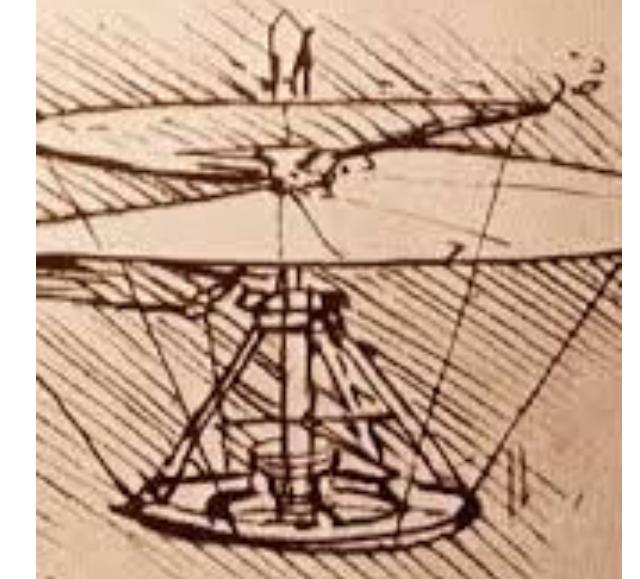




Waterford Institute of Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE



Higher Diploma in Science in Computer Science

2019 - 2020



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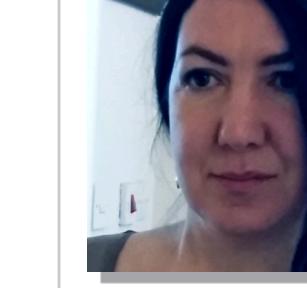
Developer Operations



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Enterprise Web Development



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Computer Systems & Networks



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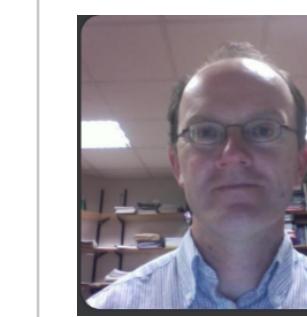
Web Development
Skills Studio 1
Enterprise Web Development
Mobile Application Development



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Programming



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Skills Studio 2



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Programme Coordinator
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Agenda for Induction Day

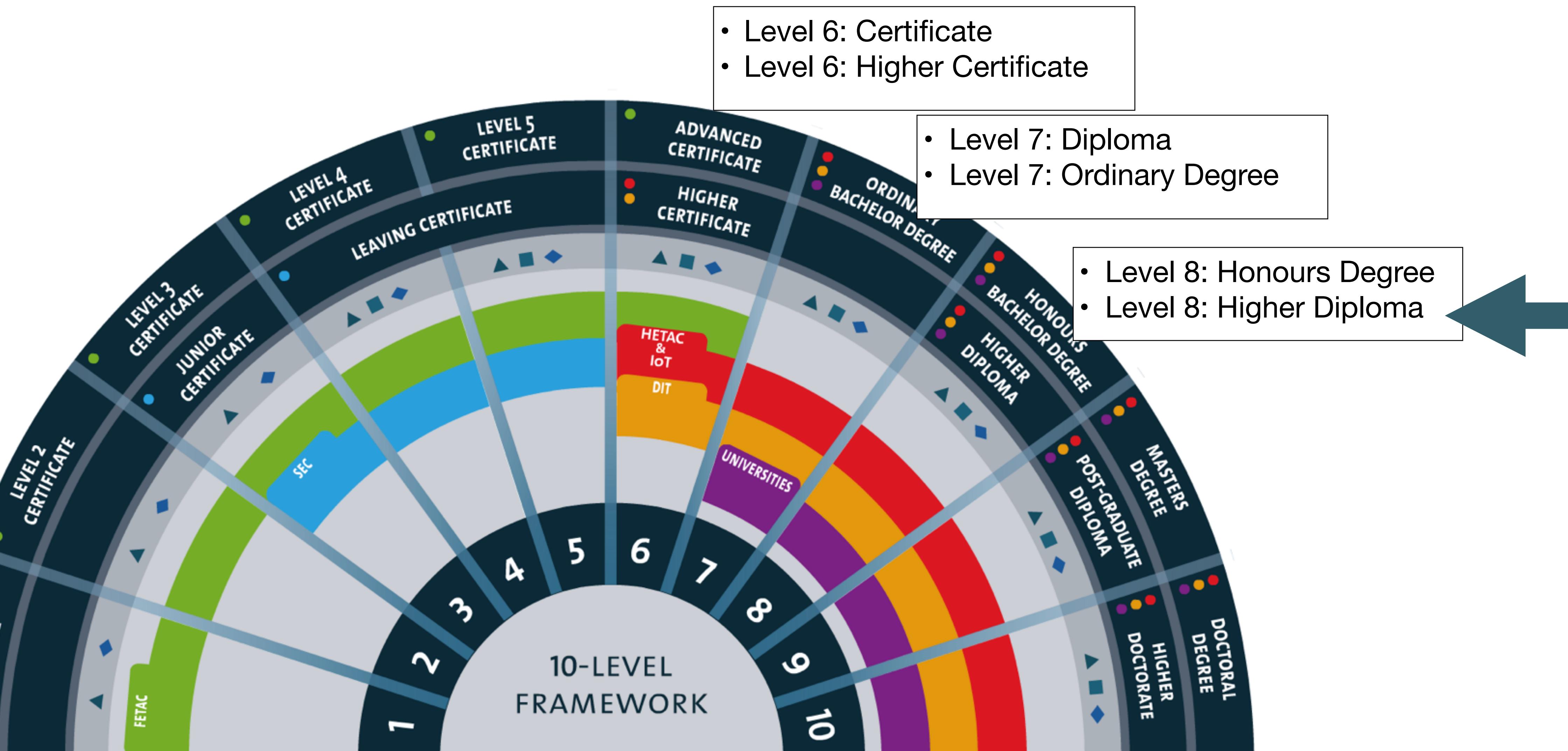
10:00		<p><i>Flexible Teaching Building: Room: FTG23</i></p> <p>Programme Overview Programme Structure & Assessment Online resources and modes of delivery</p> <p>Eamonn de Leastar, Colm Dunphy, Joan Mangan</p>	12:30	<p>Gallery Lunch</p>	13:30	<p><i>Walton Building Room: IT101</i></p> <p>Web Development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

