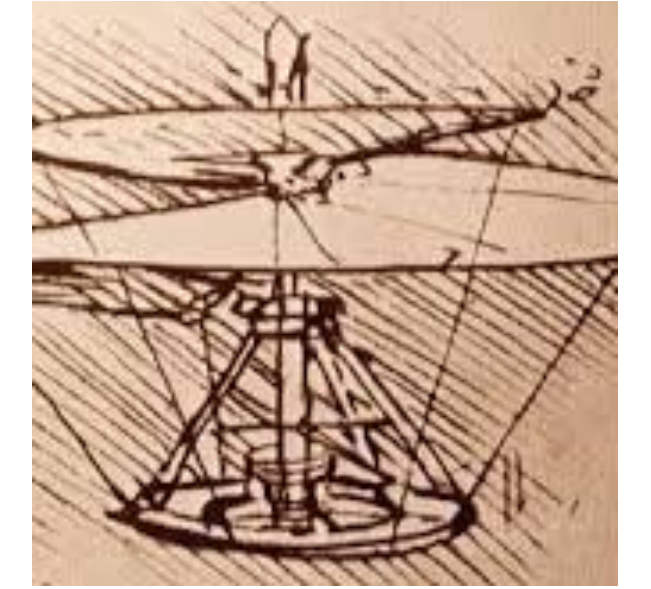




Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE



Higher Diploma in Science in Computer Science

2019 - 2020



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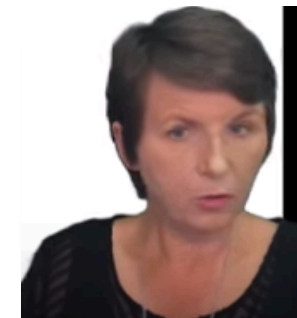
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**O'Connor ,
Diarmuid**

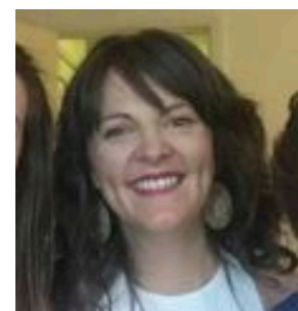
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Skills Studio 2



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Computer Systems & Networks



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Mobile Application Development



McGibney, Jimmy

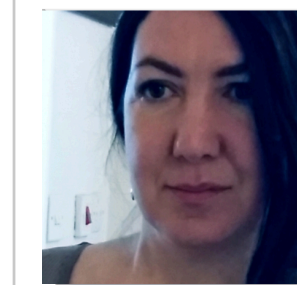
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Developer Operations
Enterprise Web Development



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Web Development



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Web Development
Skills Studio 1
Enterprise Web Development
Mobile Application Development



Dunphy, Colm

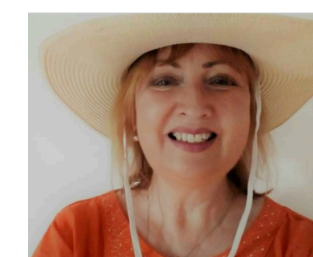
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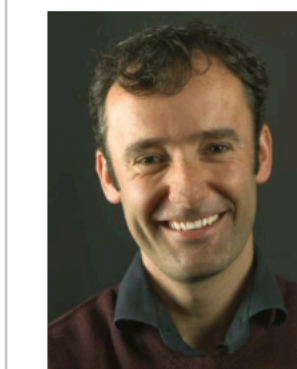
Programming



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Computer Systems & Networks

Agenda for Induction Day

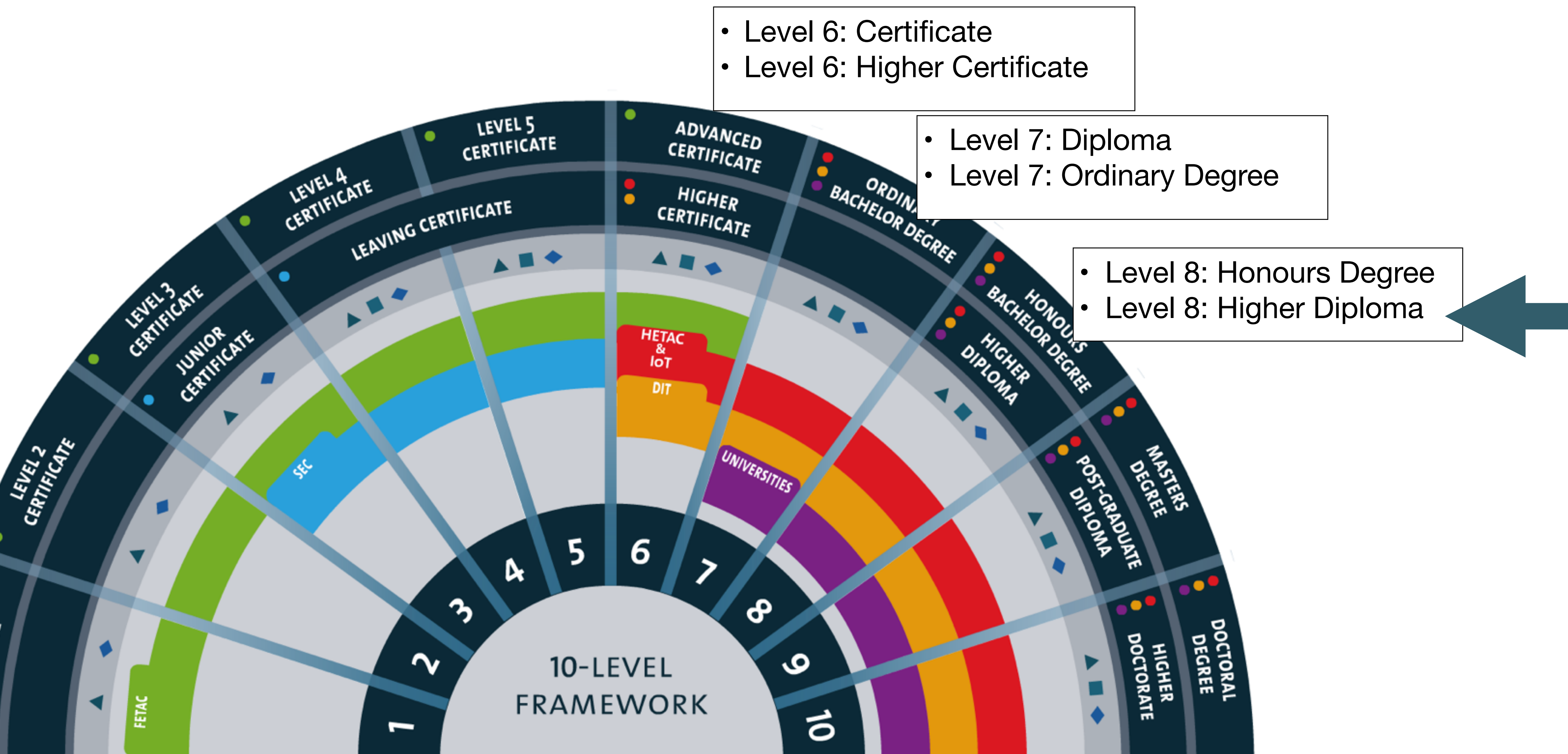
10:00		<i>Flexible Teaching Building: Room: FTG23</i>		13:30	<i>Walton Building Room: IT101</i>	<i>Walton Building Room: IT102</i>	
	Eamonn de Leastar, Com Dunphy, Joan Mangan	Programme Overview Programme Structure & Assessment Online resources and modes of delivery	12:30	Gallery Lunch	Web Development A Eamonn de Leastar Annetta Stack	Programming B Colm Dunphy, Patrick Felicia Johnathan Brazil	
11:00							
11:00	Coffee Break			15:00	Coffee Break		
11:30		<i>Flexible Teaching Building: Room: FTG23</i>			<i>Walton Building Room: IT101</i>	<i>Walton Building Room: IT102</i>	
	Colm Dunphy, Patrick Felicia Johnathan Brazil Eamonn de Leastar Annetta Stack Frank Walsh Caroline Cahill Mary Lyng Rosanne Birney	Curriculum Overviews Programming Web Development Computer Systems Database			15:30	Programming A Colm Dunphy, Patrick Felicia Johnathan Brazil	Web Development B Eamonn de Leastar Annetta Stack
					17:00		

