



COLLEGE OF COMPUTER STUDIES
INFORMATION TECHNOLOGY DEPARTMENT

COURSE SYLLABUS

COURSE TITLE	Architecture and Organization
COURSE CODE	AR101
CREDIT UNITS	3
COURSE PREREQUISITE	CC103
COURSE DESCRIPTION	The course discusses on how to develop a deeper understanding of the hardware environment upon which all computing is based, and the interface it provides to higher software layers. It acquires an understanding and appreciation of a computer system's functional components, their characteristics, performance, and interactions, and, in particular, the challenge of harnessing parallelism to sustain performance improvements now and into the future. It also needs to understand computer architecture to develop programs that can achieve high performance through a programmer's awareness of parallelism and latency.

VISION	MISSION	CORE VALUES
<i>To be recognized as the #1 local university of employable graduates.</i>	<i>To provide a comprehensive education that enhances the lives of QCU students for nation building and as world citizens.</i>	<i>J</i> ointness of undertaking and <i>O</i> rganizational adaptability with <i>Y</i> oke of Efficiency and Effectiveness
INSTITUTIONAL OUTCOMES	PROGRAM OUTCOMES	COURSE OUTCOMES
QCU graduates are: Qualified in their chosen field locally and globally Competent and effective communicators Unique in demonstrating their sense of genuine nationalism and patriotism	Common to all Programs The graduates of BSIT have the ability to a.) Articulate and discuss the latest developments in the specific field of practice; b.) Effectively communicate orally and in writing using both English and Filipino c.) Work effectively and independently in multi-disciplinary and multi-cultural teams d.) Act in recognition of professional, social, and ethical responsibility e.) Preserve and promote "Filipino historical and cultural heritage"	<i>At the end of the course, the student should be able to:</i> LO1 – Create a computer program using Intel's instruction sets programming model in assembly language. LO2 – Apply the different Arithmetic instructions. LO3 – Apply the different Logic instructions.



	<p>Common to the discipline</p> <p>The graduates of BSIT must have the ability to</p> <ul style="list-style-type: none">a.) Analyze complex problems, and identify and define the computing requirements needed to design an appropriate solutionb.) Apply computing and other knowledge domains to address real word problemsc.) Design and develop computing solutions using a system-level perspectived.) Utilize modern computing tools	
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OUTCOMES-BASED TEACHING AND LEARNING (OBTL) PLAN

WEEK	LEARNING OUTCOMES	TOPIC	METHODOLOGY <i>Flexible Teaching Learning Activities</i>	LEARNING AND TEACHING RESOURCES	ASSESSMENT and TASKS
1	<ul style="list-style-type: none">• Know the importance of the subject.• Memorize the QCU Mission and Vision.• Determine the course requirements.• Understand the Grading System of the University	Course Orientation <ul style="list-style-type: none">• Mission• Vision• Course Syllabus• Grading System• Classroom policies• Course Requirements	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation	Oral recitation Questions and Answers
2	<ul style="list-style-type: none">• Integrate Computer Organization and Computer Architecture.• Classify the basic Architecture of a Computer.• Identify the Types of Programming Languages.	Introduction to Computer Architecture and Organization. Basic Structure of Computer Hardware and Software <ul style="list-style-type: none">• The Digital Computer.• Types of Computers	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Video (Introduction to Computer Architecture and Organization) Google Workspace	Questions and Answers Assignment 1



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	<ul style="list-style-type: none">• Identify the characteristics of low and high-level programming languages.• Understand the basic operations of a computer	<ul style="list-style-type: none">• Functional Units of a Computer System.<ul style="list-style-type: none">▪ Input Unit▪ Memory Unit / Primary Storage.<ul style="list-style-type: none">◦ Main Memory Divisions.▪ The Memory Unit / Secondary Storage.• Processing Unit• Output Unit <p>Basic Operations of a Computer</p> <p>Basic Types of Computer Architecture</p> <p>Types of Programming Languages.</p> <ul style="list-style-type: none">• Advantages of High-Level Languages over Low-Level Languages.• Advantages of a Low-Level Languages over High-Level languages.• EMU8086 Emulator as a low-level language compiler.			
3	<ul style="list-style-type: none">• Describe the connections between main memory and CPU.• Illustrate the basic operational concepts of the CPU.• Discuss the different Bus Structures.	Main Memory and Central Processing Unit <ul style="list-style-type: none">• Fetch/Read Data or Instruction from main Memory.• Write/Store Data into main Memory.• Basic Operational Concepts of Main Memory and CPU.	Blended Learning (Online/Onsite) Lecture Discussion Demonstration	PowerPoint presentation Video (Main Memory and Central Processing Unit) Google Workspace	Activity 1 – Hello world program in assembly language. Quiz #1 – Week 2 and 3 coverage.



