide a vehicle for (i) progression from NFQ Level 6 to Level 7; (ii) a professional development opportunity for industry practitioners; (iii) an exit route for Level 8 students who may require a step off from their intended learning objectives in related programme areas.

The proposed programme was developed based on student and graduate feedback, consultation with industry, and an understanding of their needs. The programme replaces an existing Springboard funded Level Certificate in Cloud Provisioning, Management & Security (40 ECTS) and includes project element added to raise the standard to conform with the standards for an Ordinary BSc in this domain.

The programme will provide 60 ECTS delivered via 6 x 5 ECTS taught modules (3 of those are new modules) and a choice of electives on IT Scripting & CyberSecurity, a project and experiential learning. The variety is intended to accommodate an efficient breadth of access routes into this add-on programme.

### **Conformance with University Mission and Strategy**

**Comment:** The panel was satisfied that the proposed programme conformed to the University's mission of providing learners with flexible higher education opportunities which are of the highest quality.

### **Access, Transfer and Progression Arrangements**

**Comment:** The panel were satisfied with the arrangements stated for access and progression. Access to the programme takes cognizance of normal progression, RPL (recognition of prior learning) and APEL (Accredited Prior Experiential Learning) for practitioners seeking to gain a qualification and/or upskill in the cloud computing domain. The programme structure flexibly accommodates learners from different backgrounds seeking to upskill in the domain of Enterprise Cloud Computing.

Progression routes were clearly identified to support programme graduates going on to NFQ Level 8 programmes within TU Dublin or elsewhere.

### **Programme Structure and Design**

**Comment:** The programme structure and design were well documented, and the panel was satisfied with the information supplied. Several constructive recommendations were made to clarify some aspects of the documents.

Semester 1 of the programme involves 6 x 5 ECTS taught modules (3 existing approved modules and 3 new modules) and semester 2 offers a choice of electives on IT Scripting & Cyber-Security, a project and experiential learning. The variety is intended to accommodate an efficient breadth of access routes into this add-on programme.

The project will be a large-scale effort designed to enable learners to demonstrate an integrated understanding and application of knowledge and skills developed through the programme. The Experiential Learning module will include careers development workshops,

developing learner skills profiles, a period of work placement and/or work shadowing. Learners will complete special projects, develop reports on those projects, and maintain a log of professional development.

GE-1 (10 ECTS) is Cyber Security and Scripting, GE-2 (10 ECTS) is IT Process Automation & APMPP and GE-3 (20 ECTS) is Experiential learning. How this will operate in practice requires clarification. The options open to an individual will be defined through entry interview to assess the prior learning they bring to the programme.

### **Recommendations:**

1. Akari Book of Modules for Programme TBCC - B.Sc. Cloud Computing – clarifications and/or amendments recommended:
  - a. It is recommended that the section entitled '*Programme Structure/Module Choice Description*' (page 3) requires clarification to clearly explain the design of the programme, its intended purpose (exit award or add-on ordinary degree or both), and the routes available to applicants in accessing and completing the programme.
  - b. Minor typographical errors in the document page 3 section '*Procedures for Non-Standard Applications*' should be corrected.
  - c. The section on '*Programme Specific Assessment Regulations*' (pages 5) requires clarification and alignment with the listing of programme modules and the intended approved course schedule to explain how these modules will be delivered to learners from differing backgrounds e.g., student seeking an exit award versus those using the programme to build on prior qualifications or prior learning.
  - d. The section on '*Classification for each award type listed*' (page 5) is to be amended to include BSc in Cloud Computing with Pass.
  - e. The sections on '*Associated Modules*' (page 7) and '*Curriculum Structure, Assessment Methods and Learning Outcomes*' should be checked and aligned with to ensure consistency with one another and with other programme documentation regarding the naming of proposed modules, and in particular, the General Elective modules 1, 2 and 3.
  - f. The operation of the Group Electives requires clarification and simplification to make it explicit for potential learners to understand what is required of them.
  - g. In the case of new modules, the indicative content module was not in the programme document due to an error in printing. This detail should be included in the final programme document. The Panel noted that the learning outcomes were provided with sufficient detail to reasonably allow one to understand the intent.