Agenda

- Context & Objectives
- Semesters & Modules
- Calendar, Timetable & Assessment Sequencing
- Module Summaries

Context & Objectives

Qualification/Programme Levels....



Key Programme Features

- Immersion
- Specialisation
- Industry Partnership

Immersion in Computing Knowledge



“The participants will be graduates who have already obtained significant transferable skills by comparison with other undergraduate students...”

“Semester 1 participants will undertake a broad immersive set of modules in the fundamentals of computing...”

“The pace of delivery will have to be significantly higher than for normal undergraduate programmes...”

Deepening and Specialisation



“In semester 2 ... a specialisation which reflects their own strengths as demonstrated on the programme to date...”

“.. a focused set of modules and project-work designed to bring candidates quickly to the industry entry standard ...”

“Participants will be expected to select their specialisation based on their achievement in semester 1 and their own ambitions...”

Industry experience and professional development



“Internships or work placements are seen as crucial to providing graduates with the context and confidence in their new knowledge...”

“Outputs expected from the work placement would include a work placement report, a project ideally conducted in the work placement organisation...”

“...academic and industry partners will cooperate in the provision of appropriate academic supervision resources for the duration of this work placement activity...”

Semesters & Modules

Semesters

Semester 1:
Jan-June 2019



1

timetables · semester
calendars · assessment
schedules

Semester 2:
Sep-Dec 2019



2

timetables · semester
calendars · assessment
schedules

Semester 3:
Jan-Jun 2020



3

timetables · semester
calendars · assessment
schedules

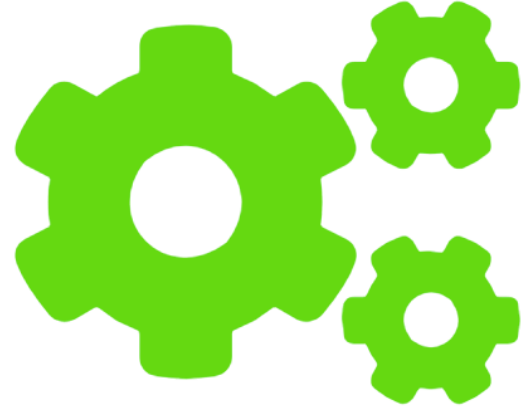

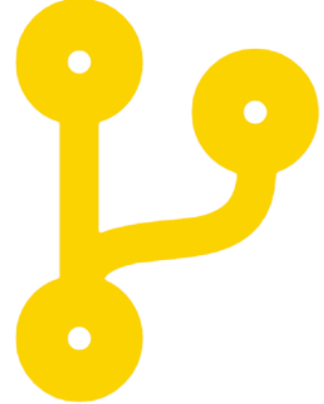