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	<ul style="list-style-type: none">• Classify the main Memory Operations.	<p>CPU Operating Steps</p> <ul style="list-style-type: none">• CPU Instruction Execution• Two Parts of Instructions• Instruction and Instruction Sequencing• Instruction Notations• Address Notations<ul style="list-style-type: none">▪ Zero Address▪ One Address▪ Two Address▪ Three Address• Two-Phase Procedure in Instructions Execution<ul style="list-style-type: none">▪ Instruction Execution and Straight-Line Sequencing▪ Branching• Bus Structures<ul style="list-style-type: none">▪ Single Bus▪ Two-Bus <p>Main Memory Operations</p> <ul style="list-style-type: none">• Memory Locations and Addresses			
4	<ul style="list-style-type: none">• Identify the History of Intel Microprocessors.• Classify the types of memory• Recognize the Intel's Instruction sets programming model	<p>History of Intel Microprocessors</p> <ul style="list-style-type: none">• 4-Bit Microprocessor• 8-Bit Microprocessor• 16-Bit Microprocessor <p>Logical and Physical Memory</p>	<p>Blended Learning (Online/Onsite)</p> <p>Lecture</p> <p>Discussion</p>	<p>PowerPoint presentation</p> <p>Video (Intel Micro-Processors, Logical and Physical Memory)</p> <p>Google Workspace</p>	Activity 2 – Pointers and Registers



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		<ul style="list-style-type: none">• Logical Memory• Physical Memory <p>Register structure of 8086/8088 microprocessors.</p> <ul style="list-style-type: none">• Basic 8088/8086 Architecture.• 8088/8086 Bus Architecture• General Purpose Registers.• Pointer and Index Registers• Status Register or Processor Status Word• Segment Registers and Memory Segmentation• Generating a Memory Address			
5	<ul style="list-style-type: none">• Describe memory segmentation• Identify Stack Operations.• Illustrate addressing modes.	<p>Memory Segments</p> <ul style="list-style-type: none">• Types of Memory Segments <p>Stack Operations</p> <ul style="list-style-type: none">• Pushing of Data onto STACK• Popping a Data onto a Stack <p>Addressing Modes</p> <ul style="list-style-type: none">• Types of Data Addressing Modes.<ul style="list-style-type: none">▪ Register Addressing▪ Immediate Addressing▪ Direct Addressing▪ Register Indirect Addressing▪ Register Relative Addressing or Base Addressing	<p>Blended Learning (Online/Onsite)</p> <p>Lecture</p> <p>Discussion</p>	<p>PowerPoint presentation</p> <p>Video (Understanding Memory Segments, Stacks Operations and Addressing modes)</p> <p>Google Workspace</p>	Assignment #2



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		<ul style="list-style-type: none">▪ Base-Plus-Index Addressing▪ Base-Relative-Plus-Index Addressing			
6	<ul style="list-style-type: none">• Identify the different Data Transfer Instructions.• Use the data transfer instructions command in a program output.	Data Transfer Instructions <ul style="list-style-type: none">• Classifications of Instructions• MOV Instruction• XCHG Instruction• PUSH Instruction• POP Instruction• LEA Instruction• Data Instruction Exercise.	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Video (Data Transfer Instructions) Google Workspace	Quiz #2 (Coverage week 4 and 5)
7	<ul style="list-style-type: none">• Identify how to convert different number systems.• Illustrate the hardware circuitry of adding two positive numbers.• Recall how to design a fast Adder Circuit.	The Arithmetic Unit - Part 1 <ul style="list-style-type: none">• Review of Number Representation• Sign and Magnitude• 1's Complement• 2's Complement• Addition of Positive Numbers• Full Adder• N-Bit Ripple Carry Adder• Design of Fast Adder• Carry-lookahead Adders	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Video (Arithmetic Unit 1) Google Workspace	Assignment #3
8	<ul style="list-style-type: none">• Apply signed Addition and Subtraction.• Apply Multiplication of Positive Numbers.• Classify and Apply Booth Algorithm.	The Arithmetic Unit - Part 2 <ul style="list-style-type: none">• Signed Addition and Subtraction• Binary Addition-Subtraction Logic Network• Overflow	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Video (Arithmetic Unit 2) Google Workspace	Quiz #3 (Coverage 6 and 7) Activity #3 – Arithmetic Operations



