ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CE)

Introduction to Computer Vision

(14034304-3)

Course Specifications

Institution	Date of Report
Umm Al-Qura University	17/04/2016
College/Department **College of Computer & Information Systems**	

A. Course Identification and General Information

1. Course title and code:
14032203-4 Digital System Design

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)
Computer Engineering

4. Name of faculty member responsible for the course
Dr. Faisal Al-Osaimi

5. Level/year at which this course is offered **Level 9 or 10**

6. Pre-requisites for this course (if any)
Eng. Math-2 and Object Oriented Programming

7. Co-requisites for this course (if any)
N/A

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? The course introduces computer vision and proceeds to key vision and recognition concepts. The topics include: image acquisition and formation, transformations, camera calibration, basic image processing, invariants, template matching, edge detection, point and patch feature detection and matching, invariants, segmentation, motion estimation and 3D stereo vision.
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) 1. Involving students in presentation of advance topics in Computer Vision to know current research in the field. 2. Lecture slides and tutorials, Animations to further clarify the theoretical concepts 3. Use of Matlab for simulating different image processing and computer Vision problems

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 vision and review digital image processing techniques	1,2	6
Image formation, transformations and camera calibrations	3,4,5	9
Basic image processing operations; including equalization, sampling, filtering	6,7,8	9
Feature detection and matching with vision and recognition applications; edges, points, patches and holistic	9,10	6
Segmentation, Dense motion estimation, 3D stereo vision.	11,12,13	9

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	39					39
Credit	3					

3. Additional private study/learning hours expected for students per week.	10

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	The students will gain a solid knowledge with hands on experience in a number of key computer vision and pattern recognition problems.	1. Assignments and solutions to the assignments, so that student can know their problems 2. Open-communication with students – show willingness to assist and take questions from students and clarify explanations in the class 3. Students presentations 4. Practical problems using Matlab	1. Exercises & Homeworks, Quizzes, Midterm, Project, Final Exam 2. Review outputs from the assignments in the computer lab and also from their assignments and projects
1.2	The students will learn about the challenges of designing a computer vision system and will gain a practical insight in trading off between system requirements (e.g. full automation or invariance versus system performance or complexity).		
1.3	The students will write brief technical reports on the lab experiments which will improve on their writing skills.		
1.4	The students will develop skills in using Matlab for computer vision and pattern recognition.		
2.0	**Cognitive Skills**		
2.1	Ability to solve real world problems in the area of computer vision and pattern recognition.	1. Assignments. 2. Lab	1. Assignments in algorithm understanding and Matlab implementation. 2. Labs (officially lab is not associated with this Course)
2.2	Ability of deduction and inference.		
2.3	Ability of analysis and design computer vision projects.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Understand and communicate to others the importance and relevance of statistics in the modern world	1. Assignments (Research topics) 2. Matlab and OpenCV Labs 3. Students Presentations of current research topics 4. Practical Computer Vision problems	1. Mid and Final Exams 2. Labs Exams
3.2	Be an independent learner, able to acquire further knowledge with some guidance or support.		
3.3	Participate in group discussions		
3.4	Manage time and meet deadlines.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Case studies: the key method of discovering a student's dexterity in analyzing	1. Written Examinations 2. Assignments 3. Quizzes	1. Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills 2. Class discussions should indicate a student's prowess in responding
4.2	Their recommendations, opinions and suggestions		
4.3	Assignments, exams, reports, presentations and quizzes will test their analytic skills and communication skills		
4.4	Class discussions should indicate a student's prowess in responding		
5.0	**Psychomotor**		
5.1			
5.2			

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**	3	5
2	**Mid term 1**	4	10
3	**Home work**	Throughout semester	10
4	**Mid Term II**	10	10
	Final Exam	16	40
5	**Quiz**	3	5
6	**Mid term 1**	4	10
7			
8			

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 • Required Text(s) Richard Szeliski, Computer Vision: Algorithms and Applications, Springer, 2010 ISBN: 978-1848829343
2. List Essential References Materials (Journals, Reports, etc.)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) http://www.cs.cmu.edu/~cil/vision.html http://szeliski.org/Book/
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Matlab 2010, OpenCV

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.) • A Lecture room having Multimedia projector for lectures and students presentation. • Lab with Matlab installed on all computers • Internet connectivity

2. Computing resources (AV, data show, Smart Board, software, etc.) 1. There is computer lab available for Simulations. 2. 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) N/A

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Course Survey and students Feedback for each learning outcome of the course
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • Faculty meetings to discuss best practices and issues related to the course • Comparison of the course content with similar courses offered in others colleges • Updating course curriculum according to latest research done in the field.
3 Processes for Improvement of Teaching • Departmental Meetings • Faculty Trainings
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 Meetings

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Departmental Meetings and management meetings

Faculty or Teaching Staff: _____

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

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

Signature: _____ **Date: _____**