COURSE OUTLINE

CSC201 Data Structures and Algorithms

Course Coordinator: Mingzhong Wang (mwang@usc.edu.au) **School:** School of Science, Technology and Engineering

2021 | Semester 2

USC Moreton Bay	ON CAMPUS	Most of your course is on campus but you may be able to do some components of this course online.

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

In the mobile world, devices need to meet hardware requirements for battery life and physical size. As such the efficiency of data representation and algorithm design are of critical importance. In this course, you will learn techniques for designing efficient algorithms and data storage. You will analyse time-and space-complexity of algorithms, identifying worst-case, average-case and best-case complexity. You will also use data structures including lists, stacks, queues, priority queues, search trees, hash tables, and graphs as well as algorithms for recursion, sorting and searching.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
ON CAMPUS			
Tutorial/Workshop 1 – Computer Workshop	2hrs	Week 1	13 times
Lecture	2hrs	Week 1	13 times

1.3. Course Topics

- Complexity analysis
- Lists, stacks, queues, and hash tables
- Trees and graphs
- Recursion
- Sorting and searching

2. What level is this course?

200 Level (Developing)

Building on and expanding the scope of introductory knowledge and skills, developing breadth or depth and applying knowledge and skills in a new context. May require pre-requisites where discipline specific introductory knowledge or skills is necessary. Normally, undertaken in the second or third full-time year of an undergraduate programs.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...		GRADUATE QUALITIES Completing these tasks successfully will contribute to you becoming...
1	Demonstrate knowledge of data structure and algorithm fundamentals.	Knowledgeable
2	Develop and evaluate solutions and systems for computing problems with time and/or space constraints.	Empowered
3	Select, adapt, and design evidence-based/optimal solutions to complex computing problems.	Creative and critical thinker
4	Describe and evaluate the impact of data structures and algorithms on resource utilisation.	Sustainability-focussed
5	Communicate data structure and algorithmic analysis applied to a specific situation in reports, design documentation and specifications.	Engaged

5. Am I eligible to enrol in this course?

Refer to the USC Glossary of terms for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

ICT221

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

Students will receive ongoing formative feedback during computer workshop and lecture sessions.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Artefact - Technical and Scientific, and Written Piece	Individual	20%	Code and report	Week 6	Online Assignment Submission
All	2	Artefact - Technical and Scientific, and Written Piece	Individual	40%	Code plus 1500 words	Week 12	Online Assignment Submission with plagiarism check
All	3	Examination - Centrally Scheduled	Individual	40%	2 hours	Exam Period	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Storing and Using Data

GOAL:	Understand, analyse, and improve the efficiency of software applications.
PRODUCT:	Artefact - Technical and Scientific, and Written Piece
FORMAT:	1 software code package consisting of two solutions to a given problem utilising different data structures and algorithms, and 1 brief report identifying the algorithmic complexity of each solution.

CRITERIA:

No.		Learning Outcome assessed
1	Demonstrated knowledge of data structure and algorithm fundamentals	1
2	Development and evaluation of software with respect to time and space constraints	2
3	Selection, adaption and design of solutions using principles of data structures and algorithms	3

All - Assessment Task 2: Coding project

GOAL:	You will explore a case study with high time and/or space constraints in its runtime. You will use your knowledge of data structures and algorithms to design, justify and develop an application to meet the case study requirements.
PRODUCT:	Artefact - Technical and Scientific, and Written Piece
FORMAT:	1 software application (code) satisfying the requirements of the case study and 1 report with 1500 words on design decisions justifying the chosen data structures and algorithms.

CRITERIA:

No.		Learning Outcome assessed
1	Demonstrated knowledge of data structure and algorithm fundamentals	1
2	Development and evaluation of software with respect to time and space constraints	2
3	Selection, adaption and design of solutions using principles of data structures and algorithms	3
4	Explanation of the software design, the selection of data structures and algorithms, and implementation.	3 5
5	Description and evaluation of the case study according to sustainability and efficiency principles	4

All - Assessment Task 3: Final Exam

GOAL:	The final exam will develop your ability to independently apply your skills and knowledge to solve familiar problem-based questions with confidence within a set time limit.
PRODUCT:	Examination - Centrally Scheduled
FORMAT:	This examination consists of a set of questions on the use of data structures and algorithms. The questions are based on tutorial activities and lecture materials.

CRITERIA:	No.		Learning Outcome assessed
	1	Demonstrated knowledge of data structure and algorithm fundamentals	1
	2	Development and evaluation of software with respect to time and space	2
	3	Selection, adaption and design of solutions using principles of data structures and algorithms	3

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	PUBLISHER
Required	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	2014	Data Structures and Algorithms in Java	Wiley

8.2. Specific requirements

Not applicable

9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%
The course is graded using the Standard Grading scale
You have not failed an assessment task in the course due to academic misconduct.

10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:
- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

10.4. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the Learning Advisers web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.5. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to Student Hub, email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.6. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, , injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, AccessAbility Services can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to Student Hub, email AccessAbility@usc.edu.au or call 07 5430 2890.

10.7. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website: http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.8. General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au