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		<ul style="list-style-type: none">• Multiplication of Positive Numbers• Binary Multiplier• Signed-Operand Multiplication• Booth Algorithm			
9	MIDTERM EXAMINATION				
10	<ul style="list-style-type: none">• Apply fast Multiplication Technique.• Illustrate the hardware circuitry of Integer Division.• Describe single-precision and double-precision of floating-point numbers.• Apply Arithmetic Operations in on floating point numbers.	<p>The arithmetic unit - part 3</p> <ul style="list-style-type: none">• Fast Multiplication• Bit-Pair Recording• Integer Division• Restoring Division• Non-Restoring Division• Floating-Point Numbers and Operation<ul style="list-style-type: none">▪ Floating-Point Number: Single-Precision▪ Floating-Point Number: Double-Precision	<p>Blended Learning (Online/Onsite)</p> <p>Lecture</p> <p>Discussion</p>	<p>PowerPoint presentation</p> <p>Google Workspace</p>	Assignment 1
11	<ul style="list-style-type: none">• Identify all Arithmetic Instructions.• Apply the different Arithmetic Instructions.	<p>Arithmetic Instructions</p> <ul style="list-style-type: none">• Review of Some Concepts Regarding the Binary Number System• The ADD Instruction• The ADC Instruction• The INC Instruction• The DAA Instruction<ul style="list-style-type: none">▪ The AAA Instruction▪ The SUB Instruction▪ The SBB Instruction▪ The DEC Instruction	<p>Blended Learning (Online/Onsite)</p> <p>Lecture</p> <p>Discussion</p> <p>Demonstration</p>	<p>PowerPoint presentation</p> <p>Video (Arithmetic instructions)</p> <p>Google Workspace</p>	Activity 1 -Arithmetic Instructions



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		<ul style="list-style-type: none">▪ The DAS Instruction▪ The AAS Instruction			
12	<ul style="list-style-type: none">• Identify the different Logic Instructions• Apply the different Logic Instructions.	Logic Instructions <ul style="list-style-type: none">▪ The NEG Instruction▪ The CMP Instruction▪ The AND Instruction▪ The OR Instruction▪ The XOR Instruction▪ The NOT Instruction▪ The TEST Instruction Logic instruction tracing program	Blended Learning (Online/Onsite) Lecture Discussion Demonstration	PowerPoint presentation Video (Logic Instructions) Google Workspace	Quiz #1 (Coverage week 10-12)
13	<ul style="list-style-type: none">• Identify the different SHIFT Instructions.• Apply the different SHIFT Instructions.• Identify the different ROTATE Instructions.• Apply the different ROTATE Instructions.	Shift and Rotate Instructions <ul style="list-style-type: none">• The SHL Instruction• The SAL Instruction• The SHR Instruction• The SAR Instruction• The ROL Instruction• The ROR Instruction• The RCL Instruction• The RCR Instruction	Blended Learning (Online/Onsite) Lecture Discussion Demonstration	PowerPoint presentation Video (Shift and rotate instructions) Google Workspace	Assignment 2 Activity 2 – Rotate instructions
14	<ul style="list-style-type: none">• Apply the steps in Instruction Execution.• Classify how gating circuits are used in Data Transfers.• Create control signals for Arithmetic or Logic Operation.	The Processing Unit - Part 1 <ul style="list-style-type: none">• Fundamental Concepts CPU Processing Review<ul style="list-style-type: none">▪ Connection between Processor and Main Memory▪ Operating Steps	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Video (Processing Unit 1) Google Workspace	Quiz 2 (Coverage Week 12-13)



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		<ul style="list-style-type: none">▪ Processes during the Execution▪ Steps in Instruction Execution▪ Data Paths in Single-Bus Organization • Processor Operations• Register Transfer• Input and Output gating for the ALU• Performing an Arithmetic or Logic Operation			
15	<ul style="list-style-type: none">• Apply memory function complete signal in fetching a word from a memory and storing a word into memory.• Determine how to write the control sequence of a complete instruction execution	The Processing Unit - Part 2 <ul style="list-style-type: none">• Fetching a WORD from Memory• Input and Output Gating of Main Memory• Memory Function Complete• Storing a WORD into the Memory• Execution of a Complete Instruction•	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Google Workspace	Assignment #3
16	<ul style="list-style-type: none">• Illustrate how branching is implemented in single bus organization,• Classify the Hardwired Control Technique.• Determine how to design the combinational Circuit of a given control signal	The Processing Unit - Part 3 <ul style="list-style-type: none">• Execution of a Complete Instruction (Continuation)• Branching• Unconditional Branching• Sequence of Control Signals<ul style="list-style-type: none">▪ Hard Wired Unit▪ Micro-programmed Control	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Google Workspace	Quiz #3 (Coverage week 14 – 15)
17	<ul style="list-style-type: none">• Describe the Hardware Implementation of the micro-programmed control.• Generate control sequence for Two-Bus Organization.	The Processing Unit - Part 4 <ul style="list-style-type: none">• Micro-Programmed Control (Continuation)	Blended Learning (Online/Onsite) Lecture Discussion	PowerPoint presentation Google Workspace	Activity #3