*‘ICT and Software Development Skills Programme’ HEA Call for Proposals / Terms & Conditions, November 2012

Semesters & Modules

Semesters

Semester 1:
Jan-June 2019



timetables · semester
calendars · assessment
schedules

Semester 2:
Sep-Dec 2019



timetables · semester
calendars · assessment
schedules

Semester 3:
Jan-Jun 2020



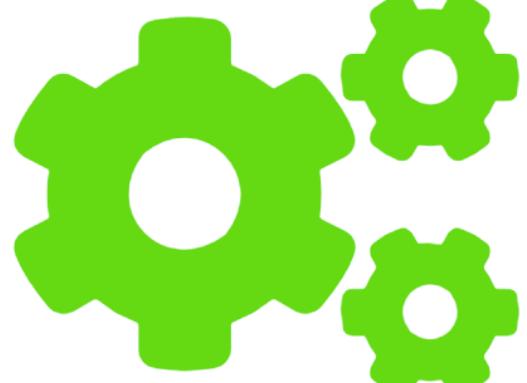
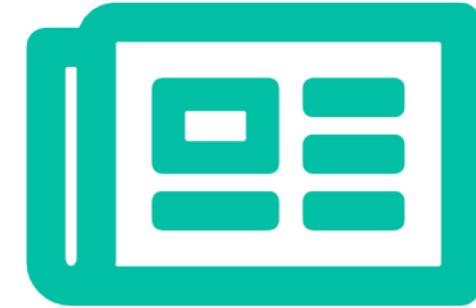
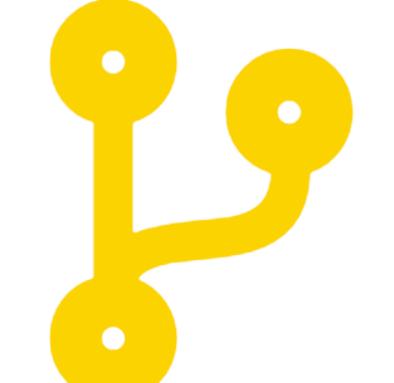
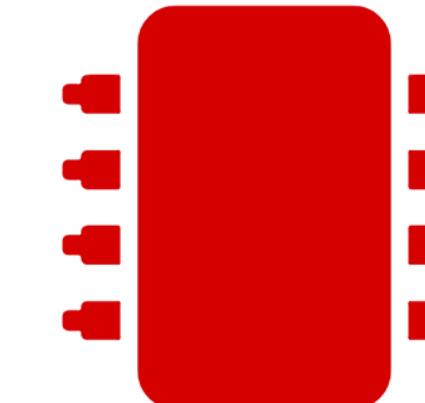
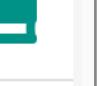
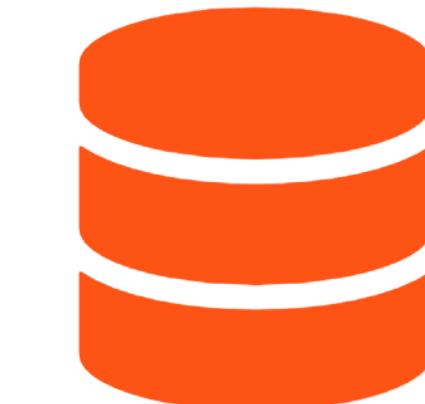
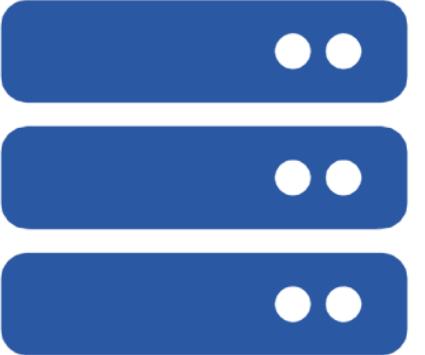
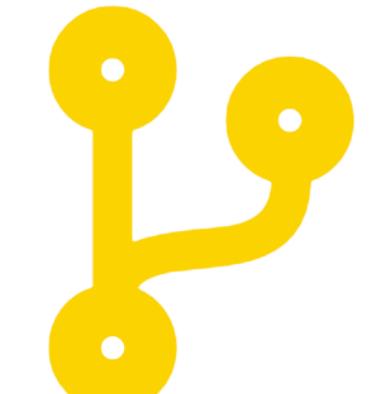
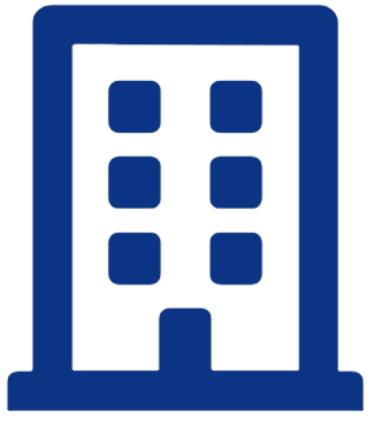
timetables · semester
calendars · assessment
schedules

