

ISCG6426: Data Structures and Algorithms

Course number:	ISCG6426	Level:	6	Credits:	15
Main programme:	BCS			Delivery:	One Semester
Endorsement:	Elective			Hours directed:	39
Other programmes:	GDCMP			Hours self-directed:	111
Prerequisites:	For BCS: ISCG5421 For GDCMP: As approved by the Programme Leader			Total hours:	150

Co-requisites:		Number of weeks:	16 weeks
Restrictions:			
Entry requirements:			

Students are expected to adhere to United's policy on conduct in respect of staff, fellow students, and in the use of resources and facilities.

NZQA Level Descriptor: (chosen from table presented above in section 2)

Knowledge	Skills	Application and applied
<p>The student is able to carry out processes that</p> <ul style="list-style-type: none"> require a command of wide-ranging highly specialised technical or scholastic skills involve a wide choice of standard and non-standard procedures, often in non-standard combinations <p>specialised knowledge with depth in more than one area</p>	<ul style="list-style-type: none"> the analysis, reformatting and evaluation of a wide range of information the formulation of appropriate responses to resolve both concrete and abstract problems <p>are employed in highly variable routine and non-routine contexts employing</p>	<ul style="list-style-type: none"> in managing processes within broad parameters for defined activities with complete accountability for determining and achieving personal and/or group outcomes.

Course aim:

This course introduces the fundamental data structures and algorithms used in software development, extending the object-oriented concepts taught in the pre-requisite subject Programming Principles and Practice. The course will cover searching and sorting, linked data structures such lists and trees as well as hash tables. Upon completion of this course students will be able to implement a variety of data structures and algorithms, and will have an expert knowledge of the scalability and design trade-offs of these algorithms.

Learning outcomes:

1. Apply object oriented design and implementation techniques.
2. Interpret the tradeoffs and issues involved in the design, implementation, and application of various data structures with respect to a given problem
3. Explain the purpose and answer questions about data structures and design patterns that illustrate strengths and weaknesses with respect to resource consumption
4. Assess the impact of data structures on algorithms
5. Analyse the scalability of data structures and algorithms in terms of both space and time complexity

Topics may include:

1. Sorting
2. Bubble Sort
3. Merge Sort
4. Insertion Sort
5. Selection Sort
6. Quick Sort
7. Searching