- h. In the module descriptors, the 'indicative hour' for learner contact should be more clearly defined to discriminate between lectures, laboratories, direct student effort etc.

## Programme Learning Outcomes and Award Standards.

**Comment:** The panel was satisfied that the learning outcomes of the programme were compliant with the Award Standard for the Bachelor of Science. Modules were reviewed with a particular focus on the new modules. It was noted, and the team were commended for the inclusion of pathways leading to industry standard certifications within the programme structure. This offers a significant value add for learners completing the programme and the profile they can present to potential employers' post-graduation.

The hours allocation within some modules includes the provision of contact hours that are linked to industry standard training e.g., Public Cloud Computing. Delivery hours might also be better distributed between lecturer and lab. The Head of Department explained that delivery is often mixed-mode in laboratories; some of those labs now avail themselves of HyFlex technology to accommodate in-person and online attendance.

### Recommendations:

1. The programme Team should review the learning outcomes for each module to ensure the verbs used are all consistent with those appropriate to the NFQ Level 7 awards standards e.g., avoid use of 'understanding' (in Public Cloud Computing and maybe other modules) as a learning outcome.
2. For certain modules e.g., Cloud Automation & Security, the modules, some LO's as stated are quite technical in nature but the proposed assessment methods rely on traditional examinations. The Programme Team should consider if the use of more laboratory or assignment-based assessment modes might be more appropriate.

## Teaching and Learning Strategy

**Comment:** The proposed approaches to teaching and learning were indicated and justified. Given the practical nature of much of the proposed learning, a mixed-mode of learning involving laboratories, lectures and use of HyFlex technology to accommodate in-person and online attendance is proposed. Lectures will be offered from laboratory environments and intersperse lecture material with the performance/solving of practical tasks.

### Recommendations:

1. The Panel recommends that the Programme Team reconsider the presentation of the Group Electives to bring greater clarity to the relationship between them. As currently stated, it is difficult to understand and may be open to challenge. A re-framing of the alignment between the 20 ECTS Experiential Learning elective and the other two General Electives is needed.

## Learner Assessment

**Comment:** The overall approach to learner assessment was discussed. The Panel expressed a concern that there may be potential for over-assessment of learners, noting that in one semester, they might have 20 separate assessments. A mapping of learner assessment and the development of a reasonable matrix of assignments for each semester be developed in advance of the start of each semester.

Several assignments indicated e.g., as week 3, are intended to be issued in that week but students will have time to develop their solutions in parallel with learning. Final exams where used, will seek to test the integration of student learning across the modules. There are x5 final examinations (FE) proposed and overall, there are ca 20 pieces of assessment in semester 1 which may be over-assessment for learners. The Head of Department explained that they would face 3 FE in one semester and 2 in the follow-on semester.

### Recommendations:

1. The Panel expressed concern at the number of proposed assessments in each semester. For example, there are 20 pieces of assessment in semester 1 which may be over-assessment for learners. It is recommended that the Programme Team review the overall assessment strategy and rebalance it as necessary whilst retaining alignment to the intended learning outcomes.
  - a. It is also recommended that the assessment schedule and assessment weightings be reviewed with students/graduates post-first delivery to inform any further re-balancing that may be required.
2. Cloud Automation & Security: the learning outcomes are described using very technical verbs e.g. manage, deploy, implement. The Panel recommends that this may lend itself more to lab-based assessment and not final examination and not the 50:50 split provided.
3. In various module descriptors, the assessment section suggests having an assessment in week 1 (e.g., Practical skills for Operating Systems; Information Systems Process Automation) in some cases with a weighting of 20 to 25%. The intention, based on discussion with the Programme Team is to issue the assignment in week one; this should be clarified in the document.