Semester 4:
Sep-Dec 2020

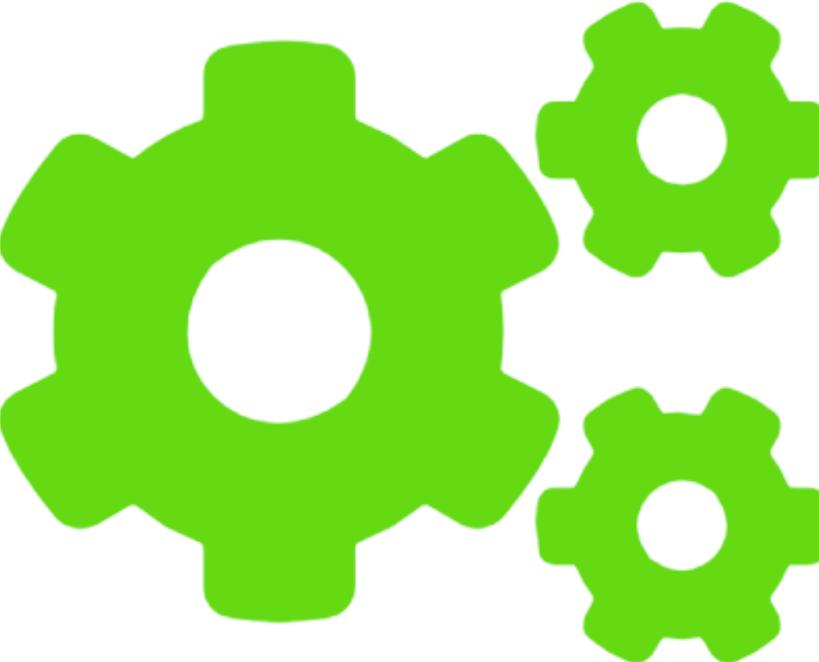


timetables · semester
calendars · assessment
schedules

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 



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

10 Credits

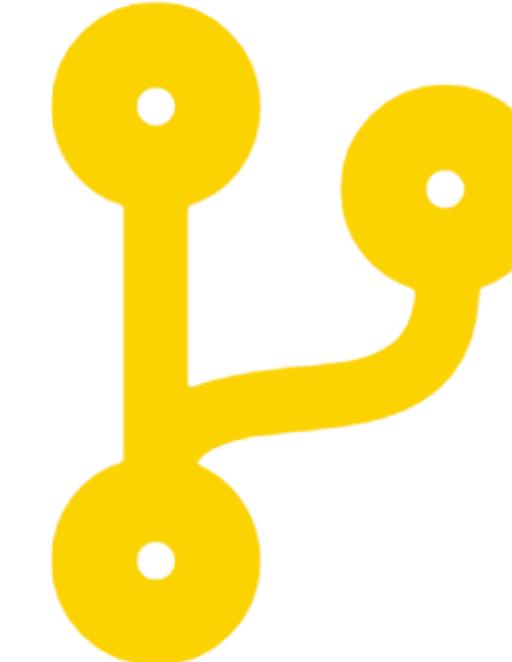
Web Development 



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

5 Credits

Skills Studio 1 



javascript · node · express ·
git · github · glitch

2.5 Credits

*“..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..”***

Semester 2: June-December 2019

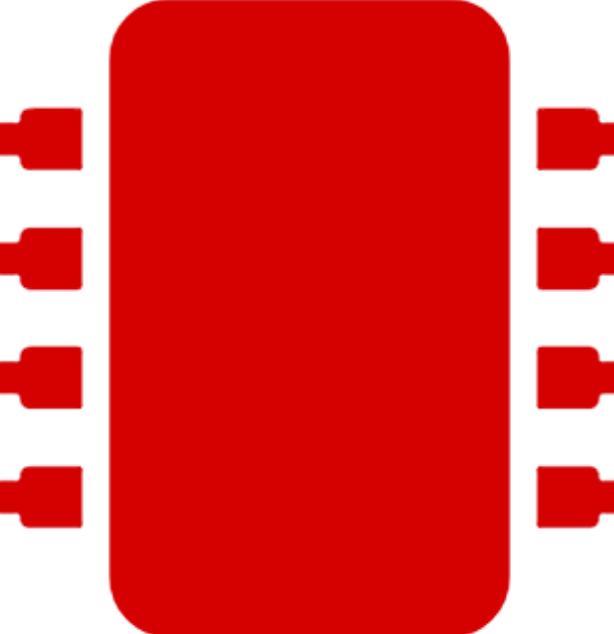
June Onsite 



industry partners · git
workshop · semester 2
previews

0 Credits

Computer
Systems &
Networks 



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

10 Credits

Databases 



entities · tables · rows · sql ·
er · nosql

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..”*

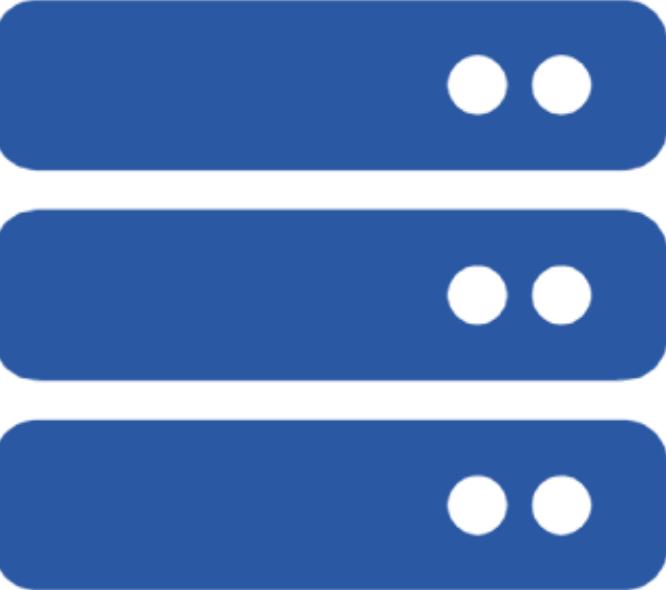
January
Onsite



industry partners · agile
