**Kingdom of Saudi Arabia**
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقـويـم
والاعـتـمـاد الأكـاديـمــي

**ATTACHMENT 2 (e)**

**Course Specifications**

**Kingdom of Saudi Arabia**

**The National Commission for Academic Accreditation & Assessment**

**Course Specifications**
**(CS)**

Kingdom of Saudi Arabia
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئــــة الوطنيــــة للتقويــم
والاعـتـمـاد الأكـاديـمـي

## Course Specifications

| Institution | Date of Report |
|---|---|
| Najran University | 18 / 5 / 2014 |
| College/Department : | |
| College of Science and Arts Sharourah/ Department of Computer Science | |

### A. Course Identification and General Information

| |
|---|
| 1. Course title and code:<br>   Title: Computer Graphics      Code: 608CS-3 (٦٠٨عال-٣) |
| 2. Credit hours :  3 |
| 3. Program(s) in which the course is offered.<br>   (If general elective available in many programs indicate this rather than list programs)<br>   Computer Science Program |
| 4. Name of faculty member responsible for the course<br>   Dr. Makarem Mohammed Bamatraf |
| 5. Level/year at which this course is offered:<br>   Level 6 |
| 6. Pre-requisites for this course (if any)<br>   101CS-4 (Introduction to Computers & IT), 303CS-4 (Object Oriented Programming) |
| 7. Co-requisites for this course (if any) |
| 8. Location if not on main campus<br>   Male and Female Branches. |
| 9. Mode of Instruction (mark all that apply)<br><br>   a. Traditional classroom     [ √ ]     What percentage?  [ 100% ]<br><br>   b. Blended (traditional and online) [ ]     What percentage?  [ ]<br><br>   c.  e-learning     [ ]     What percentage?  [ ]<br><br>   d. Correspondence     [ ]     What percentage?  [ ]<br><br>   f.  Other     [ ]     What percentage?  [ ]<br><br><br>   Comments: |

**Kingdom of Saudi Arabia**
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئــــة الوطنيـــة للتقويـم
والاعـتـمــاد الأكـاديـمــي

## B Objectives

| |
|---|
| 1.  What is the main purpose for this course? <br> The main purposes of this course are to make student able to: <br>   1)  Obtain fundamental knowledge and concepts in computer graphics. <br>   2)  Use programming languages for what he need in computer graphics. <br>   3)  Use logical thinking to apply experiments in computer graphics. |
| 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) |

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

This course covers the following topics: Computer graphics and its applications, Video Display devices, Coordinate  systems, Pixel and line, Calculating line slope, Algorithms to draw lines in computer, Algorithms to draw circle in computer, 2-D Transformations using Matrices, Coloring system, Filling Algorithms, Introduction to 3-D computer graphics, 3-D Transformations using Matrices, and Computer graphics animations.

### 1. Topics to be Covered

| List of Topics | No. of Weeks | Contact Hours |
|---|---|---|
| Introduction: <br>   1)  General introduction to computer graphics and its applications. <br>   2)  Video Display devices – CRT | 1 | 2 |
| Output primitives <br>   1)  Coordinate  systems (Cartesian and Polar) <br>   2)  Pixel and line <br>   3)  Calculating line slope <br>   4)  Algorithms to draw lines in computer <br>       a.  Using mathematical equation <br>       b.  Using DDA algorithm <br>       c.  Bresenham Algorithm <br>       d.  Advantages of Bresenham Algorithm | 3 | 6 |
| Output primitives <br>   1)  Algorithms to draw circle in computer <br>       a.  Using mathematical equation <br>       b.  Using Bresenham Midpoint algorithm <br>       c.  Advantages of Midpoint Algorithm | 2 | 4 |

**Kingdom of Saudi Arabia**
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويـــم
والاعـتـمــاد الأكـاديـمــي

| | | |
|---|---|---|
| 2-D Transformations using Matrices<br>   1) Scaling,<br>   2) Translation,<br>   3) Rotation,<br>   4) Reflection | 3 | 6 |
| Coloring system<br>   1) Memory needed to represent colors inside computers<br>   2) Lookup table<br>   3) Gray scale levels | 1 | 2 |
| Filling Algorithms<br>   1) Scan-line filling algorithm<br>   2) Flood filling algorithm | 1 | 2 |
| Introduction to 3-D computer graphics<br>   1) Concept of camera<br>   2) Parallel Projection<br>   3) Perspective Projection<br>   4) Depth Cueing | 2 | 2 |
| 3-D Transformations using Matrices<br>   1) Scaling,<br>   2) Translation,<br>   3) Rotation,<br>   4) Reflection | 1 | 2 |
| Computer graphics animations | 1 | 2 |

