

2024 / 25

School of Science and Computing

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🌐 [www.wit.ie/schools/science\\_computing](http://www.wit.ie/schools/science_computing)



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## Module Descriptor

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# Data Structures and Algorithms 2 (Computing and Mathematics)

# Data Structures and Algorithms 2 (A13490)

**Short Title:** Data Structures & Algorithms 2  
**Department:** Computing and Mathematics  
**Credits:** 5

**Level:** Introductory

## Description of Module / Aims

Implement, from first principles, advanced general purpose and custom data structures and algorithms that employ appropriate strategies for demonstrable efficiency.

## Programmes

			stage/semester/status
COMP-0639	BSc (Hons) in Applied Computing (International) (WD_KACCM_BI)		2 / 4 / M
COMP-0639	BSc (Hons) in Applied Computing (WD_KACCM_B)		2 / 4 / M
COMP-0639	BSc (Hons) in Applied Computing (WD_KCOMP_B)		2 / 4 / M
COMP-0639	BSc (Hons) in Computer Forensics and Security (WD_KCOFO_B)		2 / 4 / M
COMP-0639	BSc (Hons) in Computer Science (WD_KCMSC_B)		2 / 4 / M
COMP-0639	BSc (Hons) in Software Engineering (WD_KDEVP_BI)		3 / 5 / M
COMP-0639	BSc (Hons) in the Internet of Things (International) (WD_KINTT_BI)		2 / 4 / M

## Indicative Content

- Implementing Advanced Data Structures: Trees; Graphs; Rings; Other
- Implementing Algorithms for Advanced Data Structures: Traversals; Shortest Path; Union Find; Other
- Algorithmic Strategies: Brute Force; Greedy; Divide and Conquer; Heuristic; Other
- Algorithmic Analysis: Static Analysis; Dynamic Analysis; Profiling Tools
- Test-Driven Development for Advanced Data Structures and Algorithms

## Learning Outcomes

*On successful completion of this module, a student will be able to:*

1. Construct, from first principles, advanced general purpose and custom data structures.
2. Construct suitable and efficient algorithms for utilising advanced data structures.
3. Determine and implement suitable algorithmic strategies for utilising advanced data structures and large data sets.
4. Employ static and dynamic algorithmic analysis.
5. Construct robust advanced data structures and efficient algorithms in a systematic, test-driven fashion.

## Learning and Teaching Methods

- This module will be presented by a combination of lectures and practicals whilst capitalising on a web-enhanced learning environment.
- Students will work on building a portfolio of practical project work.
- Cooperative and peer learning (e.g. pair-programming, teamwork).
- Self-directed learning.

## Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	24	
Practical	36	
Independent Learning	75	

## Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
In-Class Assessment	30%	1,2,3,4
Portfolio	70%	1,2,4,5

## Assessment Criteria

<40%: Unable to describe or implement advanced general purpose data structures and algorithms.

40%–49%: Able to describe and implement advanced general purpose data structures and algorithms.

50%–59%: Able to choose and implement advanced general purpose data structures and algorithms to solve a problem.

60%–69%: Able to critically choose and implement advanced data structures and algorithms to solve a complex problem.

70%–100%: Able to critically choose, analyse and implement custom advanced data structures and efficient algorithms to solve complex and unseen problems.

## Supplementary Material(s)

- Sedgewick, R. and K. Wayne. *Algorithms*. 4th ed.. NY: Addison-Wesley, 2011.

## Requested Resources

- Room Type: Computer Lab