Undergraduate Program Subject Outline

School of Engineering

SUBJECT NAME: PROGRAMMING FOR ENGINEERS

Course code:	CSCI291	**Section:**	Dubai
Credit Points:	6	**Year**	2024
Session	Autumn	**Duration:**	11 Weeks
Pre-requisite(s)	ENGG100	**Co-requisite(s)**	NONE
Mode of Delivery:	On-campus (F2F)		
Final Exam Passing Requirement:	40%		

Timetabling Information can be found at MY|UOWD, https://my.uowdubai.ac.ae/

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Consultation:	See Moodle		

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Consultation:	See Moodle	

1 SUBJECT DESCRIPTION

The primary topics areas in this subject include: introduction to the C Programming environment, use of pointers, dynamic memory management, arrays and structures, file input and output, multi-file programs and make files, testing and verification of software, implementation and properties of algorithms, concepts of object-oriented programming in C++ including classes and function overloading.

2 CONTRIBUTION TO PROGRAM LEARNING OUTCOMES (PLO)

The activities in this course contribute to achieving the following program learning outcomes:

Program: Engineering	
PLO1	Demonstrate professional knowledge with a strong grounding in engineering and awareness of current local and international trends and challenges.
PLO2	Navigate disciplinary literature with particular skills in gathering & synthesising information independently to support an argument or strategy.
PLO3	Implement common research methods in the field of engineering, analyse data & evaluate the validity of findings and exercise critical judgement in determining new directions and strategies for carrying out further investigation.
PLO4	Draw from established engineering concepts, methods and industry standards to develop innovative solutions to complex engineering problems by completing a research project relating to the respective engineering major.
PLO5	Communicate clearly and coherently in writing to a range of audiences, with an ability to integrate knowledge, research, data, analysis and critical evaluation.
PLO6	Communicate verbally to a range of audiences using appropriate language in presentations, consultation and negotiation.
PLO7	Work productively as part of a team with the capacity for leadership, recognising the roles, responsibilities and accountabilities of team members.
PLO8	Show respect for the views, values and culture of others in settings involving colleagues, clients, communities and end users, and consider alternate perspectives in design and project management.
PLO9	Make complex considerations in regards to professional ethics and accountability, account for and mitigate risk, and operate with a commitment to professionalism in all work.
PLO10	Appreciate the importance of sustainable engineering design, and seek to maximise positive social and environmental outcomes in engineering design, practice and development.

	Course CSCI291 Upon successful completion of this subject, a student should be able to:	PLOs
LO1	Apply software development life cycle and use of programming environments to build C applications.	1,2
LO2	Use appropriate data structures and C core language constructs, and use of relevant libraries to implement C applications.	1,2
LO3	Construct C/C++ programs in a modular manner using functions.	1,2
LO4	Select appropriate tools (C or C++) for applications.	1,2

3. SUBJECT SCHEDULE

3.1 LECTURE SCHEDULE

Week	Lecture Topic(s)	Learning Outcomes	Session Type	Delivery format	Related supporting materials	Assessment Formative (F) Summative (S)
1	Subject overview, introduction to Programming for Engineers, overview of the C language	1	Lecture (L) / Tutorial (T)	F2F	Hanley	Lab 1 (F)
2	Top-Down Design with functions. Multi-file programming	1,3	L/T	F2F	Hanley	
3	Selection Structures: if and switch statements	2,3	L/T	F2F	Hanley	
4	Repetition and Loop Statements	2,3	L/T	F2F	Hanley	
5	Arrays & Enumeration Type	2,3	L/T	F2F	Hanley	Lab 2 (S)
6	Pointers	2,3	L/T	F2F	Hanley	Midterm exam (S)
7	Structure and Union Types & Recursion.	2,3	L/T	F2F	Hanley	
8	Text and Binary Files	2,3	L/T	F2F	Hanley	Lab 3 (S)
9	Dynamic Data Structures and Memory Allocation	2,3	L/T	F2F	Hanley	
10	On to C++: • Reference Parameters • Function Overloading • Function Template • Input / Output Streams • C++ String • Object-Oriented Programming	2,3,4	L/T	F2F	Hanley	Project (S)
11	Revision		L/T	F2F		Lab 4 (S)

3.2 LABORATORY SCHEDULE

Week	Computer Lab Activities	Learning Outcomes
1	Lab1: Introduction to C programming: - C IDE environment - Basic C coding	1
2	User defined functions, Selection statements, I/O, and Loops	1,2,3
3		
4		
5	Arrays, C-Strings, C-structure, recursive functions	1,2,3
6		
7		
8	Test & Binary files, Dynamic Memory Allocation, C++ Fundamental Coding	1,2,3,4
9		
10		

4. SUPPORTING MATERIALS

Books, Articles, Videos, Podcasts, etc. will be available on our Learning Management System (LMS).