workshop · semester 3
previews

0 Credits

Enterprise
Web
Development



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

10 Credits

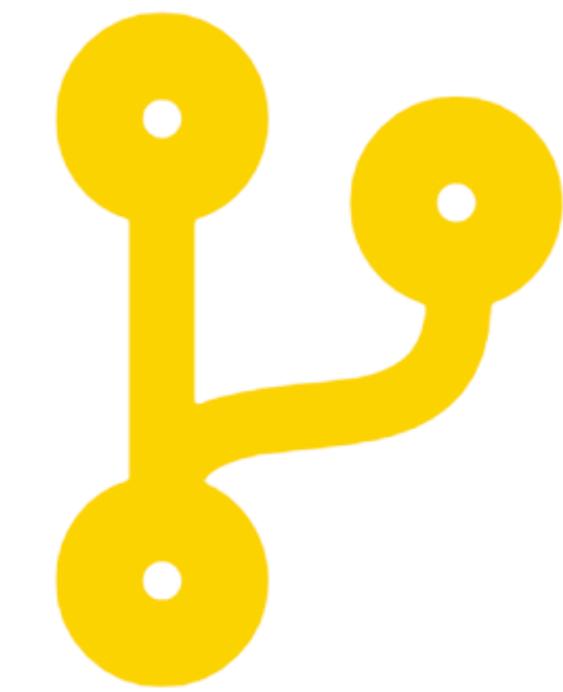
Developer
Operations



mvc · node · security · apis ·
tdd · frameworks

5 Credits

Skills Studio 2



javascript · client-side · react
· apis · routing · testing

2.5 Credits

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

Semester 4: June-December 2020

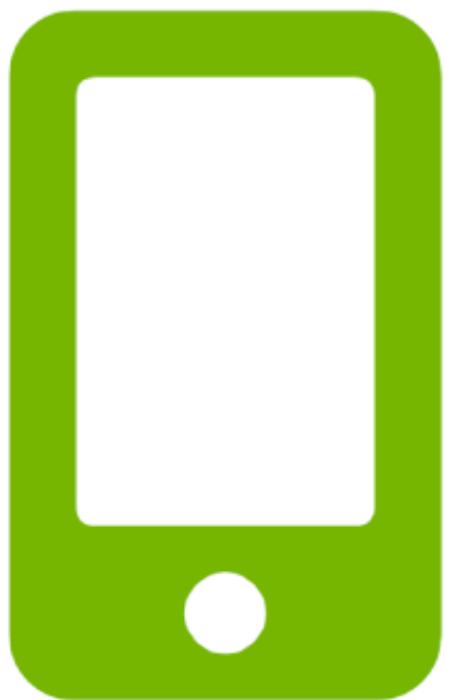
June Onsite



industry partners · semester
4 preview

0 Credits

Mobile App Development



layouts · activities ·
resources · lifecycle · widgets
· ux

10 Credits

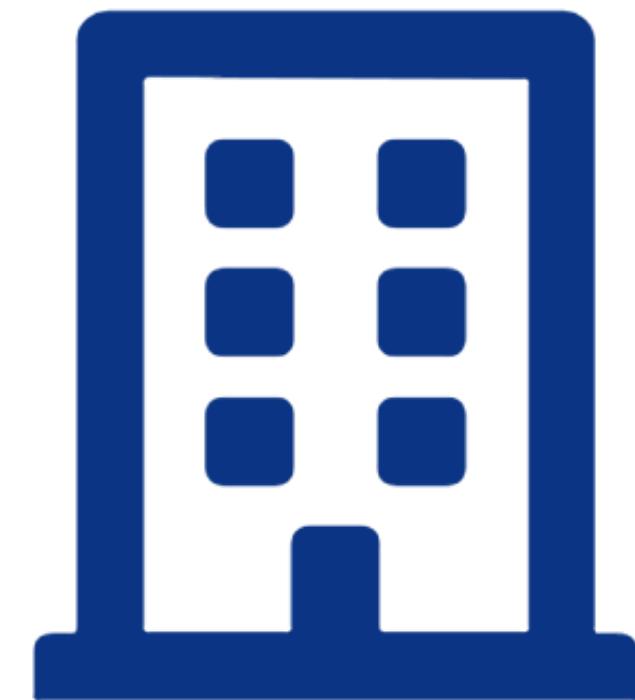
Project



proposal · specification ·
plan · iterations ·
implementation · report ·
demo

25 Credits

Work Placement



industry partner · mentor ·
developer · experience ·
project

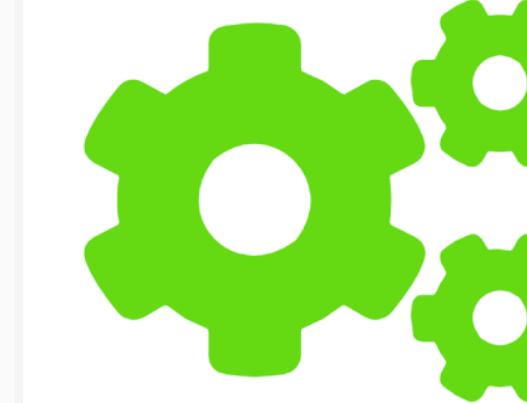
25 Credits

“... 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