## Quality Assurance

**Comment:** The procedures in developing the programme were outlined to the panel as per the University's quality assurance procedures. The panel was satisfied with the procedures that were applied to the development of the proposed programme and that the quality assurance mechanisms are in place to ensure its provision, monitoring and review.

## Information Provision

**Comment:** The panel was satisfied with the proposed information that would be available to learners and potential learners, subject to the clarifications sought around the operation of the General Elective modules.

## Library and Physical Facilities / Resources

**Comment:** The panel was satisfied that the staffing and physical resources were available to deliver the proposed programme. A good selection of up to date reading materials were identified, all of which are available in the Tallaght library.

## Learner Support Services

**Comment:** The panel were satisfied that the Department has a caring and responsive approach to the academic needs of its students. Additional academic support is available across the university in the form of e.g., Mathematics Learning Supports, and Academic Writing supports. Student wellness is also well provided through the Student Health, Counselling and Pastoral Care services on campus.

## Academic Staff and Qualifications

**Comment:** The panel was satisfied that the lecturer and support staff are available within the University and the Department to deliver the content of this programme. Staff are also actively engaged in relevant research which informs and enriches the learning opportunity for students.

The Department of Computing is commended for its strong links with professional bodies, industry and other sectoral organizations, which are leveraged to very good effect in the continuous improvement of programme offerings and the creation of opportunities for student placement and/or career progression.

<b>Signatures:</b>	<i>Yvonne Kavanagh</i>
<b>Chairperson</b>	Dr Yvonne Kavanagh
<b>Date</b>	27/04/2022
<b>Secretary:</b>	<i>Ken Carroll</i> Dr K Carroll
<b>Date</b>	28/04/2022



**Technological University Dublin – Tallaght**

**Programme Board Response to VALIDATION REPORT FOR  
*BACHELOR OF SCIENCE IN ENTERPRISE CLOUD COMPUTING  
(ADD-ON)***

**LEVEL 7**

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**School of: Science & Computing**

**Department of: Computing**

Panel Meeting date:	April 7 <sup>th</sup> 2022
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## EXTERNAL REVIEW PANEL REPORT RESPONSE

### PART 1

### GENERAL INFORMATION

<b>School</b>	Science & Computing
<b>Department</b>	Computing
<b>Date of panel meeting</b>	April 07 <sup>th</sup> 2022
<b>Programme evaluated</b>	Bachelor of Science in Enterprise Cloud Computing (add-on)
<b>National framework Qualification level</b>	7 (60 ECTS)
<b>Programme approved title</b>	Bachelor of Science in Enterprise Cloud Computing (add-on)
<b>Panel</b>	<ol style="list-style-type: none"><li>4. Dr Yvonne Kavanagh, Asst. Registrar, Institute of Technology Carlow (Chair)</li><li>5. Mr David Power, Lecturer in Computing, Waterford Institute of Technology</li><li>6. Olive Foley, Cloud Provision Architect, Microsoft</li></ol>
	Secretary: Dr Ken Carroll

### University STAFF

<b>Name</b>	<b>Grade / Responsibility</b>
Dr Barry Feeney	Head of Department of Computing
Dr David White	Lecturer in Computing, Programme Lead
Mr Kevin Bayliss	Lecturer in Computing
Mr Enda Lee	Lecturer in Computing
Dr Martin O'Connor	Lecturer in Computing
Mr Sean McHugh	Lecturer in Computing
Mr Eamon Hyland	Lecturer in Computing
Mr Gary Clynch	Senior Lecturer in Computing
Mr Pearse McCarthy	Lecturer in Computing

## **PART II RECOMMENDATION/COMMENT**

### **2.1 Commendations, Conditions and Recommendations:**

The External Review panel recommends the validation of the programme:

