



**University/Academy:** Arab Academy for Science, Technology & Maritime Transport  
**Faculty/Institute:** College of Engineering & Technology  
**Program:** B.Sc Computer Engineering

### Form no. (12): Course Specification

#### 1- Course Data

Course Code: <b>CC311</b>	Course Title: <b>Computer Architecture</b>	Academic Year/Level: year <b>3</b> / semester <b>6</b>
Specialization: <b>Computer Engineering</b>	<b>Credit Hours: 3    Lecture: 2    Tutorial: 2    Lab: 2</b>	<b>Prerequisite</b> ----- CC317

#### 2- Course Aim

To introduce students to the basic concepts of computer architecture and organization through the study of the fundamentals associated with subject matter.

#### 3- Intended Learning Outcomes

<b>a- Knowledge and Understanding</b>	<p>a5. Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.</p> <ul style="list-style-type: none"> <li>• Show facts, concepts, principles and theories relevant to comp. eng.</li> <li>• Tabulate engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.</li> <li>• Quote quality assessment of computer systems.</li> <li>• Describe related research methods and approaches to create more advanced products.</li> <li>• Identify principles of design specific to computer engineering;</li> <li>• Understand the impact of computer engineering solutions in a global and societal context.</li> </ul>
<b>b- Intellectual Skills</b>	<p>b2. Think in a creative and innovative way in problem solving and design using the latest technologies and solve engineering problems, often on the basis of limited and possibly contradicting information while identifying symptoms in problematic situations.</p> <ul style="list-style-type: none"> <li>• Demonstrate a high level of competence in identifying, defining and solving computer engineering problems</li> <li>• Maintain a theoretical approach in dealing with new and advancing technology</li> <li>• Select and apply appropriate IT tools to a variety of computer engineering problems</li> </ul> <p>b4. Assess and evaluate the characteristics and performance of components, systems and processes and investigate their failure.</p> <ul style="list-style-type: none"> <li>• Select and apply appropriate design tools, computing methods, design techniques and tools in computer engineering disciplines, for modeling and analyzing computer systems</li> <li>• Evaluate different techniques and strategies for solving computer engineering problems</li> </ul>
<b>c- Professional Skills</b>	<p>C1. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.</p> <ul style="list-style-type: none"> <li>• Use appropriate specialized computer software, computational tools and packages.</li> <li>• Write computer programs.</li> </ul>

	<p><b>C2. Create and/or re-design a process, component or system, and carry out specialized engineering designs with neatness and aesthetics in design and approach.</b></p> <ul style="list-style-type: none"> <li>• Observe, record and analyze data in laboratory using the appropriate simulation tools.</li> <li>• Integrate technical professionalism and societal and ethical responsibility.</li> </ul> <p><b>C3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment, wide range of analytical tools, techniques, and software packages pertaining to the computer engineering to design experiments, collect, analyze and interpret results and develop required computer programs.</b></p> <ul style="list-style-type: none"> <li>• Use laboratory and field equipment competently.</li> </ul>
<b>d- General Skills</b>	<p><b>d2. Work in stressful environment and within constraints, communicate effectively, lead and motivate individuals and effectively manage tasks, time, and resources.</b></p> <ul style="list-style-type: none"> <li>• Apply knowledge of computing, mathematics and logical skills appropriate to the computer engineering discipline</li> <li>• Use general computer and software tools professionally.</li> <li>• Analyze operations, realize requirements and constraints of projects and consequently achieve an appropriate cost effective design.</li> <li>• Perform troubleshooting in computer systems.</li> <li>• Demonstrate inductive reasoning abilities, figuring general rules and conclusions about seemingly unrelated events</li> <li>• Analyze the local and global impact of computing on individuals, organizations and society.</li> </ul>

#### 4- Course Content

<b>Week No.1</b>	Introduction-overview of computer architecture - lecturer grading policy.
<b>Week No.2</b>	Computer abstraction and technology + project term.
<b>Week No.3</b>	The role of performance.
<b>Week No.4</b>	MIPS Assembly Language.
<b>Week No.5</b>	Instructions for making decisions and procedures calls.
<b>Week No.6</b>	Addressing modes.
<b>Week No.7</b>	7 <sup>th</sup> Week Exam + Revision
<b>Week No.8</b>	The processor: Data path and control.
<b>Week No.9</b>	Single-Cycle Data path.
<b>Week No.10</b>	Multi-Cycle Data path.
<b>Week No.11</b>	Exceptions
<b>Week No.12</b>	12 <sup>th</sup> Week Exam.+Revision
<b>Week No.13</b>	Pipelining concept
<b>Week No.14</b>	Hazards and Dependencies in pipelining.
<b>Week No.15</b>	Cache and Virtual memory.
<b>Week No.16</b>	Presentation of projects and Final Exam.

#### 5- Teaching and Learning Methods

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports &amp; sheets</li> <li>• Laboratories</li> <li>• Seminars</li> </ul>
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#### 6-Teaching and Learning Methods for Students with Special Needs

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports &amp; sheets</li> <li>• Laboratories</li> <li>• Seminars</li> </ul> <p>The academic advisors of each student, as well as dedicated department TAs monitor the students' progress and solve any problem he/she may encounter.</p>
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## 7- Student Assessment

<b>a-Procedures used</b>	1-Written Examinations to assess The Intended Learning Outcomes. 2-Class Activities (Reports, Discussions, -----) to assess The Intellectual Skills.	
<b>b- Schedule:</b>	Assessment 1 Assessment 2 Assessment 3 Assessment 4	7 <sup>th</sup> Week Written Exam 12 <sup>th</sup> Week Written Exam Continuous Assessments 16 <sup>th</sup> Week Final Written Exam
<b>c- Weighing of Assessment</b>	7 <sup>th</sup> Week Examination 12 <sup>th</sup> Week Examination Final-term Examination Oral Examination Practical Examination Semester Work Total	30 % 20 % 40 % 0 % 0 % 10 % 100%

## 8- List of References:

<b>a- Course Notes</b>	
<b>b- Required Books</b> (Textbooks)	Patterson, David A, "Computer Organization and Design, The Hardware and Software Interface (2412)", Elsevier LTD. 4ED
<b>c- Recommended Books</b>	<ul style="list-style-type: none"><li>• Computer Design Fundamentals, M. Mano C. Kime, 2003</li><li>• Computer Architecture, Flynn, Michael, 1995</li></ul>
<b>d- Periodicals, Web Sites, etc.</b>	N/A

**Course Instructor:**  
**Dr. Ahmed Abou El-Farag**

**Program Manager:**  
**Prof. Dr. Mohamad AbouEl-Nasr**

**Dean of College of Engineering and Technology of AASTMT**  
Name: **Prof. Moustafa Hussein Aly**  
Signature:

**Executive Manager of Quality Assurance Center of AASTMT**  
Name: **Prof. Aziz Ezzat**  
Signature: