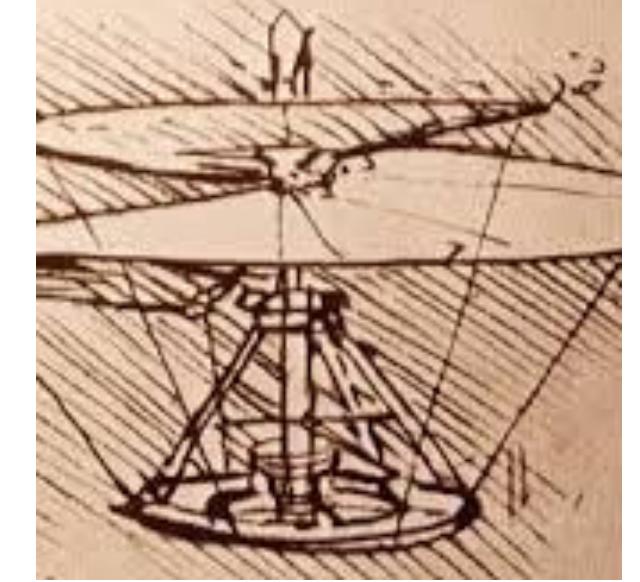




Waterford Institute of Technology  
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE



# Higher Diploma in Science in Computer Science

---

2019 - 2020



**Birney, Rosanne**  
Lecturer  
Tel:+353 0 51302647  
Email: RBIRNEY@wit.ie

[View Profile](#)

Database



**Frisby, Richard**  
Lecturer in Computing  
Tel:+353 0 51302066  
Email: RFRISBY@wit.ie

[View Profile](#)

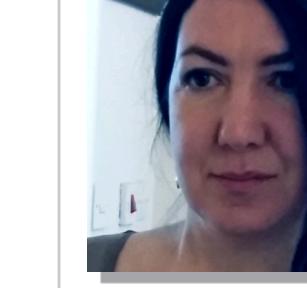
Developer Operations



**Lyng, Mary**  
Lecturer  
Tel:+353 0 51302057  
Email: MLYNG@wit.ie

[View Profile](#)

Database



**Stack, Annetta**  
Lecturer in Multimedia  
Tel:+353 0 51302741  
Email: ASTACK@wit.ie

[View Profile](#)

Web Development



**Cahill, Caroline**  
Lecturer in Computing  
Tel:+353 0 51845529  
Email: CCAHILL@wit.ie

[View Profile](#)

Computer Systems & Networks



**Drohan, David**  
Tel:+353 0 51302683  
Email: DDROHAN@wit.ie

[View Profile](#)

Mobile Application Development



**McGibney, Jimmy**  
Lecturer  
Tel:+353 0 51302070  
Email: JMCGIBNEY@wit.ie

[View Profile](#)

Developer Operations  
Enterprise Web Development



**Walsh, Frank**  
Lecturer in Computing  
Tel:+353 0 51302089  
Email: FXWALSH@wit.ie

[View Profile](#)

Computer Systems & Networks



**de Leastar, Eamonn**  
Lecturer  
Tel:+353 0 51302965  
Email: EDELEASTAR@wit.ie

[View Profile](#)

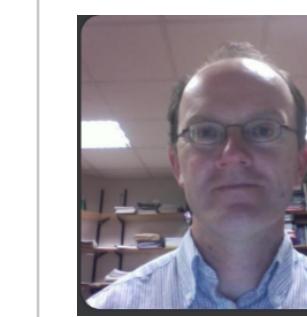
Web Development  
Skills Studio 1  
Enterprise Web Development  
Mobile Application Development



**Dunphy, Colm**  
Lecturer  
Tel:+353 0 51302059  
Email: CDUNPHY@wit.ie

[View Profile](#)

Programming



**O'Connor ,  
Diarmuid**  
Lecturer  
Tel:+353 0 51-302760  
Email: Doconnor@wit.ie

[View Profile](#)

Skills Studio 2



**Mangan, Joan**  
Programme Coordinator  
Email: jmangan@wit.ie

# Agenda for Induction Day

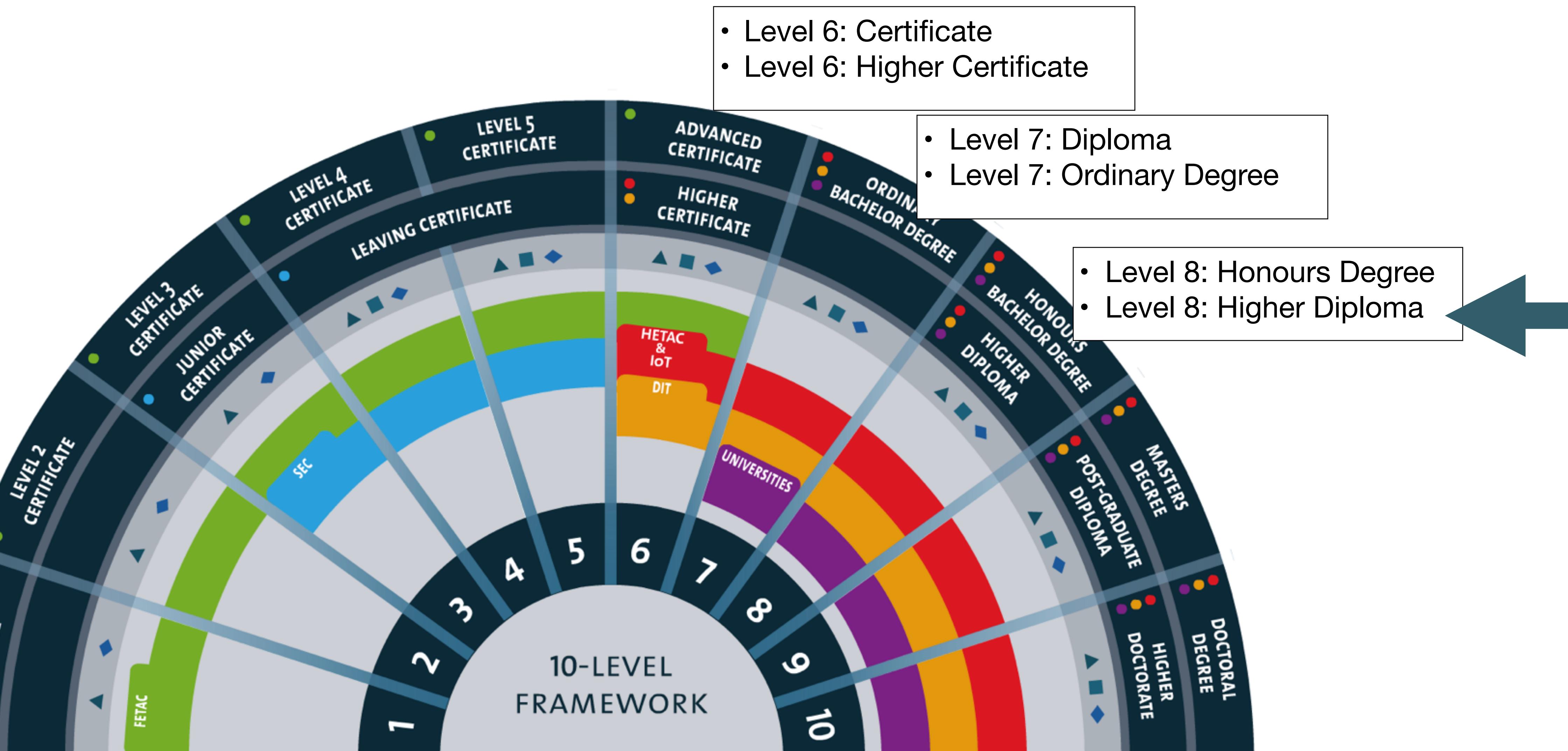
10:00		<p><i>Flexible Teaching Building: Room: FTG23</i></p> <p>Programme Overview Programme Structure &amp; Assessment Online resources and modes of delivery</p> <p>Eamonn de Leastar, Com Dunphy, Joan Mangan</p>	12:30	<p><i>Gallery</i> Lunch</p>	13:30	<p><i>Walton Building Room: IT101</i></p> <p>Web 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><i>Coffee Break</i></p>			15:00	<p><i>Coffee Break</i></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 Mary Lyng</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



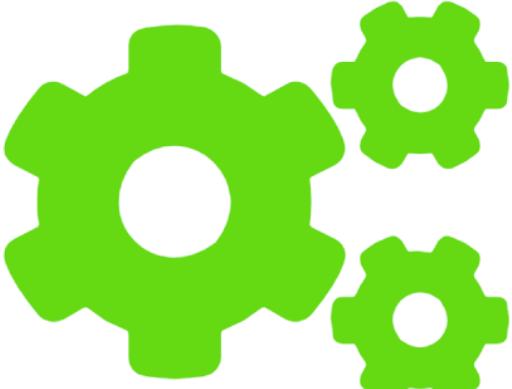
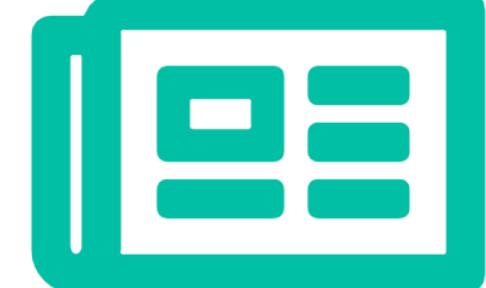
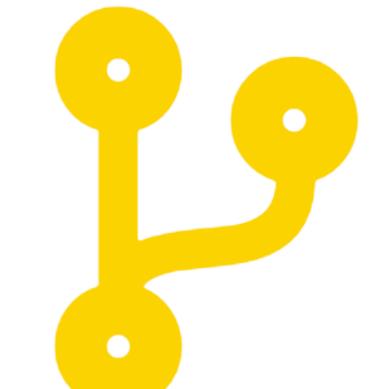
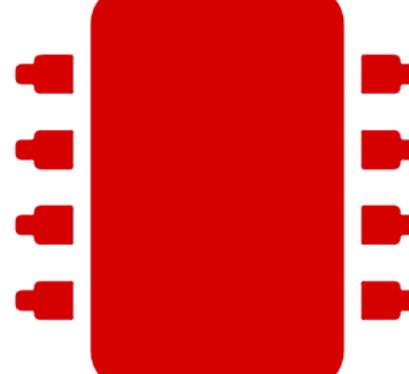
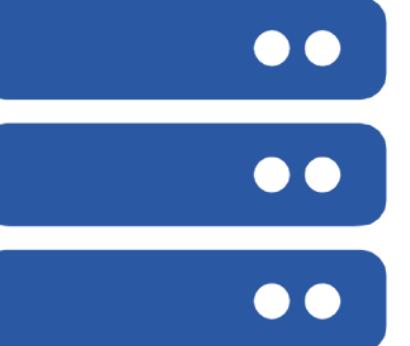
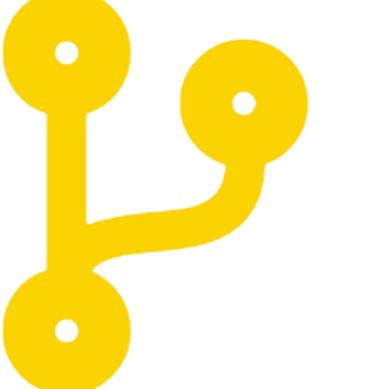
timetables · semester  
calendars · assessment  
schedules

Semester 4:  
Sep-Dec 2020

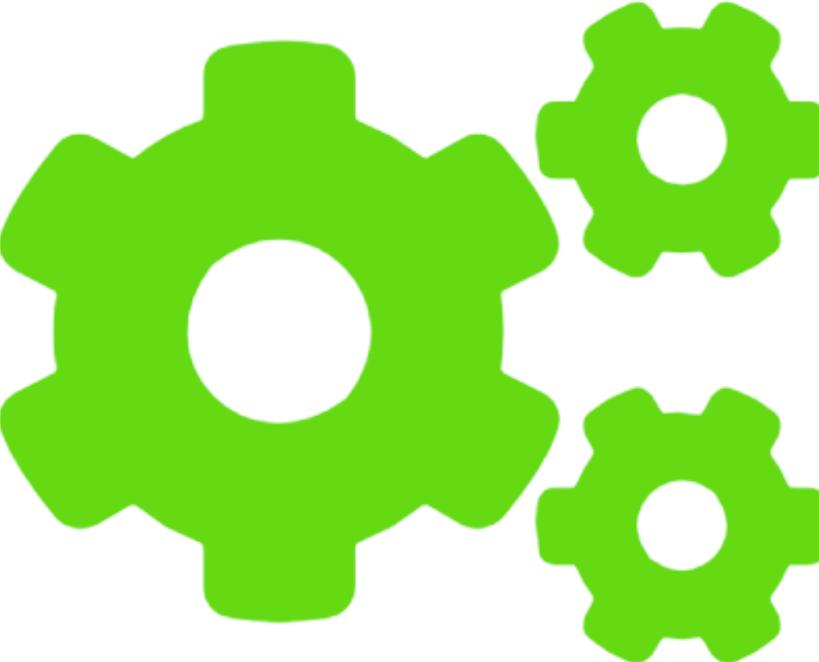


timetables · semester  
calendars · assessment  
schedules

# 9 Modules, 3 On Sites + Project/Placement

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

Programming 



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

10 Credits

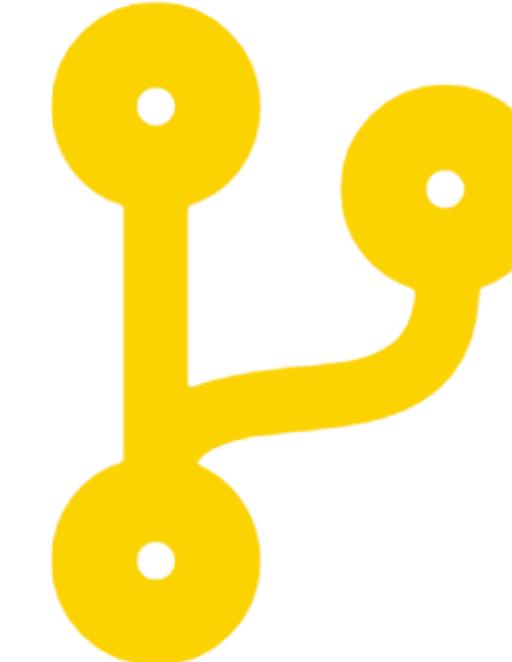
Web Development 



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

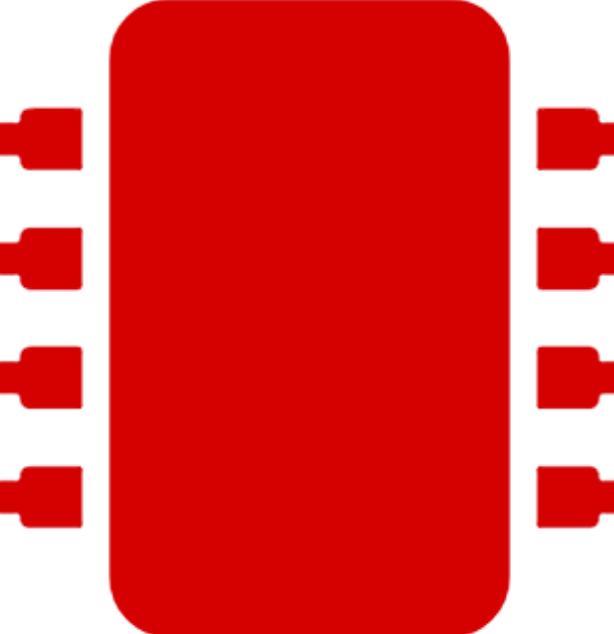
June Onsite 



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..”*

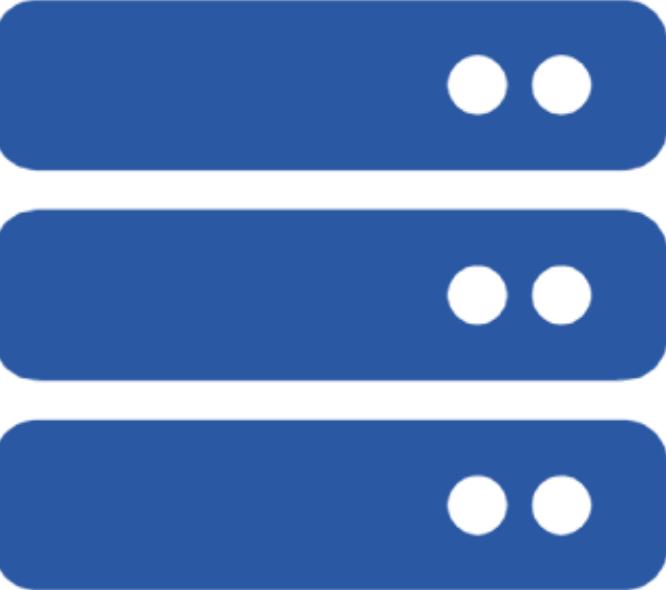
January  
Onsite



industry partners · agile  
workshop · semester 3  
previews

0 Credits

Enterprise  
Web  
Development



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

10 Credits

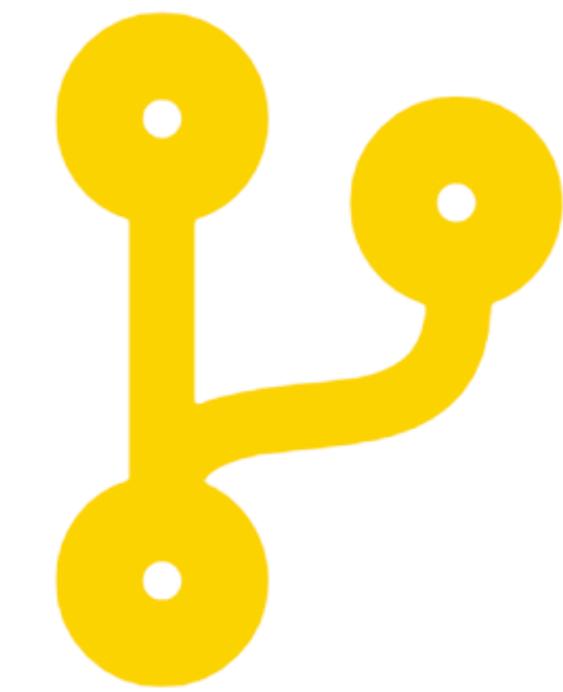
Developer  
Operations



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

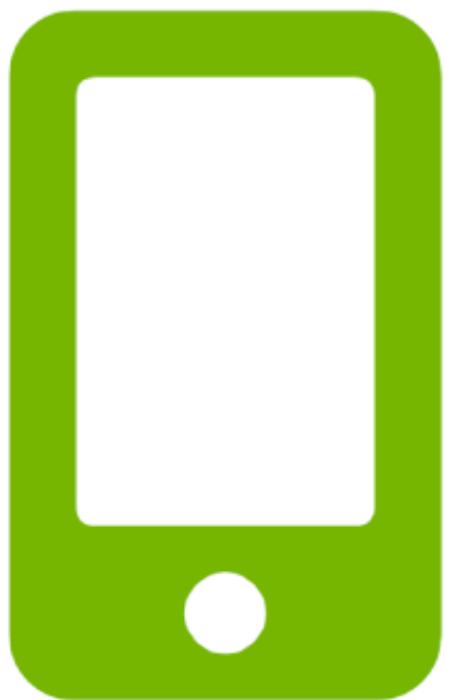
### June Onsite



industry partners · semester  
4 preview

0 Credits

### Mobile App Development



layouts · activities ·  
resources · lifecycle · widgets  
· ux

10 Credits

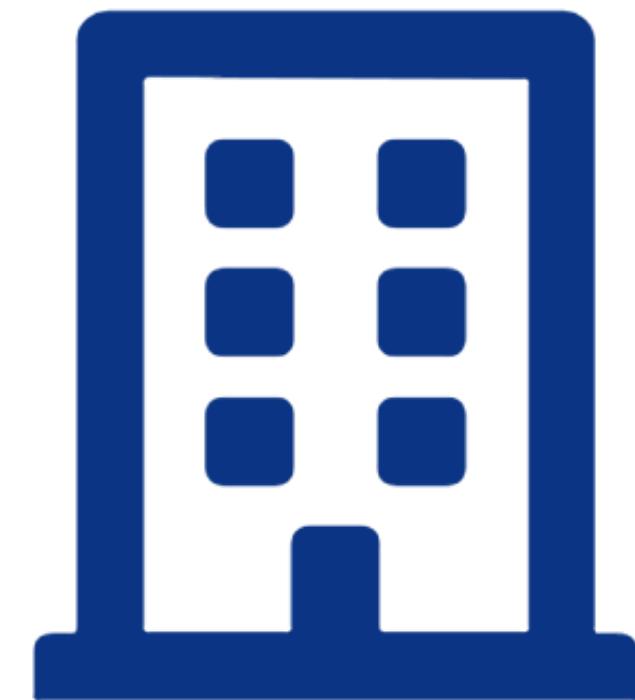
### Project



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

25 Credits

### Work Placement



industry partner · mentor ·  
developer · experience ·  
project

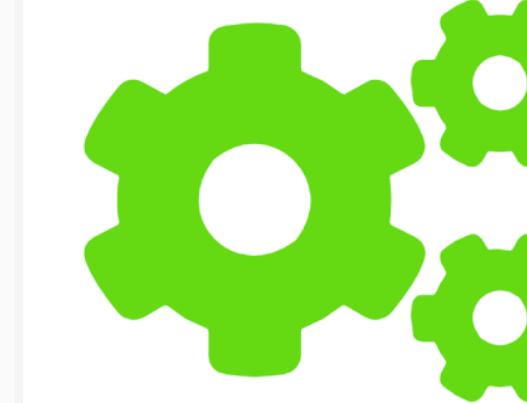
25 Credits

*“... 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

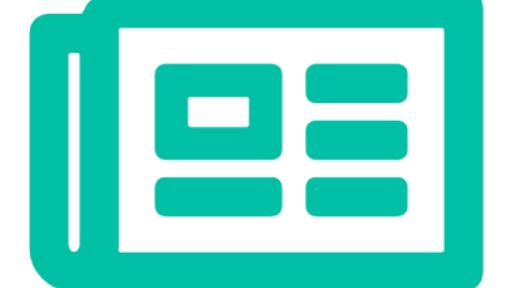
Programming 