	reading-week	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
	reading-week	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
	Easter-break	14	15	16	17	18	19	20	
	Easter-break	21	22	23	24	25	26	27	
	12	28	29	30	1	2	3	4	programming & web dev
May	reading-week	5	6	7	8	9	10	11	
	reading-week	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

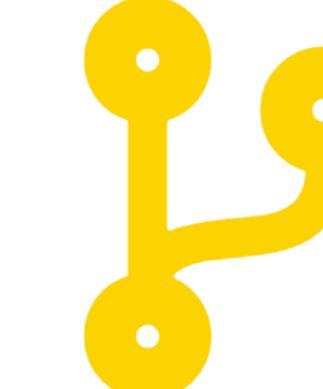
Web Development 



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

5 Credits

Skills Studio 1 



javascript · node · express · git · github · glitch

2.5 Credits

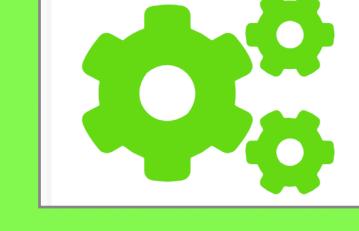
June Onsite 



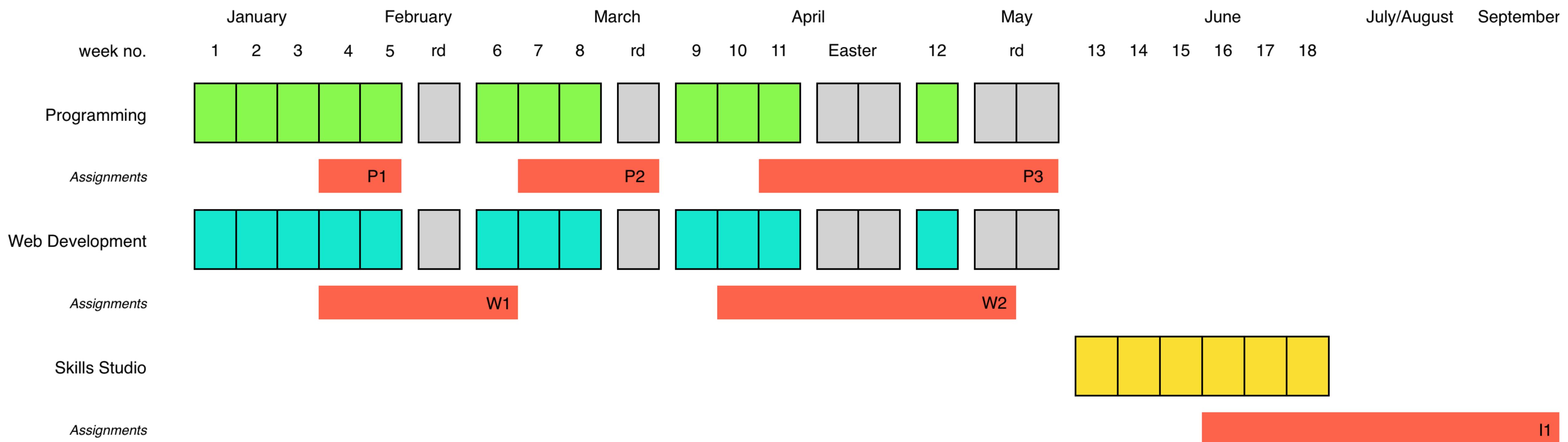
industry partners · semester 4 preview

0 Credits

Weekly Webinar Schedule

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
10:45				10:45
12:15 Programming <i>Webinar</i> 12:15-2:00 	12:15 Programming <i>Webinar</i> 12:15-2:00 	12:15 Web Development <i>Webinar</i> 12:15-2:00 		12:15
2:00				13:45
15:15				15:15

