

2024 / 25

School of Science and Computing

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🌐 www.wit.ie/schools/science_computing



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South East
Technological
University

Module Descriptor

Data Structures and Algorithms 1 (Computing and Mathematics)

Data Structures and Algorithms 1

(A13489)

Short Title: Data Structures & Algorithms 1
Department: Computing and Mathematics
Credits: 5

Level: Introductory

Description of Module / Aims

Implement, from first principles, custom and general purpose data structures and algorithms that are efficient, thread safe, and robustly tested and validated.

Programmes

stage/semester/status		
COMP-0602	BSc (Hons) in Applied Computing (International) (WD_KACCM_BI)	2 / 3 / M
COMP-0602	BSc (Hons) in Applied Computing (WD_KACCM_B)	2 / 3 / M
COMP-0602	BSc (Hons) in Applied Computing (WD_KCOMP_B)	2 / 3 / M
COMP-0602	BSc (Hons) in Computer Forensics and Security (WD_KCOFO_B)	2 / 3 / M
COMP-0602	BSc (Hons) in Computer Science (WD_KCMSC_B)	2 / 3 / M
COMP-0602	BSc (Hons) in Software Engineering (WD_KDEVP_BI)	2 / 4 / M
COMP-0602	BSc (Hons) in Software Systems Development (WD_KDEVP_B)	2 / 4 / M
COMP-0602	BSc (Hons) in the Internet of Things (International) (WD_KINTT_BI)	2 / 3 / M
COMP-0602	BSc in Applied Computing (WD_KCOMP_D)	2 / 4 / M
COMP-0602	BSc in Software Systems Development (WD_KCOMC_D)	2 / 4 / M

Indicative Content

- Implementing Data Structures: Abstract Data Types (ADTs); Lists; Sets; Stacks; Queues; Maps
- Implementing Search Algorithms: Linear; Binary; Hashing; Other
- Implementing Sorting Algorithms: Selection; Bubble; Insertion; Other
- Recursive Algorithms
- Multithreading and Concurrency Issues
- Test-Driven Development for Data Structures and Algorithms

Learning Outcomes

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

1. Construct, from first principles, custom and general purpose data structures.
2. Construct suitable and efficient search algorithms for different data structures.
3. Construct efficient sorting algorithms for different data structures.
4. Use recursion in algorithmic implementations.
5. Explain the issues surrounding, and be able to implement solutions for, concurrently accessed data structures.
6. Construct robust 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 computer-based 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	12
Practical	36	12
Independent Learning	75	111

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
In-Class Assessment	30%	1,2,3,4,5
Portfolio	70%	1,2,3,6

Assessment Criteria

<40%: Unable to describe or implement basic data structures and algorithms.

40%–49%: Able to describe and implement basic data structures and algorithms.

50%–59%: Able to choose and apply appropriate data structures and algorithms to solve problems.

60%–69%: Able to choose and apply appropriate data structures and algorithms to solve complex problems.

70%–100%: Able to critically choose, analyse and design custom data structures and algorithmic solutions to a high standard for a range of both complex and unforeseen problems.

Supplementary Material(s)

- "Khan Academy Computer science algorithms." <https://www.khanacademy.org/computing/computer-science/algorithms>
- Sedgewick, R. and K. Wayne. *Algorithms*. NY: Addison-Wesley, 2011.

Requested Resources

- Room Type: Computer Lab