4.1 Required Textbook

Hanly, Jeri R, and Elliot B Koffman. Problem Solving and Program Design in C. Upper Saddle River, Pearson, 2018, ISBN:9780132936491.

4.2 RECOMMENDED READINGS

4.2.1 W. Arthur Chapman. Mastering "C" Programming. Bloomsbury Publishing, 11 Nov. 1991, ISBN:9781349110155.

4.2.2 Jeri Hanly & Elliot Koffman. C Program Design for Engineers. Addison Wesley, 2020, ISBN: 978-0201708714.

4.2.3 Brian W. Kernighan, Dennis M. Ritchie. The C programming language, 2nd ed. Upper Saddle River,NJ: Prentice Hall PTR. 1988, ISBN: 9780131103627.

4.2.4 Bjarne Stroustrup. The C++ programming language, 4th ed. Upper Saddle River, NJ: Addison-Wesley.2013, ISBN: 9780321958327.

4.3 Lecture Notes
All teaching material can be downloaded from the Moodle site for this subject.

4.4 ACCESS TO SUPPORTING MATERIALS

The University uses MOODLE as a Learning Management System (LMS) to support all coursework subjects. The subject site and supporting materials can be accessed via: https://moodle.uowplatform.edu.au and via UOWD Library.

5   ASSESSMENT

5.1   ASSESSMENT OF LEARNING OUTCOMES

Learning Outcome	Measures (Elements ofAssessment)
LO1: Apply software development life cycle and use of programming environments to build C applications	Weekly labs, project, and partly in the midterm and final exams.
LO2: Use appropriate data structures, C core language constructs,and existing libraries to implement C applications.	Weekly labs, project, midterm and final exams.
LO3: Construct C/C++ programs in a modular manner using functions.	Weekly labs, project, midterm and final exams.
LO4: Select appropriate tools (C or C++) for applications.	Weekly labs and final exam.

5.2 Using Generative Artificial Intelligence (Genai)

GenAI technology (such as ChatGPT or Microsoft Co-pilot) is reshaping the University experience worldwide. UOW is committed to embracing GenAI as a tool to enhance learning experiences and develop vital work-readiness skills. However, misuse or use of GenAI in assessments where prohibited constitutes academic misconduct (as specified by University Policy).

It is important that students check if GenAI is permitted for each assessment task and how it is to be used and acknowledged. Please read the student guidance (Acknowledging the permitted use of GenAI in assessments, Using Generative AI tools well and Access your UOW Microsoft Copilot account) available on how to use GenAI ethically and critically, equally recognising its capabilities and limitations. For example:

1. **Generative AI is not a substitute for decision-making**: GenAI should complement, not replace, your critical thinking and decision-making skills.

2. **Output quality depends on prompts**: The quality of GenAI outputs is influenced by prompting. Poorly constructed or unclear prompts may generate outputs that are incorrect.

3. **Fact verification is essential**: GenAI outputs can be fabricated, presenting inaccurate information or contain harmful bias. Verify all GenAI outputs against reliable sources.

4. **Protect data and copyright**: Many GenAI technologies collect information in ways that breach privacy and data protection provisions, particularly where the source material is confidential or subject to copyright. Please check the Terms and Conditions of GenAI technologies and if unsure, contact UOW Copyright Guidance. Learn more about how to access UOW secured GenAI tools here.

5. **Transparency in use**: Where required, you must acknowledge GenAI use, including providing prompt histories and detailing how GenAI was utilised.

6. **Thoughtful and appropriate application**: Be mindful of when and how to use GenAI tools. Assess its appropriateness for each use, and refrain from use when not suitable.

5.2 ASSESSMENT TASKS

Learning Outcome	Assessment 1 **Laboratory Activities 20%**	Assessment 2 **Project 20%**	Assessment 3 **Midterm Exam 20%**	Assessment 4 **Final Exam 40%**
LO 1	x	x	x (partly)	x (partly)
LO 2	x	x	x	x
LO 3	x	x	x	x
LO 4	x			x
Group (G)/ Individual (I)	I	G	I	I
Total Marks	100	100	100	100
Due Date	Weeks 1, 5, 8 ,11	Week 10	Week 6	University exam period

Assessment Task:	Assessment 1: Laboratory activities
Type:	Individual
Description:	Report and written programs
Learning Outcome Measured:	1 – 4
Total Marks:	100
Weighting:	20%
Due Date:	At the eve of the next lab task; Weeks 1, 5, 8, and 11
Word Length (if applicable):	N/A
Hand in to:	Tutor via Moodle
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

Method: One formative assessed task to introduce students to the programming environment and github. Three marked tasks with the specifications as given in section 3.2. Your weekly progress on the lab tasks must be submitted to your github account and shared with the lab supervisor.

