COURSE OUTLINE

School / Faculty:	Computing / Engineering	**Page:**	1 of 5
Program Name:	BACHELOR OF COMPUTER SCIENCE (COMPUTER NETWORK & SECURITY)		
Course code:	SECR1013	**Academic Session/Semester:**	2024/2025-2
Course name:	COMPUTER ORGANIZATION AND ARCHITECTURE	**Pre/co requisite (course name and code, if applicable):**	SECR1013 DIGITAL LOGIC
Credit hours:	3		

Course synopsis	This course was designed to give the understanding of basic concept of computer organization and architecture. Topics covered in this subject will be on computer performance, types of data and the representative, arithmetic manipulation, instruction execution, micro programmable control memory, pipelining, memory, input/output and instruction format. At the end of this course, the student should be able to understand the concept of overall computer component and realize the current technology in computer hardware.			
Course coordinator	Dr. Mohd Fo'ad bin Rohani			
Bachelor of Computer Science (major)	Assoc. Prof. Dr. Norafida binti Ithnin	01	02-22-01, Level 2 (N28A)	afida
	Dr. Mohd Fo'ad bin Rohani (P)	02, 04	347-02, Level 3 (N28)	foad
	Dr. Zuriahati binti Mohd Yunos	03, 08	N28-438-02, Level 4 N28	zuriahati
	Dr. Mohd Kufaisal bin Mohd Sidik	05, 09		mohdkufaisal@gmail.com
	Dr. Nur Haliza binti Abdul Wahab	06	02-11-01, Level 2 (N28a)	nur.haliza
	Dr. Maheyzah binti Md Siraj	10	347-02, Level 3 (N28)	maheyzah

Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

Prepared by: Name: Signature: Date:	Mohd Fo'ad Bin Rohani (COA Coordinator) 10 Mar 2025	Certified by: Name: Signature: Date:	Prof. Dr. Md Asri B. Ngadi (Director of Computer Science)

School / Faculty:	Computing / Engineering	**Page:**	2 of 8
Program Name:	BACHELOR OF COMPUTER SCIENCE (COMPUTER NETWORK & SECURITY)		
Course code:	SECR1033	**Academic Session/Semester:**	2024/2025-2
Course name:	COMPUTER ORGANIZATION AND ARCHITECTURE	**Pre/co requisite (course name and code, if applicable):**	SECR1013 DIGITAL LOGIC
Credit hours:	3		

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No.	CLO	PLO (CODE)	Weight (%)	*Taxonomies and **generic skills	T&L methods	Assessment methods***
CLO1	Describe the computer systems components and apply basic computer arithmetic and measure their performances.	**PLO1** (KW)	40	C3,C5	Lecture, Active learning, OFD	Q, MT, F
CLO2	Differentiate the different types of addressing modes and micro-instructions employed in a computer system.		30	C4	Lecture, Active learning, OFD	Q, MT, F
CLO3	Design and implement low level coding for operational computer systems.	**PLO3** (PS)	15	P4	Lab-based learning in group, video demo individual	L
CLO4	Demonstrate project deliverables in a group based on predefined specifications.	**PLO8** (LAR)	10	TW1 AD3	Proposal (review)	PR
		PLO9 (PRS)	5			Final Report

Refer *Taxonomies of Learning and **UTM's Graduate Attributes, where applicable for measurement of outcomes achievement ***MT – Mid-Term; Q-Quiz, L – Lab; PR – Project; Pr – Presentation; F – Final Exam

COURSE OUTLINE

Details on Innovative T&L practices:

No.	Type	Implementation
1.	Active learning, Online Forum Discussion (OFD),	Conducted through in-class activities.
2.	Project-based learning	Conducted through programming assignment. Students in a group of 3-4 are given 1 project that require assembly language solutions involving the problem specification and low-level machine coding using MS Visual Studio. Compliance to the problem specification need to be given in the form of written reports and source code. Or CPU performance analysis

Weekly Schedule:

Week	Topic	Activities
1 17/3 - 21/3	**MODULE 1: Basic Concepts and Computer Evolution** Course Overview, Main Components of Computer, Computer Structure and Functions, Computer Evolution, Computer Level Hierarchy	ONLINE Tutorial 1
2 24/3 - 28/3	**MODULE 2: Data Representation in Computer Systems** Fixed-Number Representation, Fixed-Number Arithmetic Operations (Addition, Subtraction, Multiplication and Division), …	ONLINE Tutorial 2 23 Mac (Sunday) – Sultan Johor Birthday
3 31/3 – 4/4	… Floating-Number Representation (IEEE 754), Floating-Point Arithmetic (Addition and Multiplication).	ONLINE 31 Mac (Mon) & 1 Apr (Tue) (Eid-Fitri)
4 7/4 – 11/4	**MODULE 3: Introduction to Assembly Language Programming** Constant, Identifiers, Expression, Data Type, Little Endian, Basic Instructions	Face to Face (F2F) Tutorial 3 Quiz 1 - M1/2

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5 14/4 – 18/4	**MODULE 3: Introduction to Assembly Language Programming** Constant, Identifiers, Expression, Data Type, Little Endian, Basic Instructions Lab installation software (VS and MASM) and Lab 1	F2F Lab 1 (mov, add, sub)
6 21/4 – 25/4	**MODULE 4: Instruction Set Architecture (ISA)** ISA Level, Element of Instructions, Instruction Types, Number of Addresses, …	Face to Face (F2F) Tutorial 4
7 28/4 –2/5	**MODULE 4: Instruction Set Architecture (ISA)** … Registers, Type of Operands, Addressing Modes, Instruction Format	Face to Face (F2F) Quiz 2 – M3&4 1/5 (Thu) – Labor day
8 5/5 –11/5	**MID-SEMESTER BREAK**	
9 12/5 -16/5	**MODULE 5: Central Processing Unit (CPU)** Datapath and Control Unit, Bus, Registers, Instruction Cycle (Fetch, Indirect, Execution, Interrupt)	Face to Face (F2F) Lab 2 (xchg, dec, inc, neg) 12 May (Wesak)
10 19/5 -23/5	Pipeline, Analogy Pipeline, Degree of Speedup, Instruction Pipeline, Pipeline Limitations, Resource Conflict, Data Dependency, Branch Difficulties	Face to Face (F2F) Tutorial 5 Lab 3 (flags, offset, arrays, jmp, loop) Mid-Term (M1-M4) - 21 May (Wed – 8pm – 10pm)
11 26/5 – 30/5	Control Unit (CU) Operation, Micro-operations, CU Functions, Microinstruction, Micro-programmed CU, Control Memory	Face to Face (F2F)

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12 2/6 – 6/6	**MODULE 6: Memory System** Memory Hierarchy, Random Access, Direct Access and Sequential Access, Main Memory - Types; RAM and ROM, Memory Location and Capacity, Latency and Cycle Time, Transfer Rate and Bandwidth, Memory Interleaving; HOI and LOI	Face to Face (F2F) Tutorial 6 3/6 (Mon) – Agong Birthday (Pertabalan) 6 Jun (Eid-Adha)
13 9/6 –13/6	Cache Memory: Cache Memory Principle, Cache Address Mapping Schemes - Direct Mapping, Block Direct Mapping, Fully Associative Mapping, Set Associative Mapping, Replacement Policy, Write Policy, Average Memory Access Time, Multilevel Caches, Virtual Memory	Face to Face (F2F) Quiz 3 – M5
14 16/6-20/6	**MODULE 7: Input / Output (I/O) and Storage System** I/O and Performance, I/O Architectures - Programmed I/O, Interrupt Driven I/O, Direct Memory Access (DMA), Channel I/O, Storage Systems, Magnetic Disk Technology, Optical Disks, Magnetic Tape, RAID	Face to Face (F2F) Tutorial 7
15 23/6 – 27/6	**MODULE 8: Performance Measurements and Analysis** Computer Performance Measures and Equation, CPU Execution Time, CPI, Increasing CPU Performance, Comparing CPU Performance, Average System Performance, Comparing Relative Performance, Benchmarking	Face to Face (F2F) Tutorial 8 Quiz 4 – M6 27 Jun (Awal Muharram)
16 1/7 – 7/7	**Revision Week** **Project Presentation**	
8/7 – 28/7	Final Exam Week **Project Presentation**	

