

MODULE DESCRIPTOR

Module Title

Languages and Compilers

Reference	CM4106	Version	4
Created	September 2023	SCQF Level	SCQF 10
Approved	April 2017	SCQF Points	15
Amended	April 2024	ECTS Points	7.5

Aims of Module

This module will provide students with the theory, knowledge and skills that will provide them with a critical understanding of programming language design and facilitate in the implementation of simple compilers.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Conceptualise language syntax specifications and semantics.
- 2 Communicate the structure and phases of a conventional compilation process.
- 3 Critique the relationships between target platform architecture, compilers and programming language design.
- 4 Develop lexical and syntax analysis of a given language using appropriate techniques.
- 5 Invent a code generating compiler for a simple source language and a simple target architecture.

Indicative Module Content

This module will cover the theoretical knowledge and practical skills required to understand and construct conventional compilers for bespoke programming languages. The module will cover 4 main topics in language compiler and development. 1) Language Specification - Syntax and semantics, language grammar, derivation sequences. 2) Compiler Architecture - components, phases and general structures of compilers, including FSM approach and phase interactions 3) Analysis - Lexical, Syntax and semantic analysis as a compiler phase. Recursive descent compilation. Error detection 4) Code / Artefact Generation - generation of target platform code or artefact.

Module Delivery

Key concepts are introduced and illustrated through lectures and directed reading. The understanding of students is tested and further enhanced through interactive tutorials. In the laboratories, the student will progress through a sequence of exercises to develop sufficient knowledge and skills in language design and compiler development.

Indicative Student Workload

	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	120	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2, 3
Description:	A written exam.				

Component 2

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	4, 5
Description:	A coursework which involves the implementation of a complete, working compiler.				

MODULE PERFORMANCE DESCRIPTOR**Explanatory Text**

There are two assessment components: a written examination worth 50% and a coursework worth 50%. The minimum grade to pass the module is D.

		Examination:						NS
		A	B	C	D	E	F	
Coursework:	A	A	A	B	B	C	E	
	B	A	B	B	C	C	E	
	C	B	B	C	C	D	E	
	D	B	C	C	D	D	E	
	E	C	C	D	D	E	E	
	F	E	E	E	E	E	F	
NS		Non-submission of work by published deadline or non-attendance for examination						

Module Requirements

Prerequisites for Module	CM3113 Concurrent Programming or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

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| 1 | Watt, D.A., Brown, D.F. and Brown, D., 2000. Programming language processors in Java: compilers and interpreters. Pearson Education. |
| 2 | Lam, M., Aho, A.V., Sethi, R. and Ullman, J.D., 2013, Compilers: principles, techniques and tools. 2nd edition, Addison Wesley |
| 3 | Abelson, H. and Sussman, G.J., 1996. Structure and interpretation of computer programs. The MIT Press. |