London South Bank University
EST 1892

School of Engineering

Module Guide

Fundamentals of Computer Science

CSI_4_FCS

School of Engineering

Level 4

Template version: 8

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1. MODULE DETAILS

Module Title:	Fundamentals of Computer Science
Module Level:	4
Module Reference Number:	CSI_4_FCS
Credit Value:	20
Student Study Hours:	200
Contact Hours:	65
Private Study Hours:	135
Pre-requisite Learning (If applicable):	none
Co-requisite Modules (If applicable):	none
Course(s):	4637.1
Year and Semester:	2019-20, Semester 1
Module Coordinator (MC):	Lucia Otoyo
MC Contact Details (Tel, Email, Room):	020-7815-7480, lucia.otoyo@lsbu.ac.uk, FW-205
Teaching Team & Contact Details:	Mike Child, mike.child@lsbu.ac.uk, FW-112, 020-7815-7483, Emeka Ugwuanyi, ugwuanye@lsbu.ac.uk, FW-210, 020-7815-7511
Subject Area:	Computer Science and Informatics
Summary of Assessment Method:	Coursework only
External Examiner appointed for module:	Dr Nikolaos Thomos, Lecturer, Univ. of Essex

2. SHORT DESCRIPTION

This module introduces the history of computing, the role and the science of algorithms, abstraction, the binary numbering system and its representations, Boolean logic and gates, fundamentals of computer hardware, building computer circuits, the von Neumann model, introduction to hardware, data, and software, the nature of data and its operation.

3. AIMS OF THE MODULE

This module aims to give a comprehensive introduction to Computer Science, its theoretical basis and practical implementation in both hardware and software.

4. LEARNING OUTCOMES

LO1: Knowledge and Understanding

- Describe the historical foundations and contemporary development of computing theory and computer hardware. (Maps to: BCS 2.2.1 a1-a6, a9)

LO2: Intellectual Skills

- Describe what theoretical computing is and how it has been mechanically implemented in physical computers. (Maps to: BCS 2.2.1 a1-a6, a9)

LO3: Practical Skills

- Work with binary numbers and Boolean logic and identify the principle functionalities of the components of computer hardware. (Maps to: BCS 2.2.1 a7-a8)

LO4: Transferable Skills

- Reason about the underlying functional mechanisms at work in all kinds of computer systems. .(Maps to: BCS 2.2.1 c1-c2)

5. ASSESSMENT OF THE MODULE

The assessment is 100% coursework.

Summative Assessment

This module is primarily designed to impart knowledge and understanding, rather than skills, across a wide range of topics – consistent with expectations at Level 4. Multiple-choice tests are therefore an appropriate method of assessment, because they are able to assess knowledge and understanding in all of the areas covered by the module in an efficient manner.

The assessed coursework is expected to take the form of three in-class online multiple choice tests evenly spaced through the teaching. These three tests assess the following module learning outcomes: LO1 LO2, LO3 and LO4. The first two test will cover the material delivered in the preceding four-week block of teaching and the third test will cover all 12 topics. The material will be split into 12 weekly topics in three blocks of 4 weeks each, as follows:

- Weeks 2-5: Computer Systems & Data
- Weeks 6-9: Microprocessors, Memory & Input-Output
- Weeks 10-1: Boolean implementation, Abstraction and Algorithms

The format of the three in-class tests will be subset selection. Subset selection tests are a generalisation of traditional multiple-choice tests that cater for the situation in which a test taker can identify one or two wrong answers for a given question but not the right answer. Subset selection tests yield comparable but more reliable test scores as compared with traditional multiple-choice tests, because the test takers are no longer required to choose between alternative answers which they favour equally. Research has shown that this also makes the test format less stressful for students. The marking scheme is as follows:

- correct answer only selected => 1 mark
- correct answer plus one wrong answer => 0.5
- correct answer plus two wrong answers => 0.33
- no answers selected => 0.25
- any other response => 0

Test 1 will cover topics 1 to 4, and will consist of 20 questions. Test 2 will cover topics 5 to 8, and will also consist of 20 questions. Only the best of these two test marks will be counted for each student, and it will be worth 35% of the total module mark. Test 3 will be worth 65% of the total module mark; it will consist of 10 questions covering topics 1 to 4, plus 10 questions covering topics 5 to 8, plus a further 20 questions covering topics 9 to 12 – making 40 questions in total.

The first two tests are partly formative, partly summative, since only the best of the two test marks will be counted. Furthermore, students will be provided with the correct answers to these tests to reinforce their learning.

Test 3 is designed to encourage students to revise and improve their understanding of the material covered by the first two tests, as well as testing their understanding of the material covered in topics 9 to 12.