Aim: This assessment ascertains the level of understanding and practical application of the topics covered in lectures and tutorials.

Outcomes: Students should be able to carry out a variety of design and programming tasks in C and C++, including debugging.

MARKING CRITERIA

Correctness of the implementation in line of the task requirements and constraints, submission on time, and clear evidence of incremental design and coding. Non-approved late submissions will not be marked (zero mark). If you cannot explain clearly your own solution to the lab supervisor, your mark will be reduced.

Assessment Task:	Assessment 2: Project
Type:	Group
Learning Outcome Measured:	Report and written programs
Description:	1,2,3
Total Marks:	100
Weighting:	20%
Due Date:	Week 10
Word Length (if applicable):	N/A
Hand in to:	Tutor via Moodle
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

Method: open ended project where a student has to has to implement a C mobile robot application using Webots Robot simulator.

Aim: This assessment aims to give students an experience on developing a system solution to a real-life problem with little design and coding guidance. As a project-based learning tool, this assessment aims to develop further students' problem solving and system design skills, as well as time management.

Outcomes: Recognize the applicability of the subject content to solve real-life problems. Build a relatively complex software solution using a 3D Robot simulator widely used in industry and academia.

MARKING CRITERIA

Quality of the design solution and implementation, extent of the project requirements implementation, submission on time, clear evidence of incremental design and coding. Non-approved late submissions will not be marked (zero mark). If you cannot explain clearly your own solution to the lab supervisor, your mark will be reduced

Assessment Task:	Assessment 3: Midterm exam
Type:	Individual
Learning Outcome Measured:	Closed-book written paper
Description:	1,2,3
Total Marks:	100
Weighting:	20%
Due Date:	Week 5 (tentative)
Word Length (if applicable):	NA

Hand in to:	Lecturer / Invigilator
TurnItIn submission required by:	NA

OUTLINE AND REQUIREMENTS

Method: The exam will be based on the content covered in the first four weeks of the term. It consistsof a set of programming exercises and comprehension in C.
Aim: This assessment aims to evaluate students' learning achievement. It is timetabled in the mid of theterm to encourage students to keep up with the course and study material taught on weekly basis.

MARKING CRITERIA

Correctness of the design solution, design description quality, correctness of the code and coding style.

Assessment Task:	Assessment 4: Final Exam
Learning Outcome Measured:	1 – 4
Total Marks:	100
Weighting:	40%
Date:	To be held during the official examination period. Please refer to the Exam Timetable available on the Student Online Resources website (http://my.uowdubai.ac.ae) closer to the exam period.

OUTLINE AND REQUIREMENTS

Method: The exam will be based on the whole content of the subject with more emphasis on lectures5-10. It consists of a set of programming exercises and comprehension in C and C++.
Aim: This assessment aims to evaluate students' learning achievement.

MARKING CRITERIA

Correctness of the design solution, design description quality, correctness of the code and coding style.

LATE SUBMISSIONS:

Please note that late submissions will incur a penalty of 20% per day, including weekends.

5.3 GRADES AWARDED

The approved grades of performance and associated ranges of marks for undergraduate subjects are:
High Distinction (HD)	85 – 100%
Distinction (D)	75 – 84%
Credit (C)	65 – 74%
Pass (P)	50 – 64%
Pass Supplementary (PS)	50%
Fail (F)	0 – 49% (and not meeting the attendance requirements)
Technical Fail (TF)	Not meeting the final exam passing requirements – see the Assessment Policy PP-REG-DB-2.1

5.4 SATISFACTORY COMPLETION REQUIREMENTS

In order to be considered for a grade of Pass (P) or better in this subject, students **must achieve the minimum required mark in the Final Examination (see page 1 for required score);** students who obtain a composite mark greater than or equal to 50% but do not satisfy the Final Examination minimum pass requirements in the final examination will be awarded a "Technical Fail" grade.

Students must 'reasonably' complete all assessment tasks (including the required score for the Final Examination,) and submit these as specified in the subject outline. 'Reasonable' completion of an assessment task will be determined based on the instructions given to the student including: word length, demonstration of research and analysis where required, adherence to the Plagiarism Policy guidelines, and completion of each section/component of the assessment. Failure to submit all assessment tasks may result in a Fail grade awarded for the subject.