| 1. Topics to be Covered in Lab | | |
|---|---|---|
| **List of Topics** | **No. of Weeks** | **Contact Hours** |
| Graphics Library in C++ (installation and usage) | 2 | 2 |
| Drawing primitive shapes (coordinates - pixel – mathematical line – DDA Line, Bresenham Line, Midpoint Line, and comparison between there execution time. | 3 | 4 |
| Implement of:<br>- Transformations.<br>- Draw polygon function. | 2 | 6 |
| Colors and other graphical functions. | 1 | 2 |
| Filling functions. | 1 | 2 |
| More drawing Functions. | 2 | 2 |
| More drawing Functions. | 1 | 2 |
| Applying the animation. | 2 | 2 |

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـاد الأكـاديـمــي

| | Lecture | Tutorial | Laboratory | Practical | Other: | Total |
|---|---|---|---|---|---|---|
| Contact Hours | 30 | | 30 | | | 60 |
| Credit | 30 | | 15 | | | 45 |

2. Course components (total contact hours and credits per semester):

---

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

---

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.

**Kingdom of Saudi Arabia**
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعـتـمـاد الأكـاديـمــي

| | NQF Learning Domains And Course Learning Outcomes | Course Teaching Strategies | Course Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | Define Computer Graphics Fundamentals and Concepts | Lecture, Self learning | Written Exam |
| 1.2 | Mention the difference between drawing and coloring (filling) basic shapes in computers. | Lecture, Self learning | Written Exam |
| 1.3 | Know the fundamentals of geometric transformations and animation in computers. | Lecture, Self learning | Written Exam |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | Implement drawing and filling algorithms | Problem Solving, Practical | Project, Written Exam |
| 2.2 | Use logical thinking to determine coordinates of different shape points in display devices | Problem Solving, Practical | Project, Written Exam |
| 2.3 | Extrapolate more complex shapes from basic graphical shapes | Problem Solving, Practical | Project, Written Exam |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | | | |
| 3.2 | | | |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.1 | Use numerical skills to understand different algorithms in computers graphics | Problem Solving, Lecture | Project,Written Exam |
| 4.2 | | | |
| **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 |

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويــم
والاعـتـمــاد الأكــاديـمــي

| 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 |

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئــة الوطنيــة للتقويـم
والاعـتـمــاد الأكـاديـمــي

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 | Mid-term exam | 8 | 20 |
| 2 | Quizzes | During the semester | 10 |
| 3 | Mid-Tem Lab Assignments | 10 | 10 |
| 4 | Final Lab Assignment | 15 | 10 |
| 5 | Final Exam | At the end of semester | 40 |
| 6 | Attendance | During the semester | 10 |

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكــة العربيــة السعوديــة
الهيئـــة الوطنيـــة للتقويـــم
والاعـــتمـــاد الأكـــاديـــمـــي

**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)

For one credit hours there are two office hours per week.

**E. Learning Resources**

1. List Required Textbooks
   Computer Graphics C version, Donald Hearn et. al., 2nd edition.

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.)

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

Lab computer or personal computer with C++ compiler

**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.)

1-Class room with 30seats
2-Computer lab. With 30seats

2. Computing resources (AV, data show, Smart Board, software, etc.)

   1- Data show with screen.
   2- Lab computer or personal computer with C++ compiler + graphics library.

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

**Kingdom of Saudi Arabia**
**National Commission for**
**Academic Accreditation & Assessment**

المملكــة العربيــة السعوديــة
الهيئــــة الوطنيـــة للتقويـم
والاعـتـمـاد الأكـاديـمــي

**G  Course Evaluation and Improvement Processes**

| |
|---|
| 1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching: <br> ✓ Distribution of a questionnaire for students to know how to achieve the goals in the theoretical and practical side. |
| 2  Other Strategies for Evaluation of Teaching by the Program/Department Instructor: <br> ✓ Discussions with colleagues who specialize in teaching methods and means of learning. <br> ✓ Self-evaluation of the performance of the teacher. <br> ✓ Discussions with other colleagues who taught  this course. |
| 3  Processes for Improvement of Teaching <br> ✓ Diagnose weaknesses and turn them into strengths. <br> ✓ Discussions about the decision and methods of teaching <br> ✓ Study the needs of the labor market of college graduates |
| 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) |

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

**Faculty or Teaching Staff:  Dr. Makarem Mohammed Bamatraf** _____

**Signature:** _____   **Date Report Completed: 20 – 5 – 2014**

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

**Signature:** _____   **Date:** _____