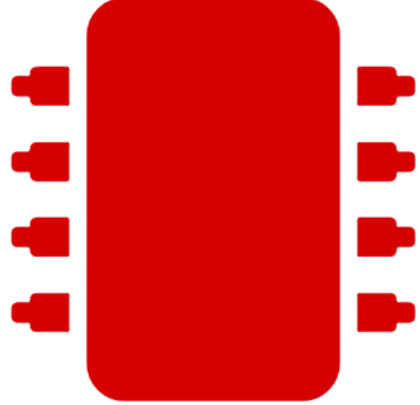


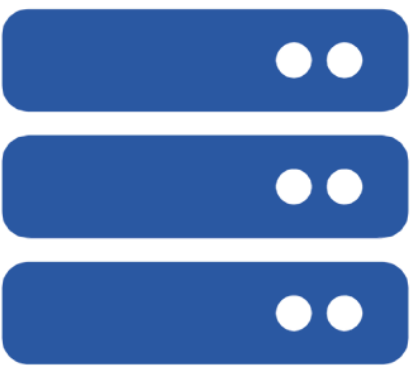



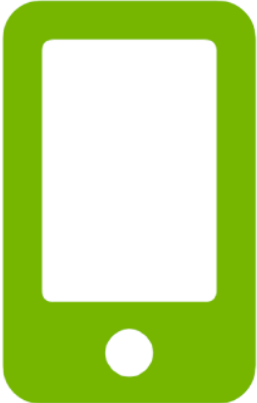


Semester 4:
Sep-Dec 2020

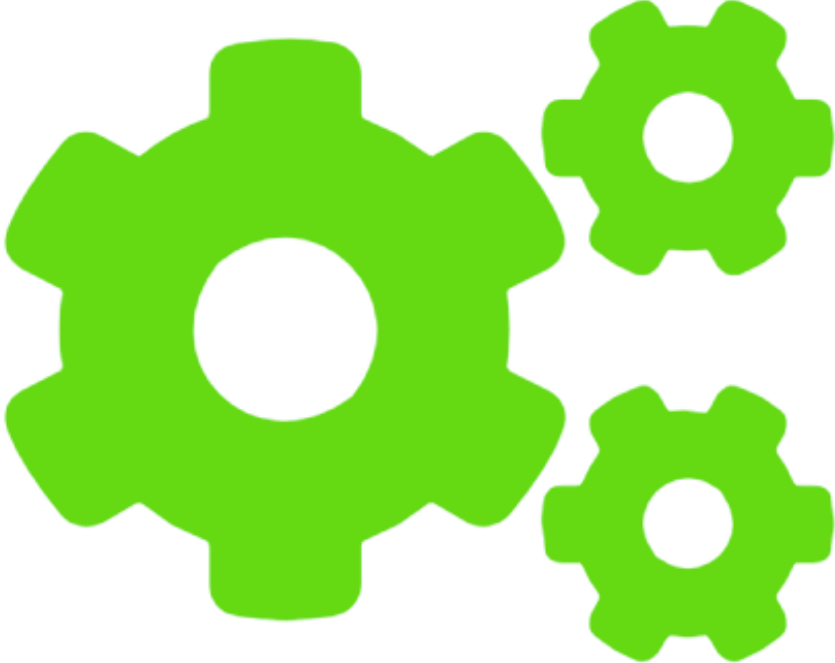




4


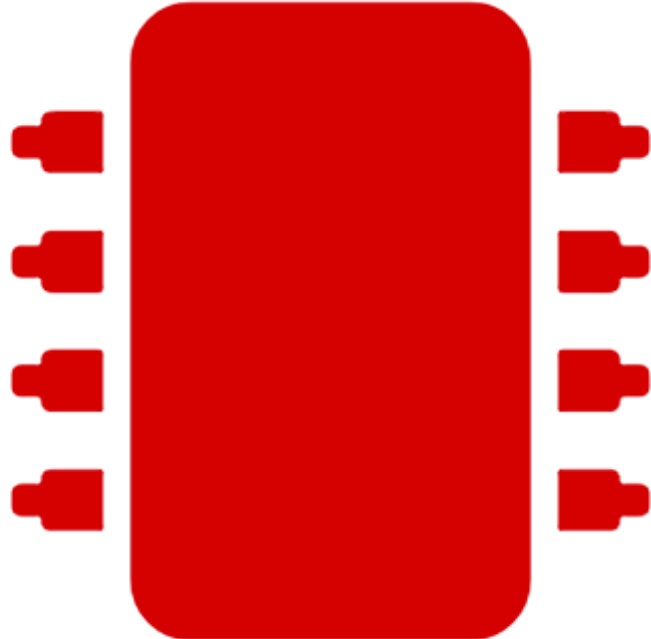

timetables · semester
calendars · assessment
schedules

9 Modules, 3 On Sites + Project/Placement




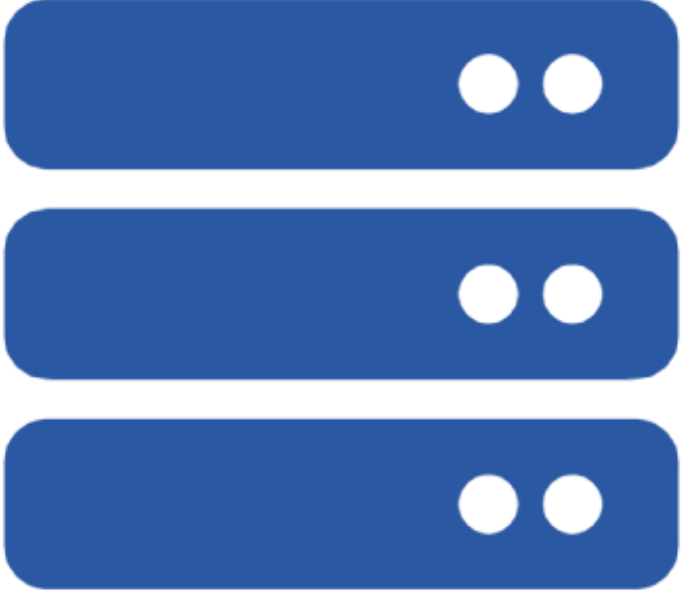



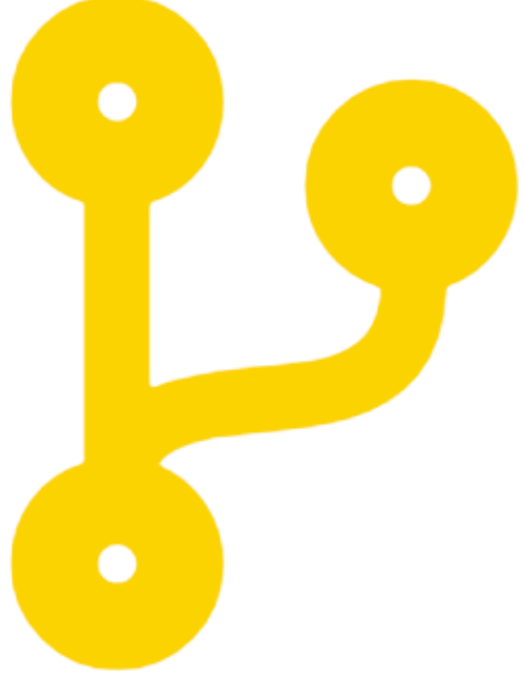
<p>Programming</p>  <p>algorithms · data structures · processing · java · classes · libraries</p> <p>10 Credits</p>	<p>Web Development</p>  <p>html · css · layout · web apps · web frameworks · deployment</p> <p>5 Credits</p>	<p>Skills Studio 1</p>  <p>javascript · node · express · git · github · glitch</p> <p>2.5 Credits</p>	<p>June Onsite</p>  <p>industry partners · semester 4 preview</p> <p>0 Credits</p>	<p>Computer Systems & Networks</p>  <p>logic · computer organisation · os · networks · interfaces · sensors</p> <p>10 Credits</p>	<p>Databases</p>  <p>entities · tables · rows · sql · er · nosql</p> <p>5 Credits</p>	<p>January Onsite</p>  <p>industry partners · agile workshop · semester 3 previews</p> <p>0 Credits</p>
<p>Enterprise Web Development</p>  <p>html · css · layout · web apps · web frameworks · deployment</p> <p>10 Credits</p>	<p>Developer Operations</p>  <p>mvc · node · security · apis · tdd · frameworks</p> <p>5 Credits</p>	<p>June Onsite</p>  <p>industry partners · git workshop · semester 2 previews</p> <p>0 Credits</p>	<p>Skills Studio 2</p>  <p>javascript · client-side · react · apis · routing · testing</p> <p>2.5 Credits</p>	<p>Mobile App Development</p>  <p>layouts · activities · resources · lifecycle · widgets · ux</p> <p>10 Credits</p>	<p>Project</p>  <p>proposal · specification · plan · iterations · implementation · report · demo</p> <p>25 Credits</p>	<p>Work Placement</p>  <p>industry partner · mentor · developer · experience · project</p> <p>25 Credits</p>