Formative Assessment

Skills for the summative assessment will be embedded throughout formative opportunities in Lectures and Workshops. Formative assessment will take different forms, such as:

- interactive revision quizzes

- verbal feedback on tutorial activities
- observation and questioning to provide instant feedback
- self assessment

Practice tests (formative)

Practice online tests will be available for the purpose of formative self-assessment. This formative assessment involves learning outcomes: LO1, LO2, LO3 and LO4.

Logbooks (formative)

Students are advised to maintain a logbook for recoding their learning from lab sessions. In-class feedback will be provided to ensure learning outcomes are met and concerns are addressed. This formative assessment involves learning outcomes: LO1, LO2, LO3 and LO4..

In order to pass this module, students must obtain a weighted average grade of at least 40%.

6. FEEDBACK

Feedback will normally be given to students 15 working days after the final submission of an assignment or as advised by their module leader.

General feedback, applying to all students, will also be placed on the module VLE site within 15 working days.

7. INTRODUCTION TO STUDYING THE MODULE

A. Overview of the Main Content

- The history of computer architectures
- Data representation for a range of common data types.
- Data processing operations, binary arithmetic.
- Processor operation and the fetch/execute cycle, simple processor operation and assembly language programming.
- Case study – x86 architecture and assembly language.
- Computer memory, caches, latency and storage mediums
- I/O fundamentals: handshaking, buffering, programmed I/O, interrupt-driven I/O
- The implementation of Boolean logic in hardware
- The concept and definition of algorithms

B. Overview of Types of Classes

The module will be taught using lectures and tutorials in a 1:2 ratio. Following an initial overview, the lectures examine all of the key parts of networked computer systems; their structure, operation and interactions. After each lecture you are expected to complete the associated tutorial questions in order to develop and reinforce your understanding of the principles involved. The tutorials form an important part of the module, allowing further investigation and discussion of the lecture topics and associated mathematical concepts. The tutorial questions associated with each topic will include practical exercises that provide some hands-on experience to complement the theoretical concepts. The module Moodle site will contain specific resources for each of the topics covered, including links to additional web-based resources. The practical exercises are designed to be capable of completion from any standard PC with an internet connection.

C. Importance of Student Self-Managed Learning Time

Student responsibility in the learning and development process will be emphasised. Students are required to undertake directed self-study and prepare solutions/discussions to questions relative to various topic areas. Students will be encouraged to identify for themselves particular problems of difficulty and to use seminar discussions, where appropriate, for the resolution of these. Students must regularly access the Moodle site for this module. They should download the class/lecture material from the Moodle site, and do the recommended reading, before each lecture/class.
Where appropriate, students are also expected to download the relevant seminar questions and study them in advance of each seminar, in order to derive maximum benefit from seminar time. The programme of teaching, learning and assessment gives guidance on the textbook reading required for each week, the purpose of which is to encourage further reading both on and around the topic.

D. Employability

This module provides an understanding of the basis on which all computer systems are built that gives immediate insight into their probable capabilities and limitations. This enhances your ability to quickly learn new systems whether as a user, administrator or developer. Almost every profession now involves computers and computing in some capacity, and this ability will be bring practical benefits to all of them.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

The material will be split into 12 weekly topics in three blocks of 4 weeks each, as shown below. Please note this Weekly teaching and learning programme is Indicative:

Week	Lecture/Tutorial Topic	Assessment
1	*Induction*	
2	Introduction to Computer Systems	
3	Data Representation	
4	Data Manipulation	
5	Peripheral Devices	
6	Microprocessors	Test 1
7	Assembly Language: Intel x86	
8	Memory (inc. cache memory)	
9	Input-Output	
10	Boolean logic	Test 2
11	The implementation of Boolean logic in hardware	
12	Algorithms	
13	Abstraction	
14	*Review*	Test 3
15	*Networking basics and tools*	

9. STUDENT EVALUATION

This module didn't run last year, but in academic year 17/18 60% of the students completed the MEQ. 90% of the students either agreed or strongly agreed that they are satisfied with the quality of this module.

10. LEARNING RESOURCES

Detailed lecture notes with links to relevant web pages for further reading will be provided.

Reading List

No single textbook has been found that is suitable as the core text for this module, however the syllabus can be covered by a combination of textbooks such as:

Brookshear, J. G., Brylow, D. (2015) Computer Science An Overview 12th Edition. Pearson

Dell, N., Lewis, J. (2015) Computer Science Illuminated 6th edition. Jones and Bartlett Publishers, Inc.

Forouzan, Behrouz A. (2014) Foundations of Computer Science 3rd edition. Andover: Cengage Learning, 2014.

Burd, S. D. (2016) *Systems Architecture* (7th edition), Cengage Learning

Patterson, D. A. & Hennessy, J.L. (2013) *Computer Organization and Design: The Hardware / Software Interface*, (5th edition), Morgan Kaufmann

Students will be also expected to refer to web-based information sources as required.