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	<ul style="list-style-type: none">• Illustrate the main memory concepts• Two-Bus Structure for Micro-Programmed Control• Input and Output Gating for Registers• Execution of a Complete Instruction• Some Basic Concepts of Micro-Programmed Control• Main Memory to the Processor• Memory Technologies			
18	FINAL EXAMINATION			

SUGGESTED READINGS AND REFERENCES

- Elahi, Ata. (2018). *Computer systems: digital design, fundamentals of computer architecture and assembly language*.
- Null, L. & Lobur, J. (2018) *Essentials of Computer Organization and Architecture*.
- Wang, R.S. (2017) *Embedded and Real-Time Operating Systems*.
- Patterson & Hennessy (2017) *Computer Organization and Design: The Hardware Software Interface*:
- Dhamdhere, D.M. (2016) *Operating Systems: A Concept Based Approach*.
- Inglander, I. (2016). *The Architecture of Computer Hardware, Systems Software, and Networking: An Information*.
- Pullin, A. (2016). *William Stallings Computer Organization and Architecture 10th Edition*.

COURSE POLICIES AND STANDARDS

Expectation from Student

The student's responsibility is to come to each class prepared, and to participate actively in the discussions. Student should read the assigned coursework prior to class, and to present reports as scheduled. S/he is also expected to take all quizzes and examinations and to submit all course requirements on the dates scheduled. S/he is expected to observe proper and polite behavior at all times, adhering to the rules and policies of QCU.

Language of Instruction

The language of instruction is English.



Attendance

Students are required to attend all classes starting with the first meeting. Non-attendance in any required class or academic activity constitutes an absence. A student who has been absent for more than 20 percent of the hours of recitation, lectures, or any other scheduled work in this course shall be automatically dropped from the class roll and the Registrar shall be advised accordingly.

Student Rights and Responsibilities

The QCU Student Manual establishes students' freedoms and protections as well as expectations of appropriate behavior and ethical academic work. The Handbook includes items such as the Policy on Student Rights, the Policy on Student Conduct, and the Academic Integrity Policy.

Academic Integrity

Any work that students submit should be their own work (i.e., not borrowed/copied from any other source, including their classmates). When using other people's ideas to substantiate their ideas, students are expected to properly cite the original source. Proper citation procedures shall be discussed in class. Any act of cheating or plagiarism shall be treated in accordance with the Institute's Policy on Academic Integrity. Depending upon the individual violation, students could face penalties ranging from failing the assignment to failing the class.

Grading System

The College of Computer Studies follows the university grading system given below:

Middle term Grade (MTG)		Final Term Grade (FTG)		FINAL GRADE:
*Class Standing	60%	*Class Standing	60%	Midterm Grade 50%
Midterm Exam Grade	40%	Final Exam Grade	40%	Final Term Grade 50%
Total	100%	Total	100%	Total 100% or (MTG + FTG)/2

**Class Standing (60%)*

- *Online Discussion/ Presentation* 5%
- *Assignment* 10%
- *Quizzes* 25%
- *Output/Machine Problem* 20%

Rubrics for Course Output/Requirements

Group Project Criteria:

Peer Evaluation	-	20%
Individual Grade	-	30%
Group Grade	-	50%



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= 100%

Student Course Portfolio

All exercises, activities and requirements for the course must be compiled by the students and must be submitted to the instructor before the end of the semester.

Learners with Disabilities

The University and the College of Computer Studies strives to make all learning experiences as accessible as possible. If a student anticipates or experiences barriers based on their disability (including mental health, chronic or temporary medical conditions), the students need to inform their instructor immediately so that they can discuss options privately. To establish reasonable accommodations, the students need to register in the "List of Learners with Disabilities" at the Office of Student Affairs and Services.

Syllabus Flexibility

The instructor reserves the right to amend or change this syllabus as needed. For example, the instructor may modify content, and/or substitute assignments in response to institutional, weather, or class situations. Any modification, however, must be communicated by the instructor to the Dean through the Chairperson. Approved changes shall be discussed by the instructor in class.

EFFECTIVITY AND REVISION		PREPARED BY	REVIEWED BY	RECOMMENDING APPROVAL	APPROVED BY
Issue No.	Revision No.	 Luisito D.C. Soriano Faculty	 Maria Aura Impang, LPT, MSIT Program Chair, Information Technology Department	 Dr. Isagani M. Tano Dean, College of Computer Studies	 Dr. Bradford Antonio Martinez Vice President for Academic Affairs
QA Doc No.	Effectivity AY 2022-2023				

The original copy of this document is filed at the Office of the Dean copy furnished the Quality Assurance Office.

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