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

10 Credits

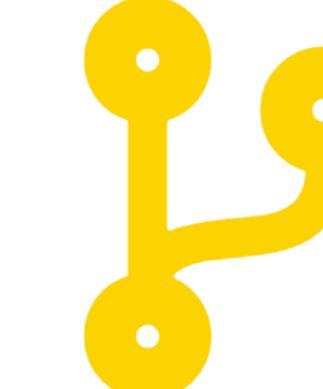
Web Development 



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

5 Credits

Skills Studio 1 



javascript · node · express · git · github · glitch

2.5 Credits

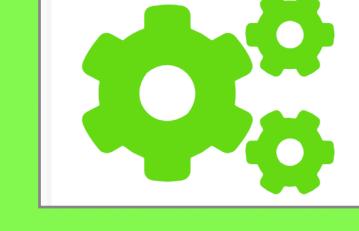
June Onsite 



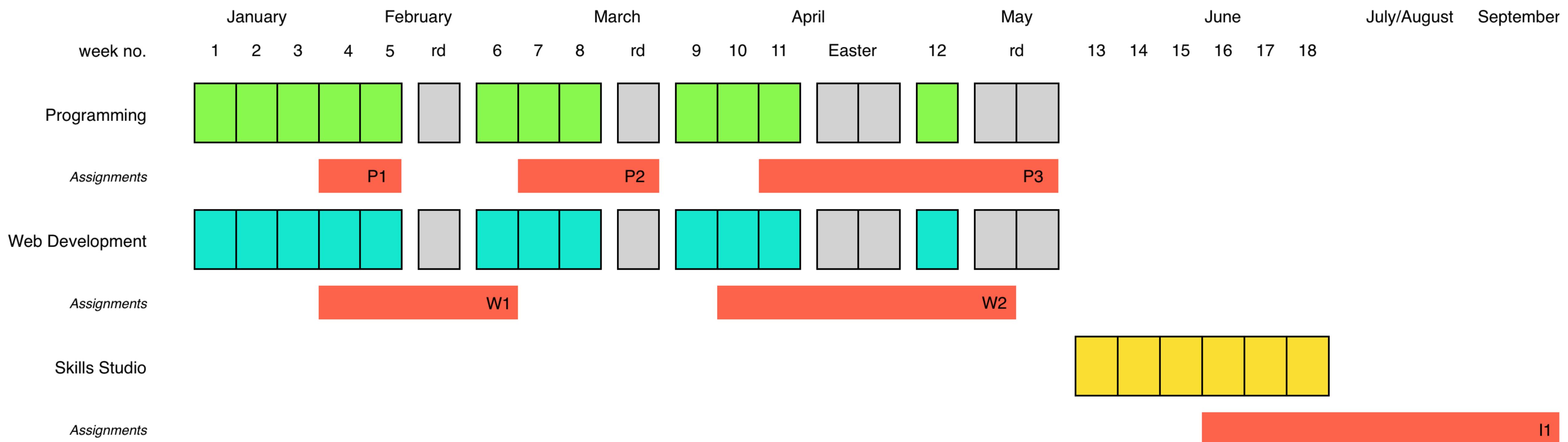
industry partners · semester 4 preview

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

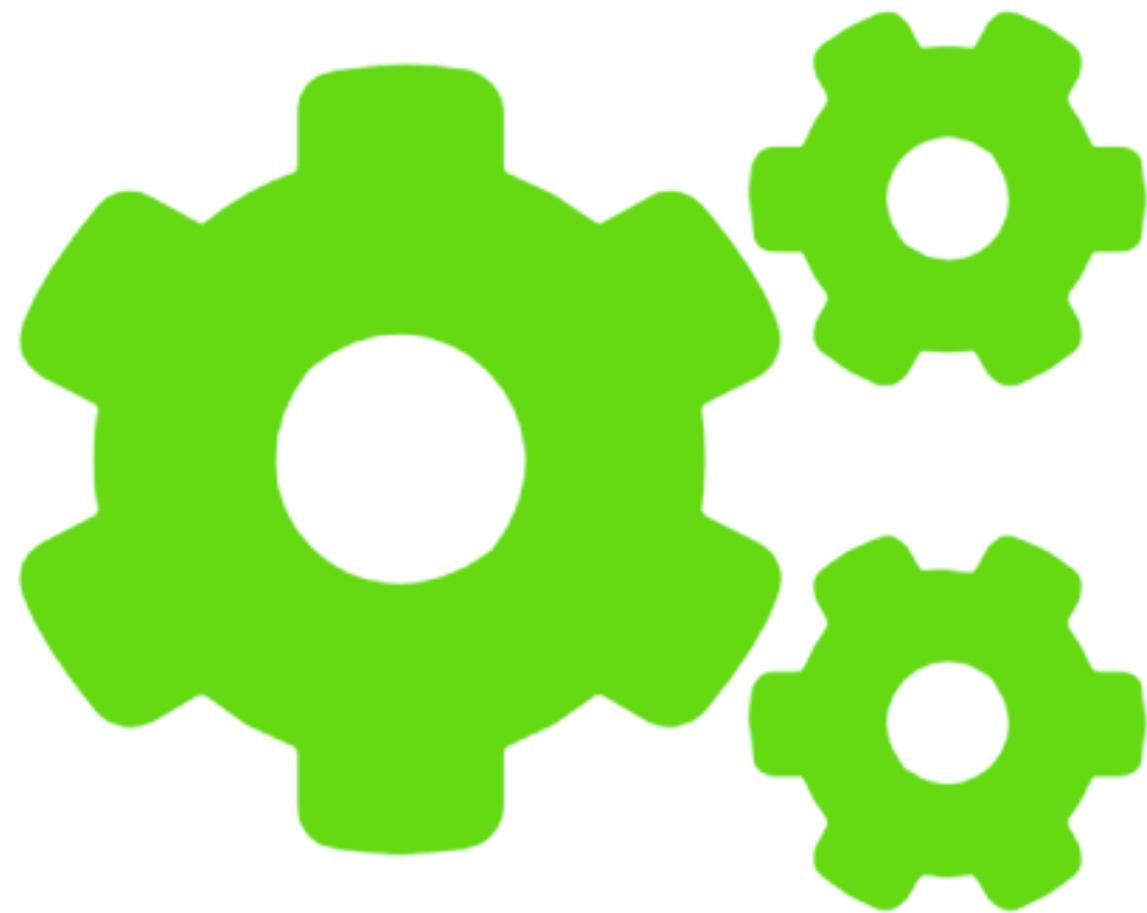
