

Waterford Institute of Technology

INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

# Higher Diploma in Science in Computer Science

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## Introduction

# Schedule for Induction Day

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10:00 - 11:00	Overview of Programme (D01) <i>Programme Outline</i> <i>Timetable, Calendar &amp; Assessment schedules</i> <i>Online resource structure and purpose</i>	
11:00 - 11:15	Coffee break (D01)	
11:15 - 1:00	Curriculum Overviews (D01) - <i>Web Development</i> - <i>Skills Studio</i> - <i>Programming</i> - <i>Computer Systems &amp; Networks</i> - <i>Databases</i>	
1:00 - 2:00	Lunch (Gallery)	
2:00 - 3:15	<i>Web Development Lab Group A (D05)</i>	<i>Programming Lab Group B (FTG24)</i>
3:15 - 3:30	Coffee break	
3:30 - 4:45	<i>Web Development Lab Group B (D05)</i>	<i>Programming Lab Group A (FTG24)</i>

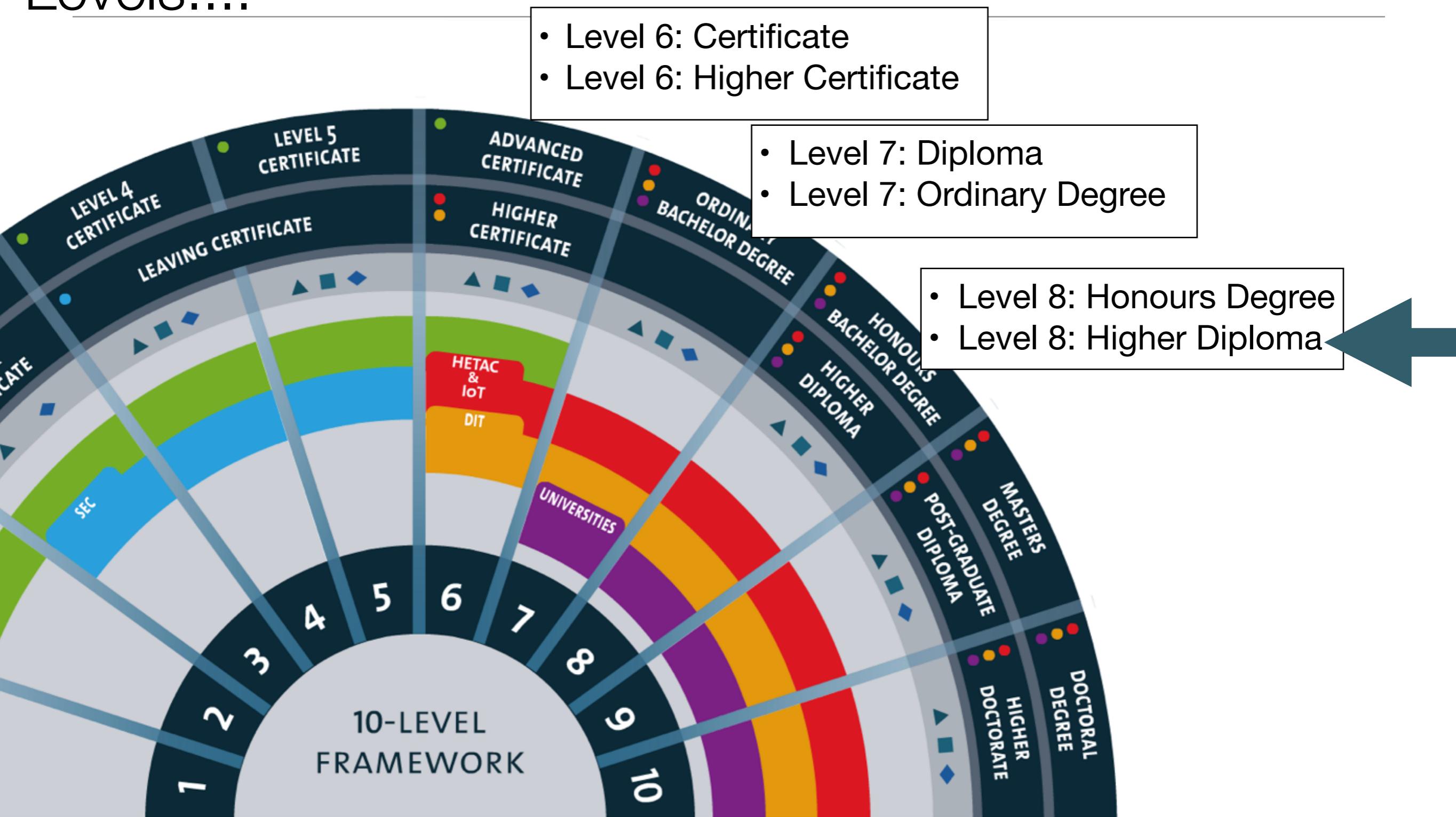
# Agenda

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- Context & Objectives
- Semesters & Modules
- Calendar
- Timetable
- Assessment Sequencing
- Q & A

# Context & Objectives

# Qualification/ Programme Levels....

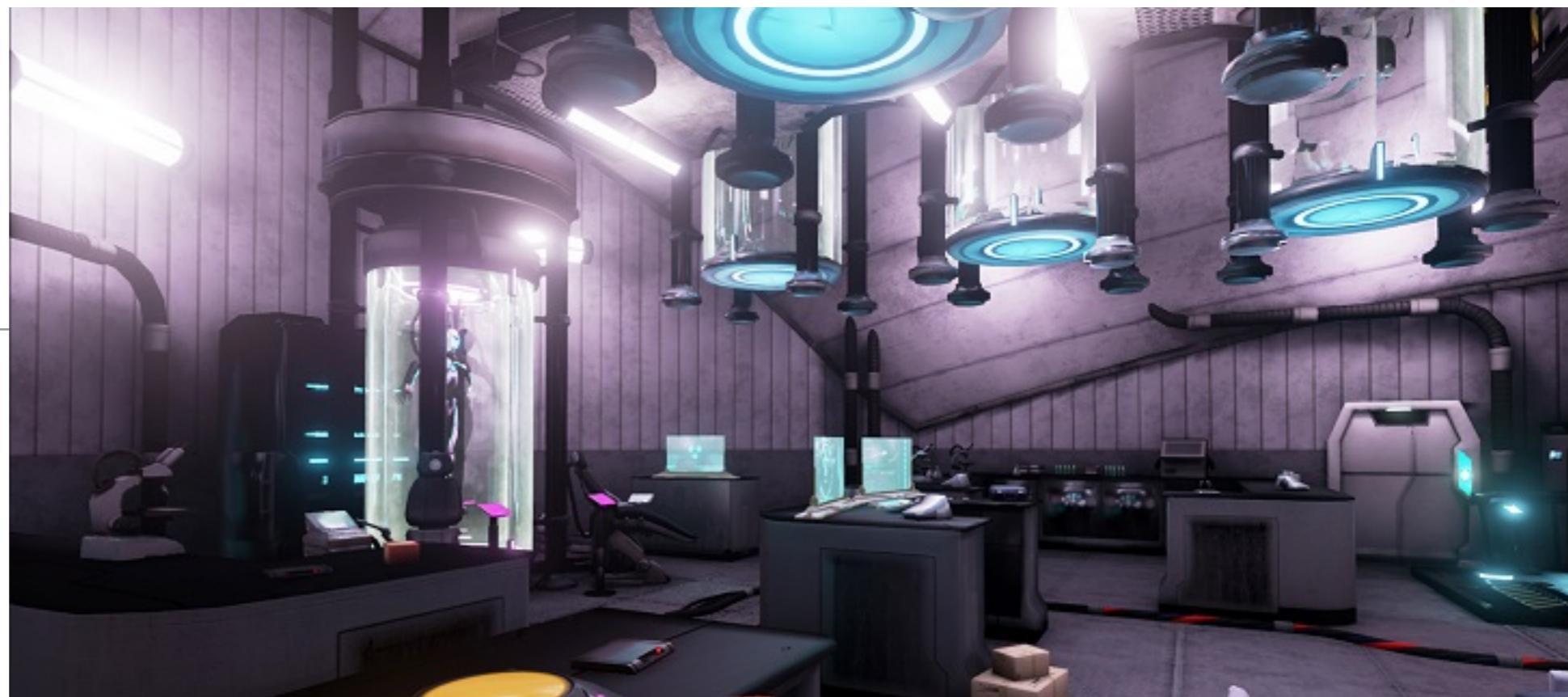


# Key Programme Features

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- 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

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*“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

# Modules

- 12 Modules

**Programming Fundamentals** 



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

10 Credits

**Web Development** 



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

5 Credits

**ICT Skills Studio** 



javascript · node · express · git · github · glitch

5 Credits

**Databases** 

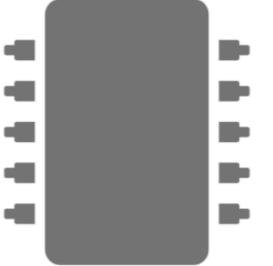


entities · tables · rows · sql · er · nosql

5 Credits

- 5 - 10 - 25 Credits

**Computer Systems & Networks** 



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

10 Credits

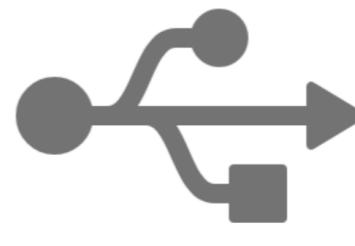
**Enterprise Web Development** 



mvc · node · security · apis · tdd · frameworks

10 Credits

**Developer Operations** 



cloud computing · scripting · scaling · automation · monitoring

5 Credits

**Project Proposal** 



proposal · scope · plan · mock up · prototype

5 Credits

**Mobile App Development** 



layouts · activities · resources · lifecycle · widgets · ux

10 Credits

**Front End Development** 



frameworks · events · mv\* · responsive · esnext · less/sass

10 Credits

**Project Implementation** 



releases · iterations · implementation · report · demo

25 Credits

**Work Placement** 



industry partner · mentor · developer · experience · project

25 Credits

# Year 1 - Semester 1

Semester 1

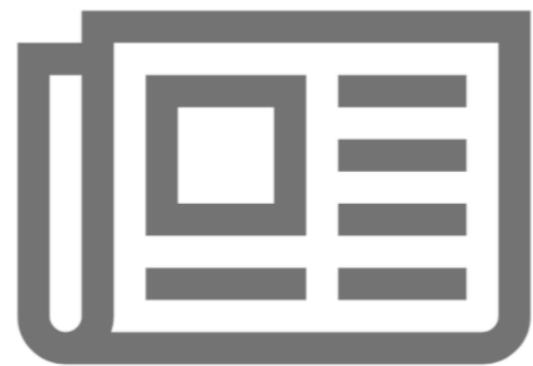
## Programming Fundamentals



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

10 Credits

## Web Development



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

5 Credits

## ICT Skills Studio



javascript · node · express · git ·  
github · glitch

5 Credits

20 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..”*

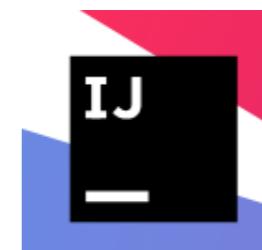
- Apply core problem solving approaches suitable to the programming discipline to build algorithms.
- Construct small applications using standard sequence, conditional and iterative control structures. Change and expand small applications.
- Construct small applications that use simple UI, computation 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