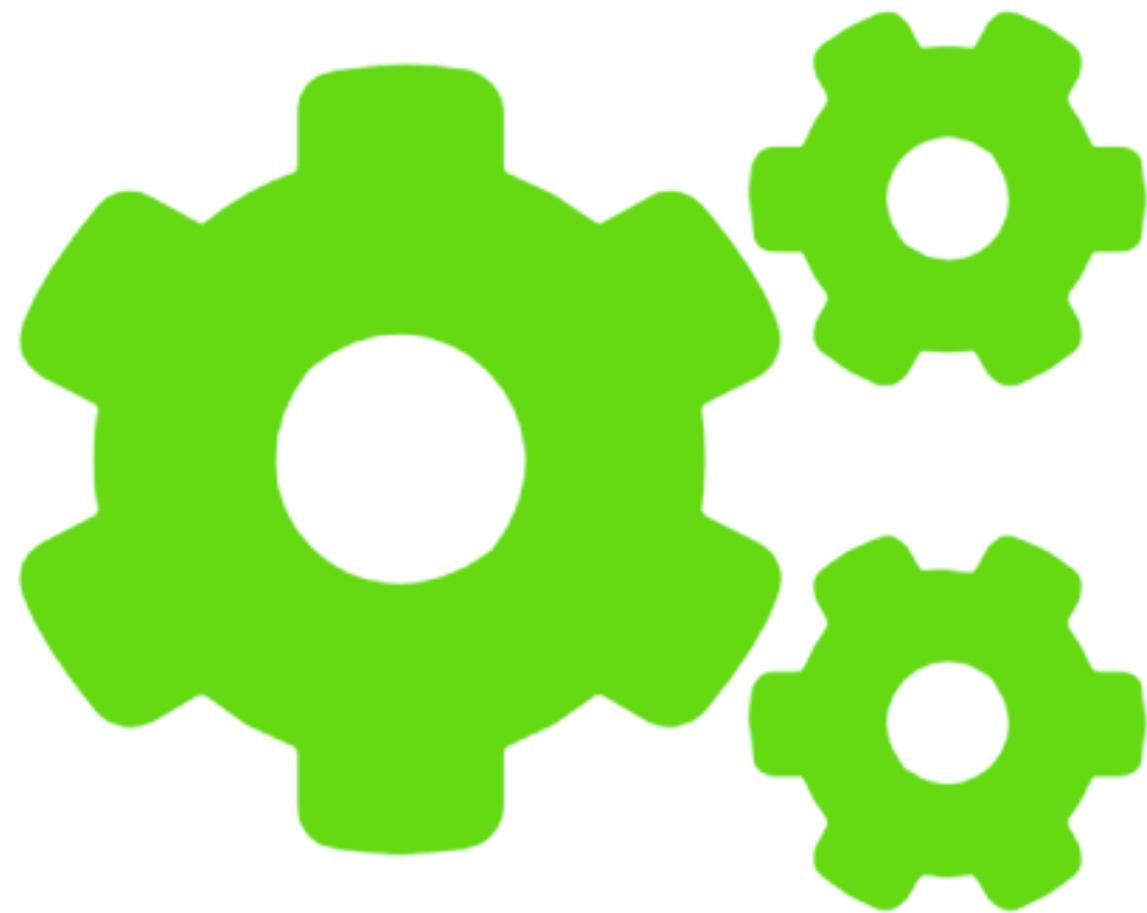
Semester 1 Assessment Schedule



- individual projects
- 2 for web development
- 3 project for programming
- 1 for Skills Studio