Programming	Web Development	Skills Studio 1
		
algorithms · data structures · processing · java · classes · libraries	html · css · layout · web apps · web frameworks · deployment	javascript · node · express · git · github · glitch
10 Credits	5 Credits	2.5 Credits

*“..a broad immersive set of modules in the fundamentals of computing covering **software development, systems analysis & testing**, databases, architecture, OS & networking, **web design / user-experience..”***


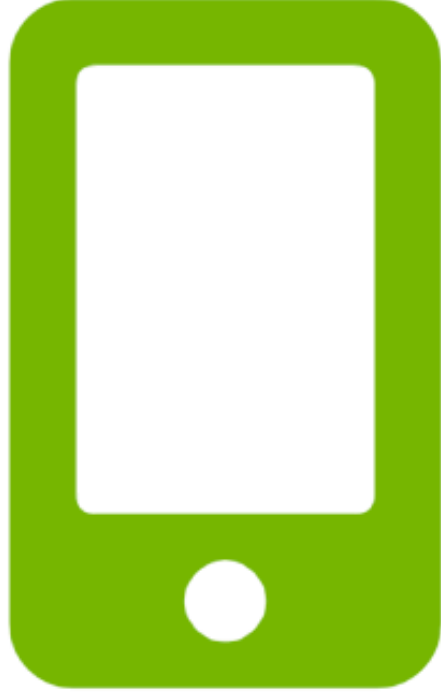


June Onsite	Computer Systems & Networks	Databases
		
industry partners · git workshop · semester 2 previews	logic · computer organisation · os · networks · interfaces · sensors	entities · tables · rows · sql · er · nosql
0 Credits	10 Credits	5 Credits

*“..a broad immersive set of modules in the **fundamentals of computing** covering software development, systems analysis & testing, **databases, architecture, OS & networking**, web design / user-experience..”*

<p>January Onsite </p>  <p>industry partners · agile workshop · semester 3 previews</p> <p>0 Credits</p>	<p>Enterprise Web Development </p>  <p>html · css · layout · web apps · web frameworks · deployment</p> <p>10 Credits</p>	<p>Developer Operations </p>  <p>mvc · node · security · apis · tdd · frameworks</p> <p>5 Credits</p>	<p>Skills Studio 2 </p>  <p>javascript · client-side · react · apis · routing · testing</p> <p>2.5 Credits</p>
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“... students are expected to take a specialisation which reflects their own strengths as demonstrated on the programme to date...”

Semester 4: June-December 2020

June Onsite	Mobile App Development	Project	Work Placement
			
industry partners · semester 4 preview	layouts · activities · resources · lifecycle · widgets · UX	proposal · specification · plan · iterations · implementation · report · demo	industry partner · mentor · developer · experience · project
0 Credits	10 Credits	25 Credits	25 Credits

“... students are expected to take a specialisation which reflects their own strengths as demonstrated on the programme to date...”

Calendar, Timetable & Assessment Sequencing


Semester 1		S	M	T	W	T	F	S	Modules
January	Week	6	7	8	9	10	11	12	
	1	13	14	15	16	17	18	19	programming & web dev
	2	20	21	22	23	24	25	26	programming & web dev
	3	27	28	29	30	31	1	2	programming & web dev
February	4	3	4	5	6	7	8	9	programming & web dev
	5	10	11	12	13	14	15	16	programming & web dev
	<i>reading-week</i>	17	18	19	20	21	22	23	
	6	24	25	26	27	28	1	2	programming & web dev
March	7	3	4	5	6	7	8	9	programming & web dev
	8	10	11	12	13	14	15	16	programming & web dev
	<i>reading-week</i>	17	18	19	20	21	22	23	
	9	24	25	26	27	28	29	30	programming & web dev
April	10	31	1	2	3	4	5	6	programming & web dev
	11	7	8	9	10	11	12	13	programming & web dev
	<i>Easter-break</i>	14	15	16	17	18	19	20	
		21	22	23	24	25	26	27	
	12	28	29	30	1	2	3	4	programming & web dev
May	<i>reading-week</i>	5	6	7	8	9	10	11	
	<i>reading-week</i>	12	13	14	15	16	17	18	
	13	19	20	21	22	23	24	25	skills studio 1
	14	26	27	28	29	30	31	1	skills studio 1
June	15	2	3	4	5	6	7	8	skills studio 1
	16	9	10	11	12	13	14	15	skills studio 1 & on site
	17	16	17	18	19	20	21	22	skills studio 1
	18	23	24	25	26	27	28	29	skills studio 1