## Programming Fundamentals



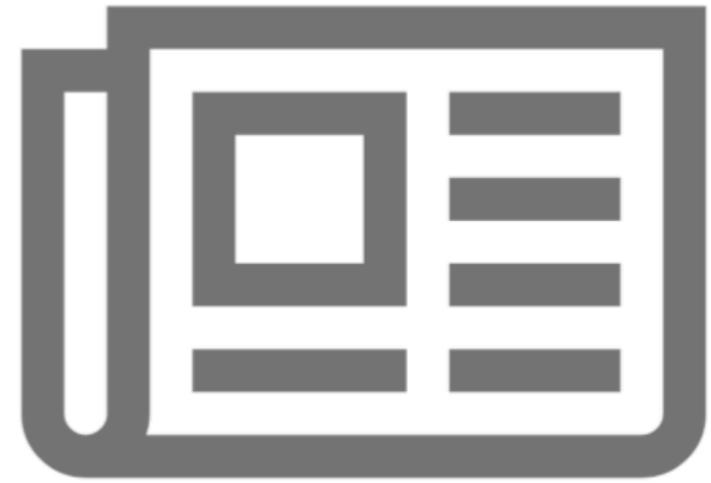
algorithms · data structures ·  
processing · java · classes · libraries

10 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
- Have an initial exposure to a web application framework and understand the roles of Models, Views and Controllers in this context.

**Web Development**

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

5 Credits



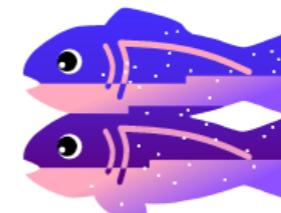


- Continue the journey into web application development
- Establish a competence in Javascript programming language
- Explore the basics of the Node.js framework
- Design, build and deploy a complete web application using these tools
- Understand the role of Agile methods in this context



javascript · node · express · git ·  
github · glitch

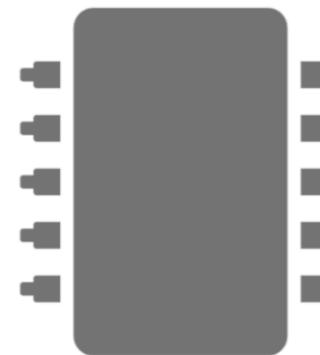
5 Credits



# Year 1 - Semester 2

Semester 2

Computer Systems  
& Networks



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

10 Credits

Databases



entities · tables · rows · sql · er ·  
nosql

5 Credits

15 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..”*

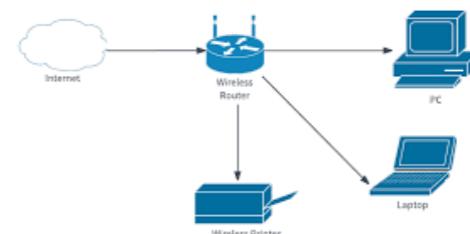
- Identify and explain the role various hardware components play in a computer system.
  - Use an operating system on a chosen computer architecture.
  - Demonstrate an ability to configure systems using the command line.
  - Describe the memory management, process management and file management components 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.
  - Complete basic automation tasks using scripting.