6   RELEVANT POLICIES AND DOCUMENTS

All students must read and be familiar with the following UOWD policies and documents, which are available on the Student Online Resources (my.uowdubai.ac.ae) website by following the Policies link:

- Academic Grievance Policy
- Academic Integrity Policy
- Campus Access and Order Rules
- Code of Conduct – Library Users
- Code of Practice – Students
- Copyright Policy
- Intellectual Property Policy
- Library Regulations
- Minimum Rate of Progress
- Music, Video and Software Piracy
- Non-Discriminatory Language and Practice & Presentation Policy and Guidelines
- Special Consideration Policy & Procedure
- Student Attendance Policy
- Student Conduct Rules
- Rules for use of UOWD ITTS Facilities
- Teaching and Assessment: Code of Practice – Teaching
- Teaching and Assessment: Assessment and Feedback Policy
- Teaching and Assessment: Subject Delivery Policy

7   SSP & STUDIOSITY

SSP (Student Support Program) is a program committed to assisting students in developing their academic skills and getting the most out of their studies. As part of their services, SSP provides Peer Tutoring Program and Academic Workshops (https://my.uowdubai.ac.ae/ssd/index.php).

Studiosity is an online study tool that students can access 24 hours, 7 days a week! Students can receive feedback on submitted writing in less than 24 hours and receive one-to-one, personal help in real time with a subject specialist. The service can be accessed through the subject's Moodle site**.**

For further information, please contact:
SSP Coordinator
ssp@uowdubai.ac.ae
Phone Number: +971 4 278 1756

8 ACADEMIC INTEGRITY

Plagiarism and cheating are serious offences that can lead to expulsion from the university. Students must be familiar with the *Academic Integrity* policy which outlines the procedure that will be followed in case of academic misconduct including cheating and plagiarism. Please refer to *How to Avoid Plagiarism* available on the Student Online Resources website (http://my.uowdubai.ac.ae).

8.1 TURNITIN

Students are required to submit all written assignments in soft copy through the TurnItIn system which is available online at www.turnitin.com. Every student must have a TurnItIn account. Failure to submit an assignment through TurnItIn will result in marks for that assignment being withheld. **Students do NOT need to hand in a printed copy of the TurnItIn Originality Report.** More information about TurnItIn (including how to create an account and add a class) will be provided in the first lecture. Students can download Frequently Asked Questions (FAQs) about TurnItIn from the SSP section of UOWD website (https://www.uowdubai.ac.ae/academic-resources/student-support-programs).

TurnItIn information required to add this subject:

Class ID:	Moodle Link
Password:	Moodle Link

8.2 REFERENCE & IN-TEXT CITATION

For information about referencing and in-text citation please review the *Academic Writing Presentation* available on the Student Online Resources website (http://my.uowdubai.ac.ae).

8.3 UOWD RULES & POLICIES

For information about UOWD Rules and Policies, please go to the Student Online Resources website (http://my.uowdubai.ac.ae) and click on the POLICIES link.

9 ATTENDANCE REQUIREMENTS

Attendance in this subject is compulsory. Failure to attend all tutorials and computer labs as per the Student Attendance Policy may result in a FAIL grade. Students are strongly encouraged to become familiar with this policy (which can be found on the Online Resources website at my.uowdubai.ac.ae).

10 TUTORIAL/COMPUTER LAB ENROLMENTS

All students must sign up for one tutorial and/or computer lab in Week 1. Admission to a tutorial/computer lab will not be possible unless the student's name is on the Attendance List for that class. No changes will be allowed once a student has enrolled in a tutorial/computer lab.

11 SUPPLEMENTARY ASSESSMENTS

A supplementary assessment may be offered to students whose performance in this subject is close (45-49 in the final examination and 48-49 in the composite score) to that required to pass the subject, and are otherwise identified as meriting an offer of a supplementary assessment. The precise form of a supplementary assessment will be determined at the time the offer of a supplementary is made.

12 Sustainability

UOWD encourages all students to act in a sustainable manner when planning and submitting assessments. If possible, students should not use plastic items, such as folders, covers, and bindings, and other synthetic materials, for presentations, workshops, and other activities. Students are also encouraged to avoid unnecessary printing; and if printing is required, please consider printing double-sided and only printing essential illustrations avoiding blocks of any colour as the use of ink is harmful to the environment. Always behave in a sustainable way.