Programming 



algorithms · data structures · processing · java · classes · libraries

10 Credits

Web Development 



html · css · layout · web apps · web frameworks · deployment


5 Credits


Skills Studio 1 



javascript · node · express · git · github · glitch

2.5 Credits

June Onsite 

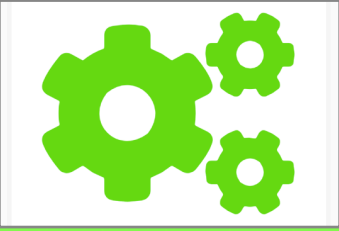
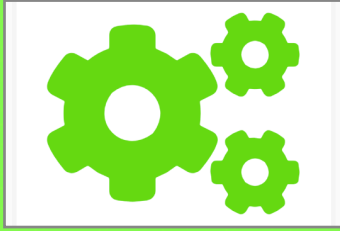



industry partners · semester 4 preview

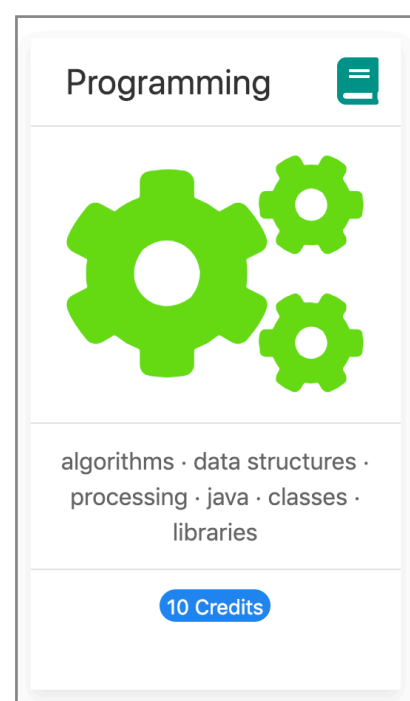
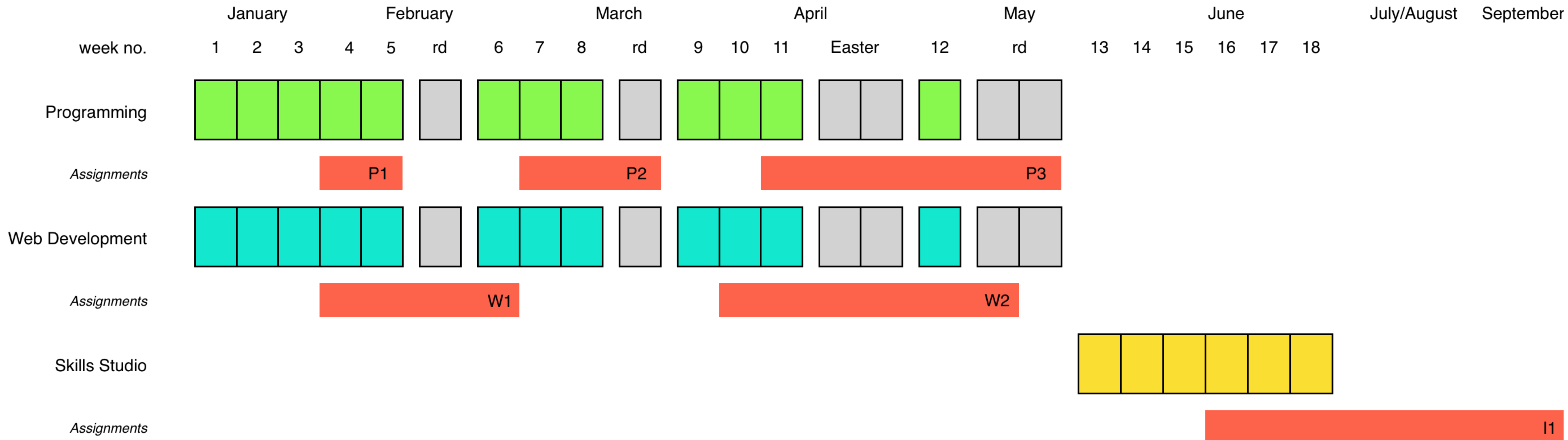
0 Credits

Weekly Webinar Schedule

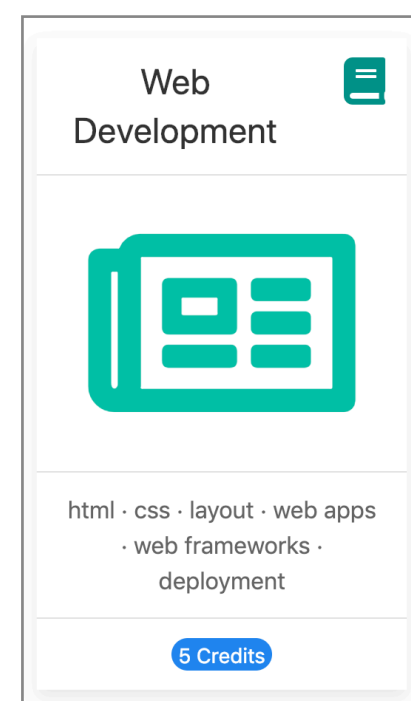
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
10:45						10:45
12:15						12:15
2:00						13:45
15:15						15:15

Time	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
12:15-2:00	<p>Programming Webinar 12:15-2:00</p> 		<p>Programming Webinar 12:15-2:00</p> 	<p>Web Development Webinar 12:15-2:00</p> 	