# Computer Systems & Networks

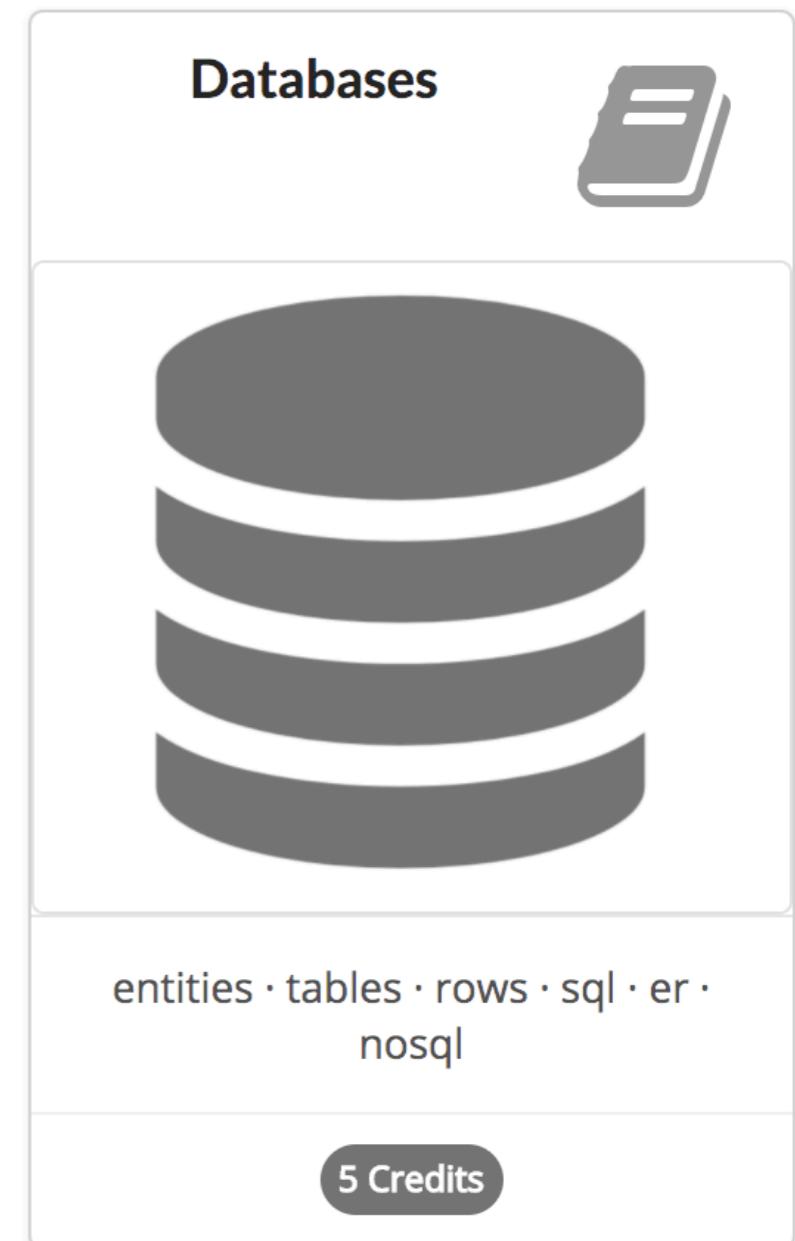


logic · computer organisation · os ·  
networks · interfaces · sensors

10 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



# Year 2 - Semesters 3

Semester 3

<b>Enterprise Web Development</b>  mvc · node · security · apis · tdd · frameworks 10 Credits	<b>Developer Operations</b>  cloud computing · scripting · scaling · automation · monitoring 5 Credits	<b>Project Proposal</b>  proposal · scope · plan · mock up · prototype 5 Credits
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20 Credits

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

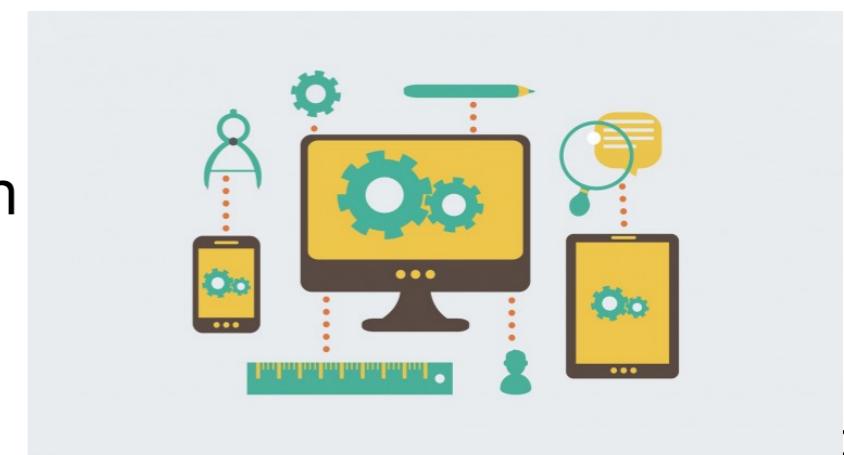
- Examine the key components of a server rendered web application and incorporate them into a running application.
- Use Model View Controller & related patterns in the implementation of a web project.
- Relate the request/response lifecycle, routing & session management in the context of a modern application 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