Module Summaries

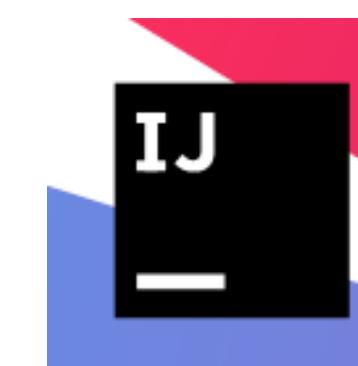
Programming



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

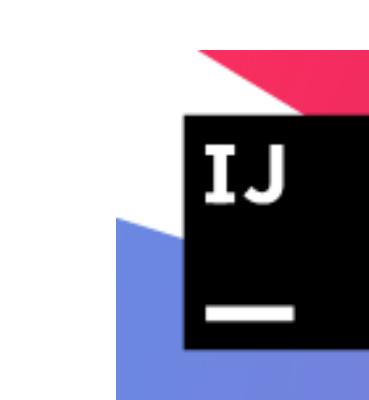


html · css · layout · web apps

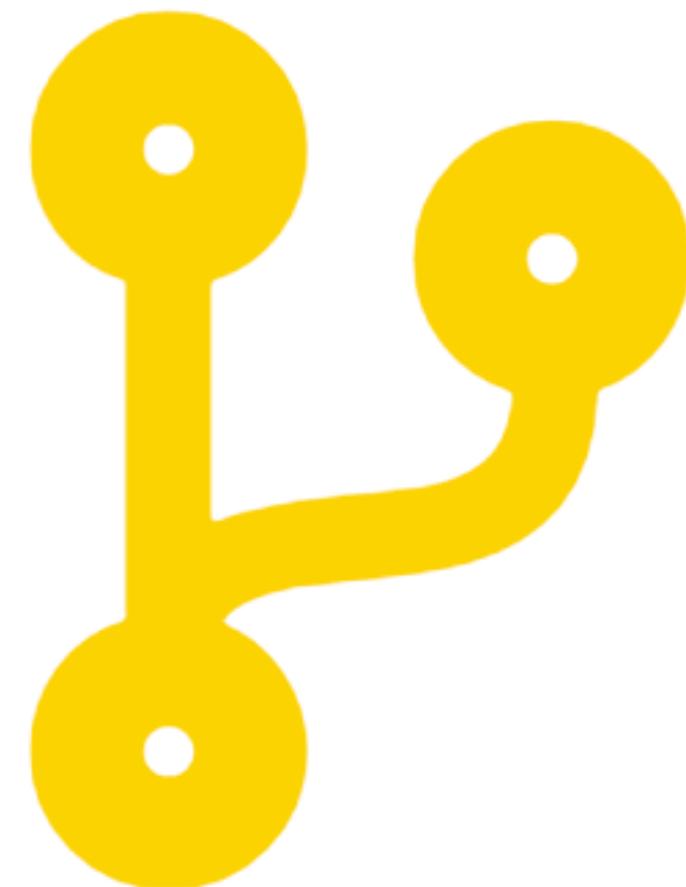
· web frameworks ·
deployment

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



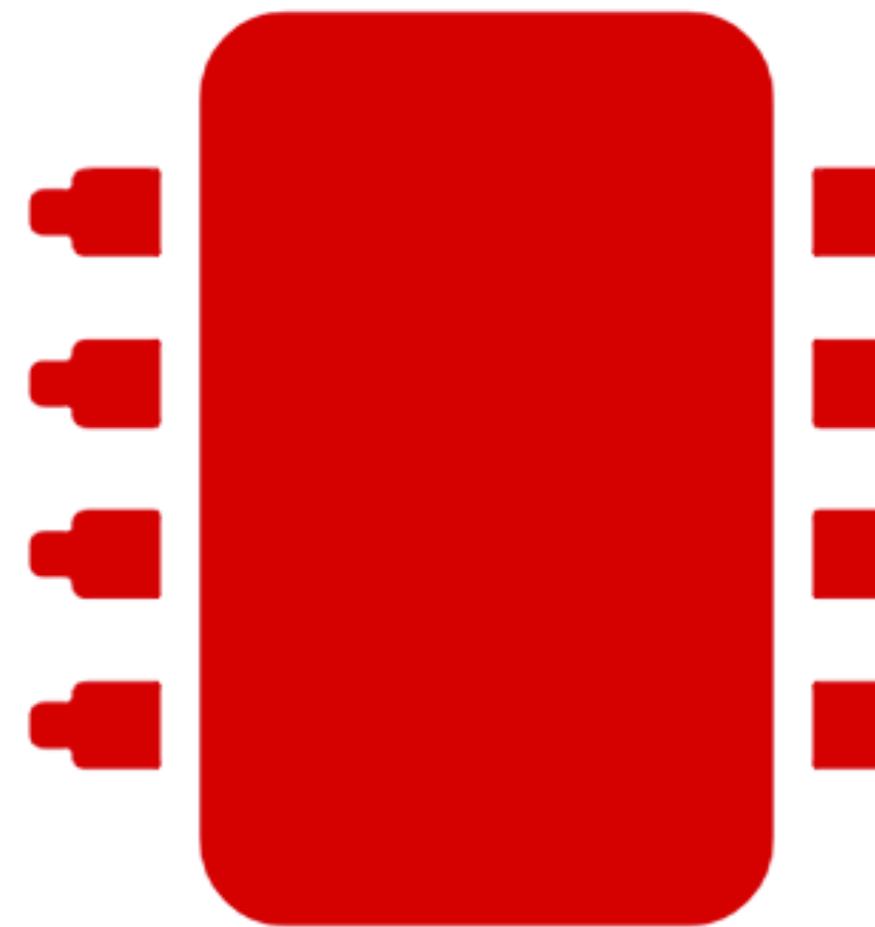
javascript · node · express ·
git · github · glitch

