ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

Computer Organization and Architecture

14032205-4

Course Specifications

Institution	Date of Report
Umm Al-Qura University	15/04/2016
College/Department **College of Computer & Information Systems**	

A. Course Identification and General Information

1. Course title and code:
Computer Organization and Architecture 14032205-4
2. Credit hours **4**
3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
Dr. Turki Al-Somani
5. Level/year at which this course is offered **Level 6**
6. Pre-requisites for this course (if any)
Digital Logic Design
7. Co-requisites for this course (if any)
8. Location if not on main campus
Al-Abidiyah Umm Al Qura University - Makkah Al Mukarramah
9. Mode of Instruction (mark all that apply)

a. Traditional classroom	yes	What percentage?	100
b. Blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. Correspondence		What percentage?	
f. Other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?

- An ability to evaluate and analyze computer performance
- An ability to understand computer instruction set architecture
- An understanding of basic computer arithmetic algorithms
- An ability to understand data-path and pipelining
- An ability to analyse and evaluate memory hierarchy
- An ability to understand I/O and storage devices
- An ability to understand the architecture of multiprocessors
- An ability to write assembly language programs using MIPS assembly language (labs)
- A working knowledge of modern computer architecture concepts and components via projects to increase the overall understanding of modern computer architectures.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

The contents of course must be reviewed and changed after every semester to include current research topics in the relevant area.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Introduction to computer organization and architecture	1	3
Instruction-set architecture (ISA) for MIPS	2-3	6
Implementation of ISA (datapath and controller)	4-5	6
Pipelined datapath and controller	6-7	6

Hazards in pipelining and remedies	8-9	6
Introduction to memory hierarchy design	10-11	6
Cache and virtual memory design	12-13	6
Storage and I/O devices	14	3

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	42	12	42	work/Internship		
Credit	3		1			

3. Additional private study/learning hours expected for students per week.

1. 3 x 50 mins lectures
2. 3 x 50 mins labs

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	1. Students will learn the fundamentals of computer organization, architecture and its relevance to classical and modern problems of computer design 2. Students will be able to identify where, when and how enhancements of computer performance can be accomplished. 3. Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field. 4. Student will see how to use concepts of computer organization in real-life settings using various PC performance improvements. Students will also be introduced to more recent applications of computer organization and architecture in advanced digital systems	Case studies: - develops analytic and problem solving skills - allows for exploration of solutions for complex issues - allows student to apply new knowledge and skills Real-life examples: allows analysis of real-world scenarios Analyse ideas and concepts bought forward in class lectures Open-communication with students – show willingness to assist and take questions from students and clarify explanations in the class	• Exercises & Home works , Quizzes, Midterm, Project , Final Exam • Review outputs from the assignments in the computer lab and also from their assignments and projects.
2.0	**Cognitive Skills**		
2.1	• Group report and group presentation: to identify leaders, followers, hard-workers, contributors, slackers and to see whether students are comfortable in working with their peers • Accountability • Their ability to be in class on time and the number of times, meet deadlines and contribute in group work • Their ability to respect class rules	• **Written Examinations** • **Assignments** • **Quizzes** • **Assessed class work and lab work** • **Classroom interactions**	• **Written Examinations** • **Assignments** • **Quizzes** • **Assessed class work and lab work**

	and college policies •		
3.0	**Interpersonal Skills & Responsibility**		
3.1	**i. Understand and communicate to others the importance and relevance of computer organization and architecture in the modern world.** **ii. Be an independent learner, able to acquire further knowledge with some guidance or support.** **iii. Participate in group discussions** **iv. Manage time and meet deadlines.** **v. Cheating will not be tolerated** **vi. This course requires significant effort** vii. **Library Usage**	i. Case studies: - develops analytic and problem solving skills - allows for exploration of solutions for complex issues - allows student to apply new knowledge and skills ii. Real-life examples: allows analysis of real-world scenarios iii. Analyse ideas and concepts bought forward in class lectures iv. Open-communication with students – show willingness to assist and take questions from students and clarify	**1. Written Examinations** **2. Assignments** **3. Quizzes** **4. Assessed class work and lab work** 5. **Classroom interactions**

		explanations in the class	
4.0	**Communication, Information Technology, Numerical**		
4.1	(i) Description of the skills to be developed in this domain • Case studies: the key method of discovering students dexterity in analyzing • Their recommendations, opinions and suggestions • Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills • Class discussions should indicate a student's prowess in responding	• **Written Examinations** • **Assignments** • **Quizzes** • **Assessed class work and lab work** • **Classroom interactions** • **Mini projects to be developed in Lab**	• Case studies: the key method of discovering students dexterity in analyzing • Their recommendations, opinions and suggestions • Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills • Class discussions should indicate a student's prowess in responding
5.0	**Psychomotor**		
5.1		• **Written Examinations** • **Assignments** • **Quizzes** • **Assessed class work and lab work** • **Classroom interactions** • **Mini projects to be developed in Lab**	