# Semester 1 Assessment Schedule



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

# Module Summaries

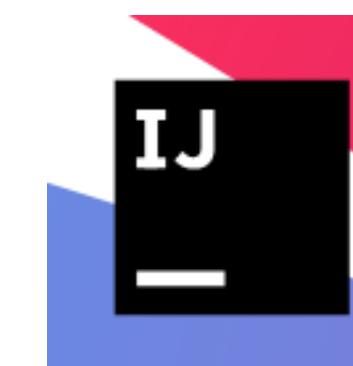
# Programming



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

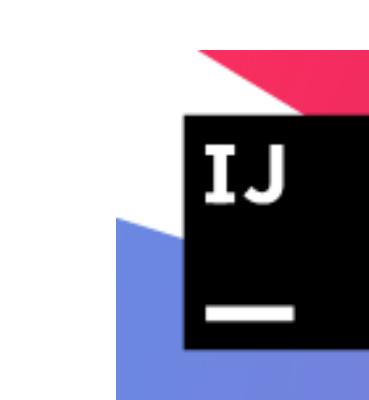


html · css · layout · web apps

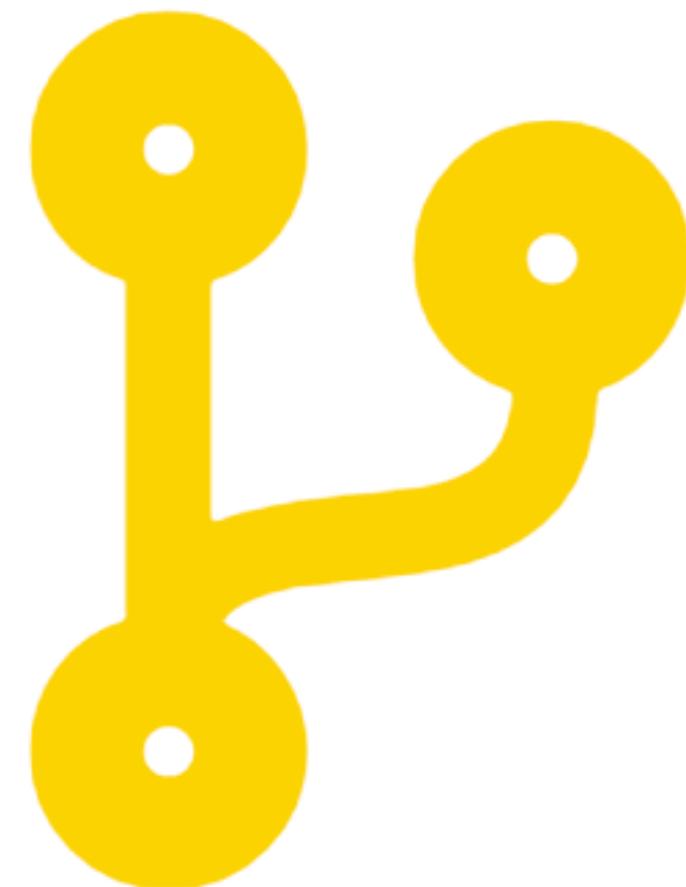
· web frameworks ·  
deployment

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



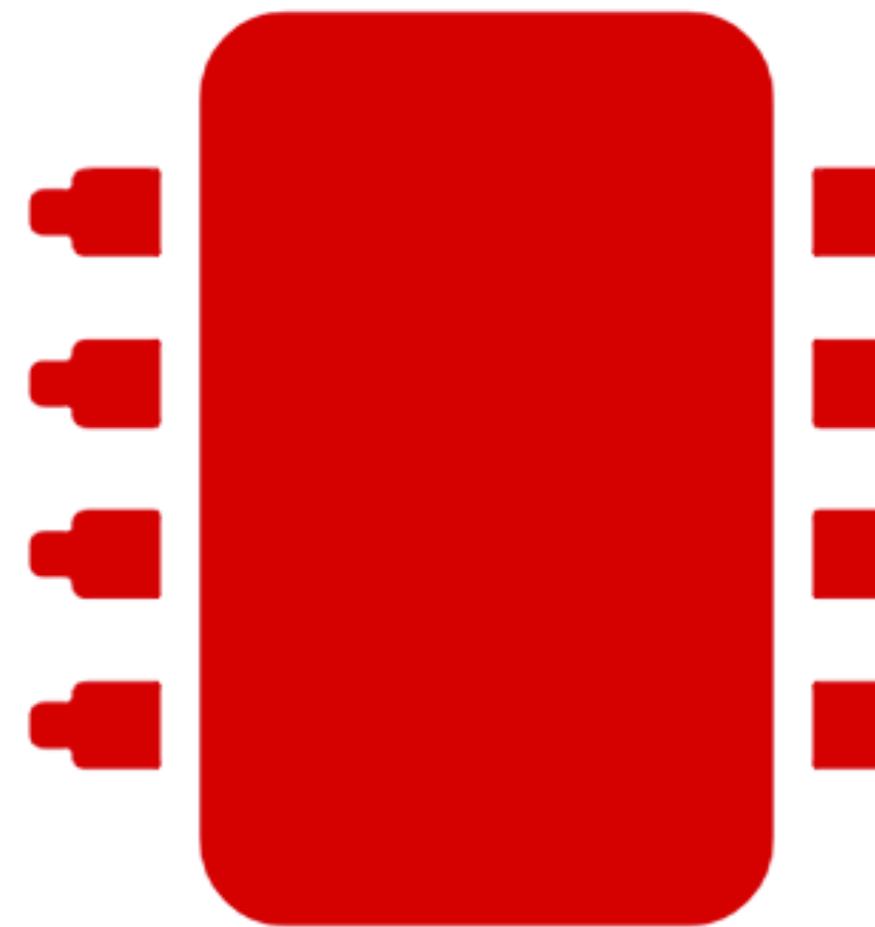
javascript · node · express ·  
git · github · glitch