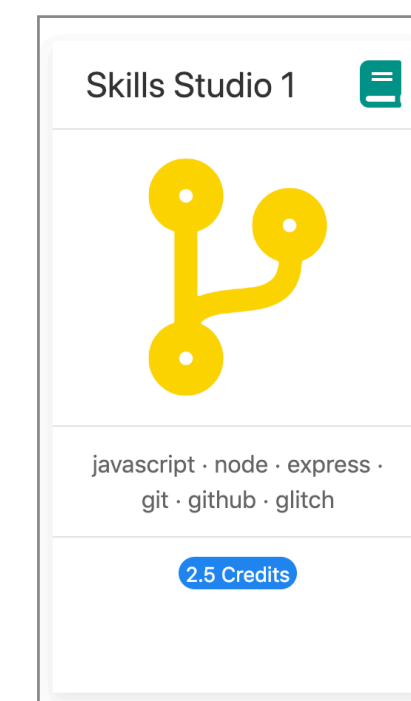
Semester 1 Assessment Schedule



- individual projects
- 3 project for programming

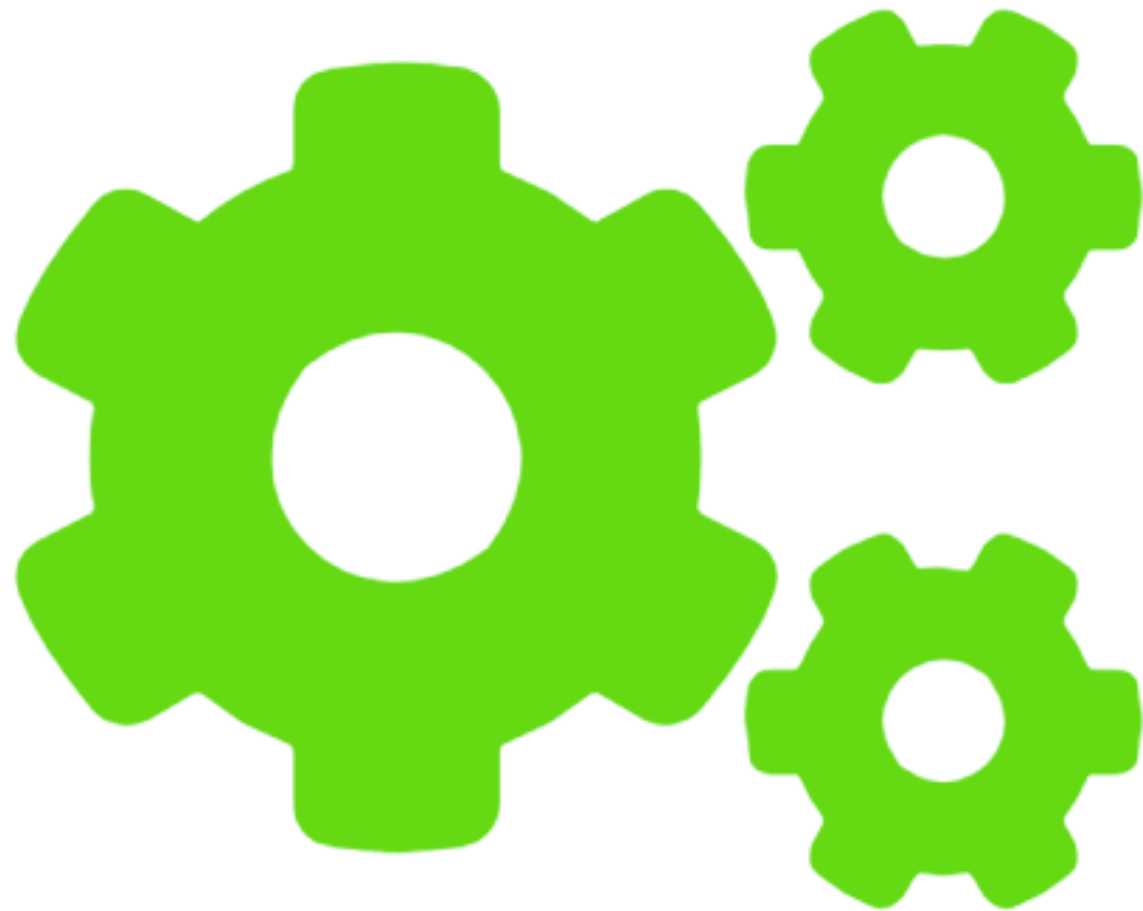


- 2 for web development
- 1 for Skills Studio



Module Summaries

Programming




algorithms · data structures ·
processing · java · classes ·
libraries

10 Credits

- Apply core problem solving approaches suitable to the programming discipline to build algorithms.
- Construct small applications using standard sequence, conditional and iterative control structures. Change and expand small applications.
- Construct small applications that use simple UI, computation and data structures.
- Apply techniques to effectively test, debug and document small applications.
- Defend and explain how the above applications work.
- Apply problem-solving strategies to various computing problems of increasing complexity.
- Plan, code, test and document applications using advanced programming constructs and data structures



Web Development



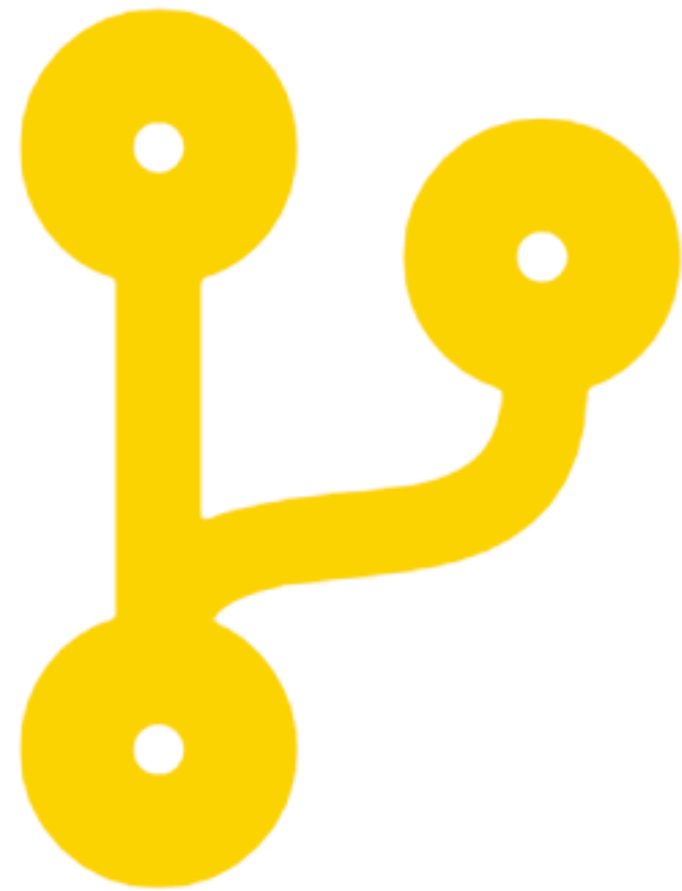
html · css · layout · web apps
· web frameworks ·
deployment

5 Credits

- Understand the fundamentals of the HTML markup language.
- Understand the role of Human Computer Interaction and manipulate CSS to present HTML content.
- Be able to integrate HTML, CSS and Java script to structure simple web sites.
- Understand how a dynamic web page is generated and be familiar with the role of html templating techniques
- Understand the difference between a web site and a web app. Be able to design and implement a simple web app.
- Implement a simple Model View Controller application pattern for a web app.