***Bachelor of Science in Enterprise Cloud Computing (add-on)***

***NFQ Level 7 for 60 ECTS***

for the purpose of the award of:

***Ordinary Bachelor Degree***

**Proposed Start Date:** 01<sup>st</sup> September 2022

**Mode of Delivery:** Full-time, Part-time, Blended

#### **Commendations:**

3. The Department of Computing is commended for its strong links with professional bodies, industry and other sectoral organizations, which are leveraged to very good effect in the continuous improvement of programme offerings and the creation of flexible opportunities for student placement and/or career progression.
4. The Department is further commended for the incorporation of routes to achieve Microsoft Security and Amazon industry certifications for programme participants which adds significant value to their learning portfolio and attractiveness to industry as graduates.

#### **Conditions**

- No conditions attached.

#### **Recommendations**

8. The Panel is happy to recommend for approval the proposed programme leading to the BSc in Enterprise Cloud Computing (add-on; 60 ECTS).
9. In the Akari Book of Modules for Programme for the programme, the panel recommends the following clarifications and/or amendments to the general information sections:

- a. It is recommended that the section entitled 'Programme Structure/Module Choice Description' (page 3) requires clarification to clearly explain the design of the programme, its intended purpose (exit award or add-on ordinary degree or both), and the routes available to applicants in accessing and completing the programme.  
*This has been addressed by focusing on add-on degree option. (See updated PDF of programme)*
- b. Minor typographical errors in the page 3 section 'Procedures for Non-Standard Applications' should be corrected.  
*This has been addressed (see pdf)*
- c. The section on 'Programme Specific Assessment Regulations' (page 5) requires clarification and alignment with the listing of programme modules and the intended approved course schedule to explain how these modules will be delivered to learners from differing backgrounds e.g., student seeking an exit award versus those using the programme to build on prior qualifications or prior learning.  
  
*This has been addressed (PDF).*
- d. The section on 'Classification for each award type listed' (page 5) is to be amended to include BSc in Enterprise Cloud Computing with Pass. The programme title should also be amended to the approved title BSc in Enterprise Cloud Computing (not BSc in Cloud Computing).  
*Completed*
- e. The sections on 'Associated Modules' (page 7) and 'Curriculum Structure, Assessment Methods and Learning Outcomes' should be checked and aligned to ensure consistency with one another and with other programme documentation regarding the naming of proposed modules, and in particular, the General Elective modules 1, 2 and 3.  
*Completed*
- f. The operation of the Group Electives requires clarification and simplification to make it explicit for potential learners to understand what is required of them.  
*Completed*
- g. In the case of new modules, the indicative content module was not in the programme document due to an error in printing. This detail should be included in the final programme document. The Panel noted that the learning outcomes



were provided with sufficient detail to reasonably allow one to understand the intent.

*Corrected*

- h. In the module descriptors, the 'indicative hour' for learner contact should be more clearly defined to discriminate between lectures, laboratories, direct student effort etc.

*Completed –Private Cloud Infrastructure explicit breakdown of lab, lecture & self-directed hours added.*

10. The programme Team should review the learning outcomes for each module to ensure the verbs used are all consistent with those appropriate to the NFQ Level 7 awards standards e.g., avoid use of 'understanding' (in Public Cloud Computing and maybe other modules) as a learning outcome.

*The programme team has addressed these discrepancies*

11. For certain modules e.g., Cloud Automation & Security, the modules, some LO's as stated are quite technical in nature but the proposed assessment methods rely on traditional examinations. The Programme Team should consider if the use of more laboratory or assignment-based assessment modes might be more appropriate.

*The proposed module assessments are an elapsed CA worth 30%, labs worth 20% and a final exam worth 50%. The CA and the labs will be focus on practical configuration with students getting hands on experience working with the technologies and tools covered in the module. The final exam will focus on practical / scenario based questions which will aim to assess the students knowledge of the technologies and tools covered in the module and where best to use them. The assessments will be reviewed and may be amended if required after the first delivery of the module.*

12. The Panel recommends that the Programme Team reconsider the presentation of the Group Electives to bring greater clarity to the relationship between them. As currently stated, it is difficult to understand and may be open to challenge. A re-framing of the alignment between the 20 ECTS Experiential Learning elective and the other two General Electives is needed.