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



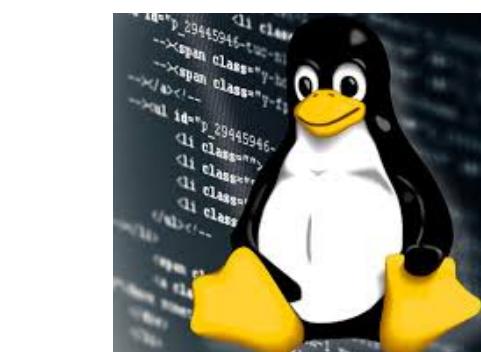
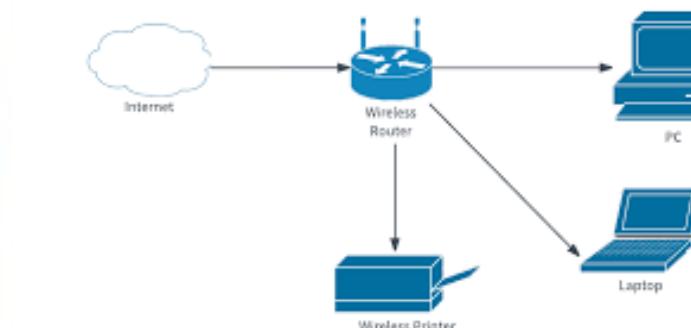
# Computer Systems & Networks



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/mm_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 $MM_SNP_OUT ./ 
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 $(LOG_SNP_OUT) basename $(CERN_SNP_OUT) basename $(HIGH_SNP_OUT)
33   $0 $MM_FILE $0 $MM_FILE)">$(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®

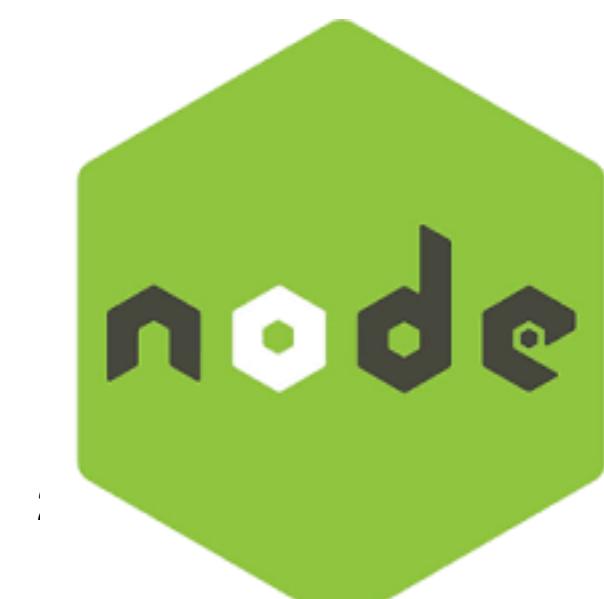
# Enterprise Web Development



- 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



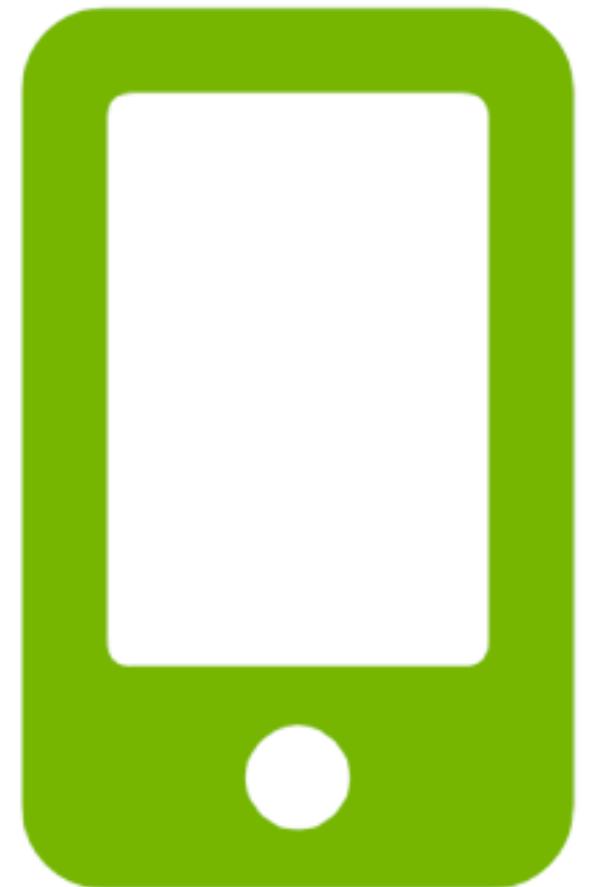
mvc · node · security · apis ·  
tdd · frameworks

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.