* *Public Holidays:*

Birthday of His Majesty the Sultan of Johor (3/6); Eid Al-Fitri (31 Mac-1 Apr); Labour Day (1/5); Wesak Day (12/5); Pertabalan Agong (3/6), Eid Al-Adha (6/6)

COURSE OUTLINE

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

Team working, Scholarship

Student Learning Time (SLT) details:

L: Lecture, P: Practical (Lab), O: Others

Distribution of course content	Teaching and Learning Activities			TOTAL SLT
	Guided Learning (Face to Face)	Guided Learning Non-Face to Face	Independent Learning	

CLO	**Lecture**	**Tutorial**	**Practical**	**Other**		Non-Face to face	
CLO 1	18	5	4			25.75	**50h 45m**
CLO 2	17	2	2			10	**31h**
CLO 3			12		1	7	**20h**
CLO 4				1	1	10	**12h**
Total SLT	**28h**	**7h**	**18h**	**1h**	**2h**	**52h 45m**	**113h 45m**

Continuous Assessment (70M)		PLO	Percentage	Total SLT
1	Labs (1-3)	PLO3 (PS)	15	**As in CLO3**
2	Quiz (1-4)	PLO1 (KW)	20	**1h 15m**
3	Mid Term	PLO1 (KW)	20	**2h**
4	Group Project	PLO8 (LAR), PLO9 (PRS)	15	**As is CLO4**
Final Assessment (30M)			Percentage	Total SLT
1	Final Examination	PLO1 (KW)	30	**2.5**
Grand Total SLT			**100**	**120h**

COURSE OUTLINE

Computer lab with MS Visual Studio 2010

Learning resources:

Text book

W. Stalling, Computer Organization and Architecture, 10th Edition, Prentice Hall, 2016.

Main references

L. Null & J. Lobur, The Essentials of Computer Organization and Architecture, 4th Edition, 2015.

Kip R. Irvine, Assembly Language for Intel-based Computers, Prentice Hall, 6th edition, 2011.

Additional references

David Patterson and John Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5th Edition, Morgan Kaufmann, 2014.

Mano, M. Morris, Computer System Architecture, 3rd Edition, Prentice-Hall, 1993.

Online http://elearning.utm.my

Academic honesty and plagiarism:

Assignments are individual tasks and NOT group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES). Copying of work (texts, lab results etc.) from other students/groups or from other sources is not allowed. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of **zero** for the assignment and exams and disciplinary steps may be taken by the Faculty. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy.

COURSE OUTLINE

Other additional information (Course policy, any specific instruction etc.):

1. Attendance is compulsory and will be taken in every lecture session. Student with less than 80% of total attendance is not allowed to sit for final exam.
2. Students are required to behave and follow the University's dressing regulation and etiquette all the time.
3. Exercises and tutorial will be given in class and some may be taken for assessment. Students who do not do the exercise will lose the coursework marks for the exercise.
4. Assignments must be submitted on the due dates. Some points will be deducted for late submissions. Assignments submitted three days after the due date will not be accepted.
5. Make up exam will not be given, except to students who are sick and submit medical certificate confirmed by UTM panel doctors. Make up exam can only be given within one week of the initial date of exam.

No	Assessment	PLO1 (KW)		PLO3 (PS)	PLO8 (LAR)	PLO9 (PRS)	TOTAL
		CLO1	CLO2	CLO3	CLO4	CLO4	
1	LABS (3)			15			15
2	QUIZ (4)	10	10				20
3	MID-TERM	10	10				20
4	FINAL EXAM	20	10				30
5	PROJECT REPORT				10	5	15
TOTAL PLO		70		15	10	5	100

Disclaimer: