THE UNIVERSITY OF BUCKINGHAM

Sarajevo School of Science and Technology

MODULE SPECIFICATION

Name of Module		Computer Organization and Architecture					
Parent School/Dept		**Computer Science/Information Systems**					

Programme(s) where module is offered		BSc Computer Science with Electrical Engineering;
		BSc Computer Science with Economics;
		BSc Computer Science with Business;
		BSc Computer Science with International Relations;
		BSc Computer Science with Political Science;
		BSc Information Systems with Electrical Engineering;
		BSc Information Systems with Economics;
		BSc Information Systems with Business;
		BSc Information Systems with International Relations;
		BSc Information Systems with Political Science;					

Status (core, option, free choice)		Core		**Pre-Requisite Modules or Qualifications**		None	
FHEQ Level	4	**Unit Value**	8 ECTS	**Module Code**	**CS130**	**Module coordinator**	Dr. Jasminka Hasic Telalovic
Term taught		Spring		**Applicable From**		2016	

Educational Aims of the Module

The module aims to introduce students to the fundamentals of computer hardware and software. After a short historic review, the module introduces 7 layers of abstraction; deals with bits, data types and operations; and then goes into implementation of von Neumann architecture: hardware (gates, registers, processing unit, memory), sequencing (finite state machines), data representation and manipulation (numbers, characters, strings, structures), and instruction set and their implementation on hardware. Then the module teaches the art of programming (declarations, statements, control structures, functions, etc.) in machine and assembly language.

Module Outline/Syllabus

- History of computing and computers. Von Neumann architecture.
- Bits, Data Types, and Operations.
- Digital Logic Structures.
- Implementation of von Neumann model with LC-3 architecture.
- Programming organization of LC-3 machine.
- Assembly language programming.
- I/O interrupts and trap implementation.
- Functions, subroutines, the stack.
- Module Review and Conclusion.

Student Engagement Hours

Type	**Number per Term**	**Duration**	**Total Time**
Lectures	30	2 hours	60 hours
Tutorials	15	2 hours	30 hours
		Total Guided/Independent Learning Hours	**110**
		Total Contact Hours	**90**
		Total Engagement Hours	**200**

Assessment Method Summary

Type	**Number Required**	**Duration / Length**	**Weighting**	**Timing/Submission Deadline**
Final exam	1	180 minutes	50%	End of semester
Mid-term exam	1	90 minutes	25%	Mid-semester
Assignment (group)	2	2,000 words	15%	Week 4 and 12
Quiz	2	90 minutes	10%	Week 4 and 12

Module Outcomes		
Intended Learning Outcomes: 1. Understand the data flow in a computer. 2. Design any digital hardware device. 3. Understand Instruction Set Architecture. 4. Program in assembly language.	→	**Teaching and Learning Strategy:** 1. Lectures (ILO: 1-4) 2. Tutorials (ILO: 1-4)
	→	**Assessment Strategy** 1. Mid-term exam (ILO 1-3) 2. Assignment (ILO 3-4) 3. Quiz (ILO 1-4) 4. Final exam (ILO 1-4)
Practical Skills 1. Designing a simple computer (LC-3) using lower level devices and structures 2. Learning the ISA (Instruction Set Architecture) of the LC-3 and programming in machine language 3. Programming in assembly language	→	**Teaching and Learning Strategy:** 1. Tutorials with tutor-lead support (PS: 1-3) 2. Assignment (PS: 2,3) 3. Use of quizzes to test student subject knowledge (PS: 1-3)
	→	**Assessment Strategy** 1. Final exam (PS: 1-3) 2. Mid-term exam (PS: 1,2) 3. Assignment (PS: 2,3) 4. Quiz (PS: 1-3)
Transferable Skills 1. IT Skills 2. Ability to apply theory in practice 3. Team working skills 4. Critical thinking and reasoning	→	**Teaching and Learning Strategy:** 1. Lectures (TS: 2, 4) 2. Tutorials (TS: 1-4)
	→	**Assessment Strategy** 1. Mid-term exam (TS: 2,4) 2. Assignment (TS: 1-4) 3. Quiz (TS: 2,4) 4. Final exam (TS: 2,4)

Key Texts and/or other learning materials

Set Text

- Yale N. Patt, Sanjay J. Patel, (2004), Introduction to Computing Systems from bits and gates to C and beyond, 2nd Edition, McGraw-Hill 2004

Supplementary Materials

- Hyde R., (2004), Write Great Code: Volume I: Understanding the Machine, No Strach Press
- Nisan N., Schocken S., (2008),The Elements of Computing Systems: Building a Modern Computer from First Principles, The MIT Press
- Patterson, D., Hennessy, J., (2013), Computer Organisation and Design: The Hardware/Software Interface, 5th Edition, Morgan Kauffman
- Harris, S., Harris, D., (2015), Digital Design and Computer Architecture, Morgan Kauffman
- Hennessy, J., (2011), Computer Architecture, 5th Edition, Morgan Kauffman
- Goldstine, H., (2008) The Computer from Pascal to von Neumann, Princeton University Press

Additional Reading: As needed.

Please note: This specification provides a concise summary of the main features of the module and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module and programme can be found in the

departmental or programme handbook. The accuracy of the information contained in this document is reviewed annually by the University of Buckingham and may be checked by the Quality Assurance Agency.	
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