Suggested Guidelines for Learning Outcome Verb, Assessment, and Teaching

NQF Learning Domains	Suggested Verbs
Knowledge	list, name, record, define, label, outline, state, describe, recall, memorize, reproduce, recognize, record, tell, write
Cognitive Skills	estimate, explain, summarize, write, compare, contrast, diagram, subdivide, differentiate, criticize, calculate, analyze, compose, develop, create, prepare, reconstruct, reorganize, summarize, explain, predict, justify, rate, evaluate, plan, design, measure, judge, justify, interpret,

	appraise
Interpersonal Skills & Responsibility	demonstrate, judge, choose, illustrate, modify, show, use, appraise, evaluate, justify, analyze, question, and write
Communication, Information Technology, Numerical	demonstrate, calculate, illustrate, interpret, research, question, operate, appraise, evaluate, assess, and criticize
Psychomotor	demonstrate, show, illustrate, perform, dramatize, employ, manipulate, operate, prepare, produce, draw, diagram, examine, construct, assemble, experiment, and reconstruct

Suggested ***verbs not to use*** when writing measurable and assessable learning outcomes are as follows:

Consider	Maximize	Continue	Review	Ensure	Enlarge	Understand
Maintain	Reflect	Examine	Strengthen	Explore	Encourage	Deepen

Some of these verbs can be used if tied to specific actions or quantification.

Suggested assessment methods and teaching strategies are:

According to research and best practices, multiple and continuous assessment methods are required to verify student learning. Current trends incorporate a wide range of rubric assessment tools; including web-based student performance systems that apply rubrics, benchmarks, KPIs, and analysis. Rubrics are especially helpful for qualitative evaluation. Differentiated assessment strategies include: exams, portfolios, long and short essays, log books, analytical reports, individual and group presentations, posters, journals, case studies, lab manuals, video analysis, group reports, lab reports, debates, speeches, learning logs, peer evaluations, self-evaluations, videos, graphs, dramatic performances, tables, demonstrations, graphic organizers, discussion forums, interviews, learning contracts, antidotal notes, artwork, KWL charts, and concept mapping.

Differentiated teaching strategies should be selected to align with the curriculum taught, the needs of students, and the intended learning outcomes. Teaching methods include: lecture, debate, small group work, whole group and small group discussion, research activities, lab demonstrations, projects, debates, role playing, case studies, guest speakers, memorization, humor, individual presentation, brainstorming, and a wide variety of hands-on student learning activities.

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Quiz 1**	**2**	**5**
2	**Quiz 2**	**4**	**5**
3	**Assignment 1**	**5**	**5**
4	**Midterm**	**8**	**10**
5	**Project 1**	**10**	**5**
6	**Class Participation/Attendance**	**16**	**5**
7	**Final Exam**	**16**	**40**
8			**75**
9	**Lab Assessment**		**25**

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) **Faculty is available 10 hours per week for student help and consulting.**

E. Learning Resources

1. List Required Textbooks D. Patterson and J. Hennessy, Computer Organization and Design, The Hardware/Software Interface, 5th Edition, Morgan Kaufmann (MK), 2013
2. List Essential References Materials (Journals, Reports, etc.) D. Harris and S. Harris, Digital Design and Computer Architecture, Morgan Kaufmann (MK), 2nd Edition, 2012
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) **Students should be motivated to search related journals and conference papers and write a monthly report over it**.
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) **All related journal and conference papers**
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **Use of Simulators in Lab**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Maximum class size is 25. Each class room is provided with projector and electronic board. Lecture rooms and Auditorium (Occasionally)

2. Computing resources (AV, data show, Smart Board, software, etc.) There are computer labs available for development of software skills. Students are encouraged to bring in their laptops and use them in solving problems in the class room.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching **Survey at the end of course**
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor **Monthly Meeting discussing current teaching methods.**
3 Processes for Improvement of Teaching 1. **Faculty Development Program (Provide Training to the faculty)** 2. **Departmental Meeting**
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) **Departmental & Management Meetings.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Course Improvement Plan

Six Step Plan for Course Improvement

- ❑ Step 1) Review the minimum, average, and maximum score for each topic (framework objective). Mark each score which is less than 80% (highlight, circle, etc.)
- ❑ Step 2) For each topic marked for analysis, review the current curriculum framework. Reflect on why scores are low in that topic area.
- ❑ Step 3) For each topic marked for analysis, review the lesson plans used to teach the topic. Determine if the lesson plan and the topic are correlated. Reflect on how this topic was taught. What would improve student learning and retention? …a different instructional method? …devoting more time to the topic?
- ❑ Step 4) Decide on the action you can take to enhance teaching and learning in the course. Indicate, in note or narrative form, what action you will take. Communicate this to administrators and colleagues. Lesson plans can be updated to include the improvements/changes that you will utilize for the next school year.
- ❑ Step 5) Make some predictions about how much you believe these improvements and/or changes will affect the student's learning and retention.
- ❑ Step 6) The improvement process is an ongoing activity that should be visited each year. When it comes time for next year's Improvement Plan you can look back at your predictions and determine how well your plan worked.
  - ⇨ Were the resources that you listed as "not available" a stumbling block in making improvement? How can these resources be obtained?
  - ⇨ Have you made significant enough improvements that a principal would consider obtaining those resources in hopes that even more improvement will be made?
  - ⇨ Were you realistic in your goal setting?

Faculty or Teaching Staff: _____

Signature: _____ **Date Report Completed:** _____

Received by: _____ **Dean/Department Head**

Signature: _____ **Date:** _____