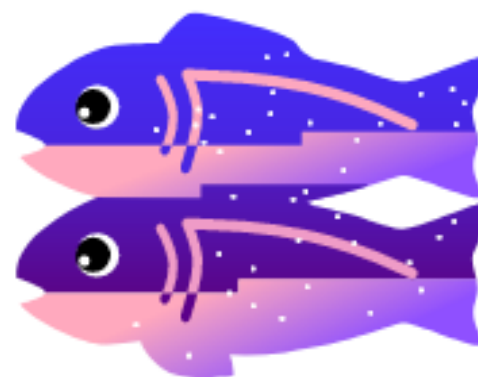
Skills Studio 1



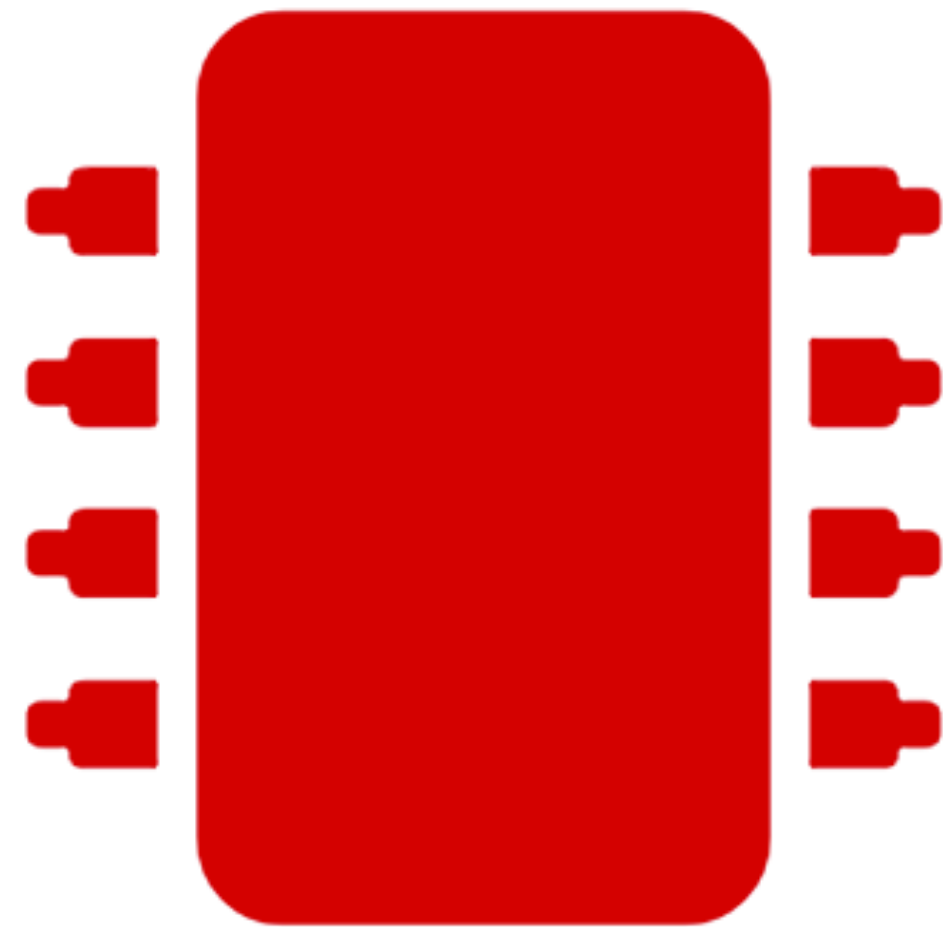
javascript · node · express ·
git · github · glitch

2.5 Credits

- Continue the journey into web application development
- Establish a competence in Javascript programming language
- Explore the basics of the Node.js framework
- Use a simple JSON persistent storage database
- Design, build and deploy a complete web application using these tools
- Understand the role of Agile methods in this context



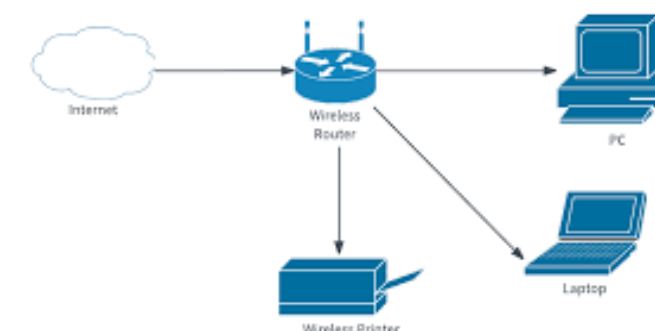
Computer Systems & Networks



logic · computer
organisation · os · networks ·
interfaces · sensors

10 Credits

- Identify and explain the role various hardware components play in a computer system.
- Use an operating system on a chosen computer architecture.
- Demonstrate an ability to configure systems using the command line.
- Describe the memory management, process management and file management components of a modern operating system.
- Explain basic concepts and theory of networked operating systems and virtualisation.
- Configure a contemporary operating system (within a virtual machine environment)
- Demonstrate competency in a limited set of utilities provided by a contemporary operating system.



```
#!/bin/bash
# Sample script for testing
# Author: [Your Name]
# Version: 1.0

# Set environment variables
SCRIPT_PATH=$(dirname $0)
SCRIPT_NAME=$(basename $0)

# Function to print usage
usage() {
    echo "Usage: $SCRIPT_NAME [options]"
    echo "Options:"
    echo "  -h, --help            display this help message"
    echo "  -v, --version         display version information"
    echo "  -o, --output FILE     output file"
    echo "  -d, --debug           enable debug mode"
}

# Parse command line arguments
while [ "$#" -gt 0 ]; do
    case "$1" in
        -h | --help)
            usage
            exit 0
        ;;
        -v | --version)
            echo "Version: 1.0"
            exit 0
        ;;
        -o | --output)
            OUTPUT_FILE="$2"
            shift 2
        ;;
        -d | --debug)
            set -x
        ;;
        *)
            echo "Error: Invalid option '$1'"
            exit 1
        ;;
    esac
done

# Main execution
echo "Starting script execution..."

# Example of a loop
for i in {1..5}; do
    echo "Iteration $i"
done

# Example of a function call
my_function() {
    echo "Function executed"
}

my_function

# End of script
exit 0
```