*This is being dealt with in 'programme information' leaflets.*

13. The Panel expressed concern at the overall number of proposed assessments in each semester. It is recommended that the Programme Team review the overall assessment strategy and rebalance it as necessary whilst retaining alignment to the intended learning outcomes.

- a. It is also recommended that the assessment schedule and assessment weightings be reviewed with students/graduates post-first delivery to inform any further re-balancing that may be required



*The programme board has reviewed this feedback of which it is most appreciative. The programme board is mindful of the risk of over –assessing but does wish to ensure students can demonstrate the practical skills needed to operate in this area. The programme board will develop a robust assessment schedule which ensures the CAs are spread across the semester and not an overload at any one point.*

*The programme board will also review the operation of the CA schedule at the end of the first running of the programme.*

14. In various module descriptors, the assessment section suggests having an assessment in week 1 (e.g., Practical skills for Operating Systems; Information Systems Process Automation) in some cases with a weighting of 20 to 25%. The intention, based on discussion with the Programme Team is to issue the assignment in week one; this should be clarified in the document.

*Assessments assignments are not collected in Week 1 through some assignments are handout out in week 1 with a view to collection in later weeks. The intention of handing out assignments well in advance of delivery date is to ensure students have an opportunity to plan their work. Programme documentation and student communications will be reviewed to ensure that this is clear to programme participants.*

*Information Systems Process Automation module update clarifying that it is ongoing lab work that will be examined during the course of the semester*

<b>Signatures:</b>	
<b>Chairperson</b>	Dr Yvonne Kavanagh
<b>Date</b>	09/05/2022
<b>Secretary:</b>	
	Dr K Carroll
<b>Date</b>	09/05/2022

## PART III: PROGRAMME SCHEDULES

### Semester 1 Modules

<i>Year/Cycle</i>	<i>Semester</i>	<i>Delivery Type</i>	<i>Code</i>	<i>Title</i>	<i>Version</i>	<i>Credits</i>
1	Semester 1	Mandatory	tbc/IS	Cloud Automation & Security [Draft]	1	5
1	Semester 1	Mandatory	tbc/IS	Private Virtualised Environments [Draft]	1	5
1	Semester 1	Mandatory	tbc/IS	Public Cloud Computing [Draft]	1	5
1	Semester 1	Mandatory	DBAS H3001	Big Data Technologies [Draft]	4	5
1	Semester 1	Mandatory	OPSY H3003	Operating Systems [Approved]	4	5
1	Semester 1	Mandatory	WEBD H3001	Server-Side Web Development [Draft]	5	5

### Semester 2 Modules

<i>Year/Cycle</i>	<i>Semester</i>	<i>Delivery Type</i>	<i>Code</i>	<i>Title</i>	<i>Version</i>	<i>Credits</i>
1	Semester 2	Group Elective 3	PLAC H3005	Experiential Learning [Approved]	1	20
1	Semester 2	Mandatory	PROJ H3018	Project [Approved]	1	10
1	Semester 2	Group Elective 1	SRTY H2001	Cyber Security [Draft]	5	5
1	Semester 2	Group Elective 2	tbc/IS	Information Systems Process Automation [Draft]	1	5
1	Semester 2	Group Elective 2	APMPH3001	Agile Project Management Principles [Approved]	1	5
1	Semester 2	Group Elective 1	AUTO H2005	IT Scripting & Automation [Draft]	3	5

\* Note: GE1 mandatory for those not having completed Equivalent modules. GE 2 available to those with Work Experience

**PART III: PROGRAMME SCHEDULES**

The Banner schedules will be inserted here