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



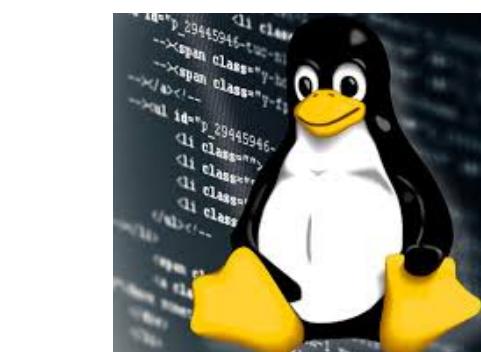
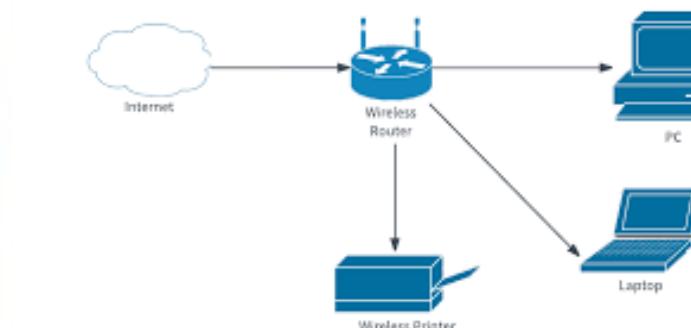
Computer Systems & Networks



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.



```

1  #!/bin/bash
2  #INPUT_SAMPLE_LIST(s)
3  cd /Volumes/PhD10Drive_095/TestDec7/lim_postprocess/
4  ;;
5  ;;
6  . paths.txt
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21 echo "Debug level set for $DEBUG_LEVEL"
22 echo "log found in scripts directory"
23 ;;
24 ;;
25 cp $HIGH_SNP_OUT ./ 
26 cp $LOW_SNP_OUT ./ 
27 cp $BAM_FILE ./ 
28 cp $SCRIPT_DIR/run_somatic_mutation_analysis.sh $1 no_false.snp
29 if [ $DEBUG_LEVEL -gt 0 ]
30 then
31   echo "INFO: $(SCRIPT_DIR)run_somatic_mutation_analysis.sh $SAMPLE no_false.snp
32   basename $(LOW_SNP_OUT) basename $(HIGH_SNP_OUT) basename $(BAM_FILE)
33   $BAM_FILE)">$(LOG)
34 fi
35
36 $SCRIPT_DIR/run_somatic_mutation_analysis.sh
37
38 echo "End of somatic mutation analysis" >> $LOG

```

Databases



entities · tables · rows · sql ·
er · nosql

5 Credits

MySQL™

- 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



ORACLE®

 mongoDB®

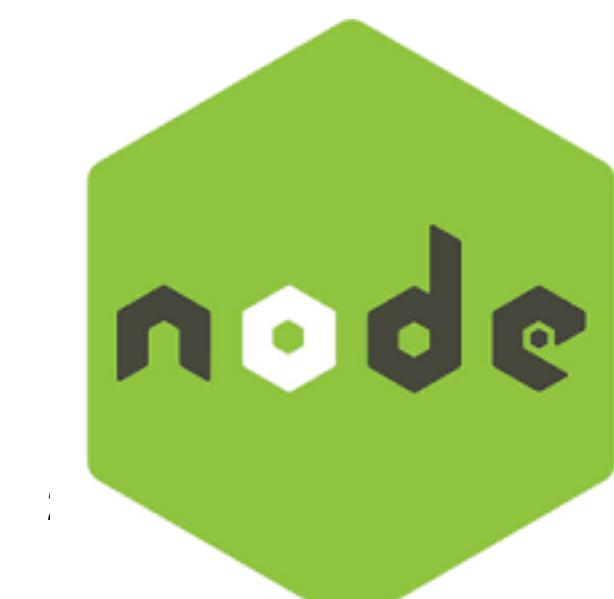
Enterprise Web Development



- 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

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

10 Credits



Developer Operations



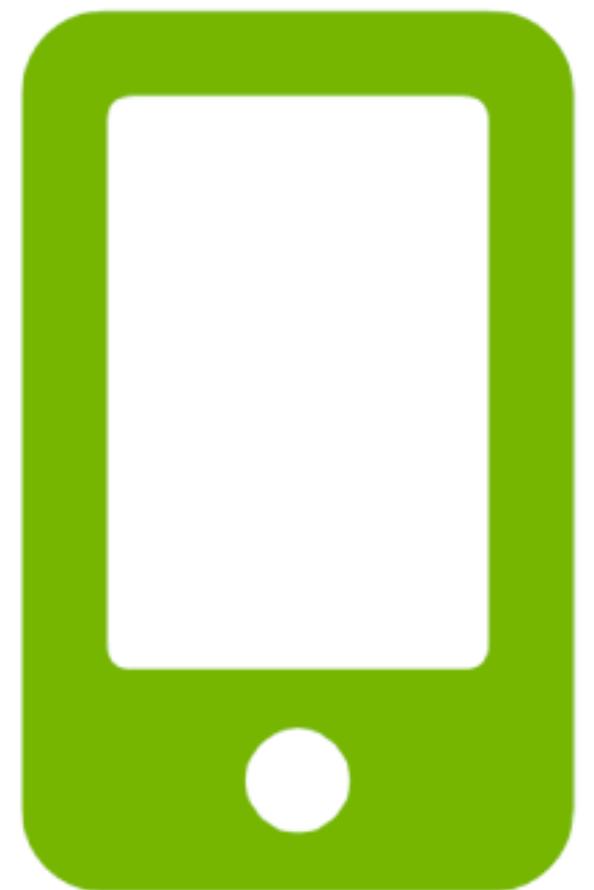
mvc · node · security · apis ·
tdd · frameworks

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 · widgets
· 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.



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.