## Enterprise Web Development



mvc · node · security · apis · tdd ·  
frameworks

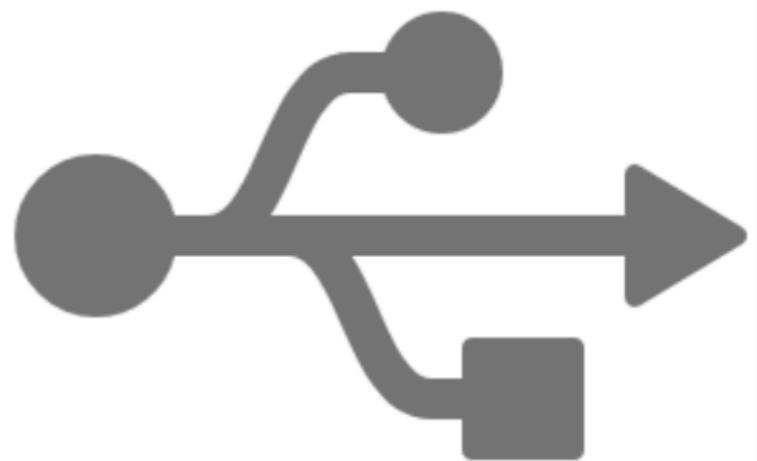
10 Credits



- 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.



## Developer Operations



cloud computing · scripting · scaling · automation · monitoring

5 Credits



# Year 2 - Semesters 4

Choose one of

Choose one of

Semester 4

Mobile App Development



layouts · activities · resources ·  
lifecycle · widgets · ux

10 Credits

Front End Development



frameworks · events · mv\* ·  
responsive · esnext · less/sass

10 Credits

Project Implementation



releases · iterations ·  
implementation · report · demo

25 Credits

Work Placement



industry partner · mentor ·  
developer · experience · project

25 Credits

35 Credits

# Calendar

# Calendar - Semester 1

Semester 1		S	M	T	W	T	F	S	Modules	
January	Week	0	14	15	16	17	18	19	20	prog & web
	1	21	22	23	24	25	26	27	28	prog & web
February	2	28	29	30	31	1	2	3	4	prog & web
	3	4	5	6	7	8	9	10	11	prog & web
	4	11	12	13	14	15	16	17	18	prog & web
reading-week		18	19	20	21	22	23	24	25	
March	5	25	26	27	28	1	2	3	4	prog & web
	6	4	5	6	7	8	9	10	11	prog & web
	7	11	12	13	14	15	16	17	18	prog & web
	8	18	19	20	21	22	23	24	25	prog & web
easter-break		25	26	27	28	29	30	31	32	
April		1	2	3	4	5	6	7	8	
	9	8	9	10	11	12	13	14	15	prog & web
	10	15	16	17	18	19	20	21	22	prog & web
	11	22	23	24	25	26	27	28	29	prog & web
May	12	29	30	1	2	3	4	5	6	prog & web
reading-weeks		6	7	8	9	10	11	12	13	
		13	14	15	16	17	18	19	20	
June	1	20	21	22	23	24	25	26	27	ict skils
	2	27	28	29	30	31	1	2	3	ict skils
	3	3	4	5	6	7	8	9	10	ict skils
	4	10	11	12	13	14	15	16	17	ict skils
	5	17	18	19	20	21	22	23	24	ict skils

2018	Onsite Sessions
18	January
14-15	June

<b>Programming Fundamentals</b>  algorithms · data structures · processing · java · classes · libraries 10 Credits	<b>Web Development</b>  html · css · layout · web apps · web frameworks · deployment 5 Credits
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<b>ICT Skills Studio</b>  javascript · node · express · git · github · glitch 5 Credits
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# Calendar - Semester 2