Databases



entities · tables · rows · sql ·
er · nosql

5 Credits

- Discuss the role of a database and its management system.
- Draw Entity Relationship (ER) diagram from an application problem and reproduce this diagram into a set of normalised relations, which are ready for database implementation.
- Design a NoSQL database suitable for a distributed environment with consideration of the CAP theorem.
- Gain an understanding of the physical database design process, its objectives and deliverables.
- Design and implement a database system

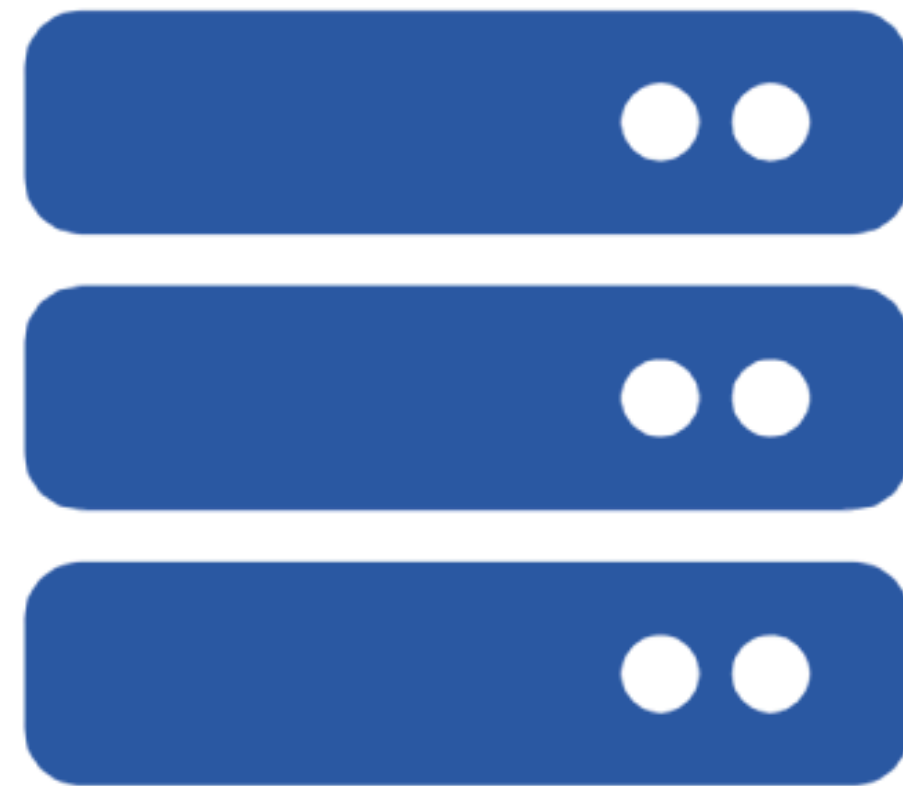
MySQL™



ORACLE®

 mongoDB®

Enterprise Web Development



html · css · layout · web apps
· web frameworks ·
deployment

10 Credits

- Examine the key components of a server rendered web application and incorporate them into a running application.
- Use Model View Controller & related patterns in the implementation of a web project.
- Relate the request/response lifecycle, routing & session management in the context of a modern application framework.
- Model the user requirements and realize the model in a simple database.
- Apply best practice principles and patterns to the design and documentation of a web API.
- Apply best practice principles and patterns to the design of a medium-sized Single Page Web App.
- Develop an end-to-end web app that supports session management and persistence for a constrained functional requirement set.
- Demonstrate specific security problems that can arise with web applications and how to address them.
- Compare and contrast alternative approaches to authentication in both enterprise and consumer-oriented



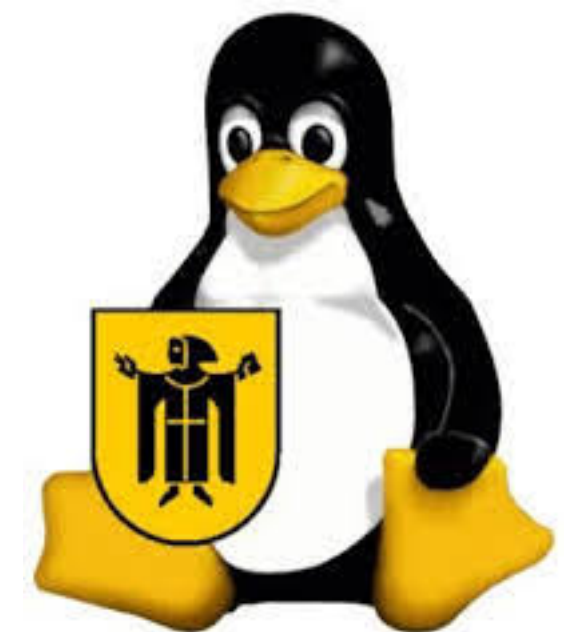
Developer Operations



mvc · node · security · apis ·
tdd · frameworks

5 Credits

- Build, configure and manage essential network infrastructure services.
- Build, configure and manage essential application services.
- Deploy a network monitoring solution.
- Develop scripts to assist in the management and automation of modern network services.
- Configure appropriate security mechanisms, including firewall rules, encrypted services, and authentication.



Mobile App Development



layouts · activities ·
resources · lifecycle · widgits
· ux

10 Credits

- Decompose an application into its constituent parts, including but not limited to: core application components, user experience resources, packaging.
- Design a coherent User Experience - using appropriate tools, practices and guidelines - for a moderately sized application. Produce a medium sized application, based on a limited set of design patterns.
- Manage the application lifecycle. Structure persistent storage on a device and reliably save and restore application state.
- Select the appropriate design patterns and tools in the development of complex mobile apps.
- Comment on the chosen mobile app framework and the underlying hardware components.
- Design and develop complex multi-screen mobile apps from concept through to completion using best practices and guidelines.
- Set up the interaction of an application with internal sensors and physical subsystems.
- Integrate a remote service API within an application, perhaps based on REST principles, to deliver aspects of its core features set.



Firebase



Opportunities for Further Study

- The development team are closely involved in the delivery of two potential follow-on graduate programmes:
 - MSc in Communications Software
 - MSc in Enterprise Software Systems
- These are mature courses, closely aligned with research at TSSG, with substantial enrolments in part-time mode from industry practitioners in the region.
- Successful candidates could continue their academic development in part-time or full-time capacity.