Semester 2	S	M	T	W	T	F	S	Modules
September	2	3	4	5	6	7	8	
	1	9	10	11	12	13	14	comp sys & database
	2	16	17	18	19	20	21	comp sys & database
	3	23	24	25	26	27	28	comp sys & database
October	4	30	1	2	3	4	5	comp sys & database
	5	7	8	9	10	11	12	comp sys & database
	6	14	15	16	17	18	19	comp sys & database
	7	21	22	23	24	25	26	comp sys & database
November	reading-week	28	29	30	31	1	2	3
	8	4	5	6	7	8	9	comp sys & database
	9	11	12	13	14	15	16	comp sys & database
	10	18	19	20	21	22	23	comp sys & database
December	11	25	26	27	28	29	30	1 comp sys & database
	12	2	3	4	5	6	7	comp sys & database
		9	10	11	12	13	14	15
		16	17	18	19	20	21	22
		23	24	25	26	27	28	29

2018 | Onsite Sessions

21 September

22 December  
(written examination)

Computer Systems & Networks



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

10 Credits

Databases



entities · tables · rows · sql · er · nosql

5 Credits

# Timetable

# Weekly Webinar Schedule

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

# 'Live' Lab Support Availability - Group A

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
10:45				10:45
			Programming Lab Support <i>Slack</i> 10:45-12:15 A	
12:15	Programming Lab Support <i>Slack</i> 12:15-13:45 A			12:15
			Web Development Lab Support <i>Slack</i> 12:15-13:45 A	
13:45				13:45
				15:15
15:15				

# 'Live' Lab Support Availability - Group B

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
10:45				10:45
				12:15
12:15				12:15
				13:45
13:45				13:45
14:15	<p>Programming Lab Support <i>Slack</i> 14:15-15:45 B</p>		<p>Programming Lab Support <i>Slack</i> 14:15-15:45 B</p>	<p>Web Development Lab Support <i>Slack</i> 13:45-15:15 B</p>
15:45				15:15

# Weekly Timetable: Summary

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
10:45			Programming Lab Support <i>Slack</i> 10:45-12:15 A	10:45
12:15	Programming <i>Webinar</i> 12:15-2:00 A&B	Programming Lab Support <i>Slack</i> 12:15-13:45 A	Programming <i>Webinar</i> 12:15-2:00 A&B	Web Development <i>Webinar</i> 12:15-2:00 A&B
13:45				12:15
14:15	Programming Lab Support <i>Slack</i> 14:15-15:45 B		Programming Lab Support <i>Slack</i> 14:15-15:45 B	Web Development Lab Support <i>Slack</i> 13:45-15:15 B
15:45				15:15

# Assessment Sequencing

# Semester 1 Assessment Schedule

	Jan	February				March				April				May				June					September
week no.	1	2	3	4	rd.	5	6	7	8	easter	9	10	11	12	rd.	1	2	3	4	5			
Programming								A1				A2											
Web Development																							
ICT Skills																							A

- All assessments for this semester:
  - individual projects
  - specifications released & projects submitted on Sundays
  - 3 project for programming
  - 2 for web development
  - 1 for Skills Studio

Programming	A1	spec:	18-Feb
		submit:	10-Mar
	A2	spec:	18 Mar
		submit:	8 Apr
	A3	spec:	18 Apr
		submit:	21 May
Web Development	A1	spec:	4-Feb
		submit:	25 Mar
	A2	spec:	18 Apr
		submit:	21 May
ICT Skills	A	spec:	11-Jun
		submit:	2-Sep

# Questions?

# Strong Industry Support

Mr Eamonn De Leastar,  
Waterford Institute of Technology,  
Cork Road,  
Waterford.  
18<sup>th</sup> December 2012.

Dear Eamonn,

On behalf of FUSE I would like to express our support for this program. We believe that this program offers a unique opportunity to bring academic and industry expertise together.



*Local Procurement Project*



amazing experiences!

Eamonn de Leastar  
Waterford Institute of Technology  
Cork Road,  
Waterford,  
Ireland

Dear Mr de Leastar,



info@cernam.com

www.cerna

elfield, Dublin 4

ppard,  
Computing, Maths & Physics,  
ence,  
nstitute of Technology

that Cernam would like to support WIT  
course.

ME specialising in digital evidence and in  
operate with WIT on this programme and

Zolk C Limited,  
Carriganore,  
Co. Waterford



Online  
Betapond.com  
info@Betapond.  
Facebook/Betap  
@Betapond

Eamonn de Leastar,  
WIT,  
Cork Road,  
Waterford.

Commitment to sup

To whom it concerns,  
Betapond is an SME that employs  
Waterford and London. Betapond



Re: Expression of Interest -



Arclabs Research & Innovation Centre  
WIT West Campus, Carriganore, Waterford

17 December, 2012

Dear Eamonn,

Arclabs Research & Innovation Centre is the South technology companies. Since its inception in 2005 many of which are spin-outs from research at WIT incubator provides a base for the New Frontiers Enterprise Platform Programme) and many of the centre. Arclabs is also the focal point for helping In the past five years, more than 280 innovation projects in the region and beyond.

The biggest challenge facing high-growth technology resources, such as developers and early-stage companies recognise an aptitude for software development.

**RE: HEA Skills Shortage, WIT one-year Higher Diploma in Computing**

Eamonn de Leastar  
Department of Computing, Mathematics & Physics  
Waterford Institute of Technology  
Cork Road  
Waterford  
IRELAND

Dear Eamonn,



Exceptional Web & Mobile Development

Waterford, Ireland  
Phone: +353 01 5143545  
Email: contact@nearform.com

14 Dec 2012



Waterford Institute of Technology  
Cork Rd

Dear Sir/Madam,

nearForm Ltd is a technology business is internationally Romania. The company to operate at an international

The company principals education, graduate place relationship by supportin

Telecommunications Software & Systems Group  
Arclabs Research & Innovation Building,  
WIT, West Campus,  
Carriganore,  
Co. Waterford,  
Ireland.

15<sup>th</sup> December, 2012

To Whom it may Concern,

TSSG is an internationally recognised center of excellence for ICT research and innovation. We carry out a wide spectrum of industry-informed research in Information and Communications Technologies (ICT), particularly technologies enabling communications and information services. We create economic impact by translating our knowledge base and innovation into leading edge products and services by continuing our engagement with industry in collaborative R&D, knowledge generation and transfer. Over the past five years, TSSG has delivered innovative solutions to over 110 Irish companies, and has created 11 spin out companies in the South East.

The proposed programme represents an outstanding opportunity for the TSSG to continue its mission to the region. From our perspective, the curriculum aligns closely with the needs of ICT industry nationally, the applied research conducted within the group and specifically the needs of the cluster of enterprises that are co-located with the TSSG at Carriganore and Killaloe, South Waterford.

**FEEDHENRY™**

FeedHenry Ltd.  
Arclabs Research & Innovation Building  
WIT West Campus  
Carriganore  
Co. Waterford  
Ireland

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+353 51 302963 (office)  
+353 86 8044640 (mobile)

12<sup>th</sup> December 2012



EMAGINE MEDIA

Arclabs, WIT West Campus  
Carriganore, Waterford.

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f: +353 51 341100  
e: info@tssg.org  
w: www.tssg.org

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Friday, 14 December 2012

# Laptop

## Recommendations

- It is strongly recommended you have a laptop for this programme

- Recommended Minimum Specification:

- Intel Core i5, 8Gb RAM or mac equivalent, + 200gb HD (SSD preferable)

Macbook  
Pro



Lenovo  
Thinkpad  
T440S



*premium developer laptops*

# Opportunities for Further Study

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- 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.

