



COURSE SPECIFICATIONS (CS)

Najran University
College of Computer Science and Information Systems
Department of Computer Science

Course Name: Computer Graphics
Course Code: 281CSS-3

Prepared By:

MD. SELIM REZA

August 2017

Institution: Najran University	Date of Report : August 2017
College/Department Computer Science and Information Systems/Computer Science	

A. Course Identification and General Information

1. Course title and code: Computer Graphics – 281 CSS-3			
2. Credit hours: 3 (2, 2, 1) (Theory, Lab, Tutorial)			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Computer Science			
4. Name of faculty member responsible for the course MD. SELIM REZA (Male Campus)			
5. Level/year at which this course is offered: Level 7			
6. Pre-requisites for this course (if any): 111CSS-4, 342MATH-3			
7. Co-requisites for this course (if any) : - NIL			
8. Location if not on main campus: NA			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
b. Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="100%"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>
d. Correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>
e. Other	<input type="checkbox"/>	What percentage?	<input type="text"/>
Comments:			

B Objectives

1. What is the main purpose for this course?

After successful completion of this course students should be able to:

1. Demonstrate knowledge of fundamental and contemporary computer graphics hardware.
2. Demonstrate basic knowledge of mathematical background (vector and matrix computation) and algorithms underlying the basic computer graphics primitives.
3. Apply the main OpenGL attributes that control the display characteristics of graphics primitives.
4. Implement basic geometrical transformations on simple 2D and 3D computer objects using OpenGL in C++.
5. Create interactive and usable graphic applications in C++ using OpenGL programming interfaces.
6. Apply basic physics of light and its interaction in simple objects using OpenGL in C++.
7. Illustrate good level of debugging, documentation and structuring skills in computer graphics programs.

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)

- Hard copies and soft copies of the text books and reference books are provided to the students.
- Online Links are provided at the end of each chapter in the lecture slides such that the students can make use of the web based material to know the concepts in detail.
- All the reference books and the text books are posted in the Blackboard.

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 Graphics	1	5
Graphics display devices and input/output primitives	1	5
Drawing basic graphics primitives, filling polygons	1	5
Attributes of computer graphics primitives (state variables, color, points, lines, filling regions, antialiasing)	2	10
2D Geometric affine transformations	2	10
2D Viewing Pipeline, Clipping and coordinates	1	5
Three dimensional viewing and graphics rendering pipeline and 3D viewing and graphics rendering pipeline	2	10
Representation and transformation of geometric objects (Polyhedra and Curved Surfaces)	2	10
Introduction to interactive input methods and mouse and keyboard functions	1	5
Visible Surface Detection	1	5
Revision for Theory/Lab	1	5

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	6	30	-	-	66
Credit	2	0	1	0	0	3

3. Additional private study/learning hours expected for students per week.	2
--	---

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	CLO-3: Apply the main OpenGL attributes that	TS:1-Interactive Lectures	Locally Developed Exams

	control the display characteristics of graphics primitives	<p>using powerpoint slides with more examples</p> <p>TS:2- Engaging the students in problem based learning through Tutorials</p> <p>TS:3- Lab Demonstrations</p> <p>TS: 4- Encouraging the students to use the online links to know the concepts in detail.</p> <p>TS: 5 – Recall the topics discussed in the last lecture by asking questions to the students.</p> <p>TS: 6 – Associating the topics in each chapter with the CLO.</p>	such as Quiz, Lab Assessments & Mid Exams
2.0	Cognitive Skills		
2.1	CLO-3: Apply the main OpenGL attributes that control the display characteristics of graphics primitives	TS:1-Interactive Lectures using powerpoint slides with more examples	Locally Developed Exams such as Quiz, Lab Assessments & Mid Exams
2.2	CLO:4-Implement basic geometrical transformations on simple 2D and 3D computer objects using OpenGL in C++	<p>TS:2- Engaging the students in problem based learning through Tutorials</p> <p>TS:3- Lab Demonstrations</p> <p>TS: 4- Encouraging the students to use the online links to know the concepts in detail.</p> <p>TS: 5 – Recall the topics discussed in the last lecture by asking questions to the students.</p> <p>TS: 6 – Associating the topics in each chapter with</p>	Locally Developed Exams such as Lab Assessments, Final Lab embedded Questions with Scoring Rubrics

		the CLO.	
2.3	CLO-5: Create interactive and usable graphic applications in C++ using OpenGL programming interfaces	TS:3- Lab Demonstrations	Final Lab Exam embedded Questions with Scoring Rubrics
2.4	CLO-6: Apply basic physics of light and its interaction in simple objects using OpenGL in C++	TS: 4- Encouraging the students to use the online links to know the concepts in detail.	Locally Developed Exams such as Final Lab Exam embedded Questions with Scoring Rubrics
3.0	Interpersonal Skills & Responsibility		
3.1	CLO-1: Demonstrate knowledge of fundamental and contemporary computer graphics hardware	<p>TS:1-Interactive Lectures using powerpoint slides with more examples</p> <p>TS:2- Engaging the students in problem based learning through Tutorials</p> <p>TS: 4- Encouraging the students to use the online links to know the concepts in detail.</p> <p>TS: 5 – Recall the topics discussed in the last lecture by asking questions to the students.</p> <p>TS: 6 – Associating the topics in each chapter with the CLO.</p>	Locally Developed Exams such as Quiz, Mid Exams & Final Exam
3.2	CLO-7: Illustrate good level of debugging, documentation and structuring skills in computer graphics programs	<p>TS:3- Lab Demonstrations</p> <p>TS: 4- Encouraging the students to use the online links to know the concepts in detail.</p>	Lab Assessments
4.0	Communication, Information Technology, Numerical		
4.1	CLO-2:-Demonstrate basic knowledge of mathematical background (vector and matrix computation) and algorithms underlying the basic	TS:1-Interactive Lectures using powerpoint slides	Locally Developed Exams such as Quiz, Mid Exams & Final Exams embedded

	computer graphics primitives	<p>with more examples</p> <p>TS:2- Engaging the students in problem based learning through Tutorials</p> <p>TS:3- Lab Demonstrations</p> <p>TS: 4- Encouraging the students to use the online links to know the concepts in detail.</p> <p>TS: 5 – Recall the topics discussed in the last lecture by asking questions to the students.</p> <p>TS: 6 – Associating the topics in each chapter with the CLO.</p>	Questions with Scoring Rubrics
5.0	Psychomotor N/A		

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	Assignment	4 th week	5%
2	Mid Terms 1 & 2	7 th & 10 th week	30%
3	Quiz	8 th week	5%
4	Lab Activities	Every Week	10%
5	Final Lab Exam	13 th week	10%
6	Final Exam	14 th week	40%
	Total		100%

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)

- 4 weekly office hours + appointments
- 3 weekly academic advising hours
- Extra weekly 2 office hours prior to exams.
- Tutorials are also provided to the students

E. Learning Resources

1. List Required Textbooks

- Francis S Hill Jr. and Stephen M Kelley, **Computer Graphics Using OpenGL**, Prentice Hall, Latest Edition 2007.
- Hearn & Baker, **Computer Graphics with OpenGL**, PHI International Edition

2. List Essential References Materials (Journals, Reports, etc.)

- Dave Shreiner, Mason Woo, Jackie Neider, and Tom Davis, **OpenGL Programming Guide: The Official Guide to Learning OpenGL**, Addison-Wesley, Latest Edition, 2009.

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

- Edward Angel, **OpenGL: A Primer**, Addison Wesley, Latest Edition, 2007.

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

<http://freecomputerebooks.blogspot.com/2007/05/computer-graphics-3d-graphics-vrml.html>

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

- Installation CD of Microsoft Visual Studio 2010 with glut libraries
- Help Tutorial – Addison Wesley OpenGL Reference Manual

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.)
<p>1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p> <ul style="list-style-type: none"> Smart Boards may be provided to carry out the demonstrations and lectures.
<p>2. Computing resources (AV, data show, Smart Board, software, etc.)</p> <ul style="list-style-type: none"> The laboratory may be equipped with network, so that the students have their privacy (by providing logins) in accessing their own files with limited permissions of accessibility. All the computers in all the laboratories may be installed with the Visual Studio 2010 software with glut package.
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)</p> <ul style="list-style-type: none"> UPS (Uninterrupted Power Supply) may be provided in the lab to overcome power failures especially during exams. Upgraded Anti-Virus with long term validity may be installed in all the systems in the lab. Printers should be installed in each lab to enable the students to take print out of their lab work.

G Course Evaluation and Improvement Processes

<p>1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none"> Students course evaluation through CLO course survey during the course period. Organizing general meetings with students. Students' opinion on the Online Course Survey at the end of the final exam period.
<p>2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor</p> <ul style="list-style-type: none"> Consulting peers on teaching. Discussion about the course in department.
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none"> Follow the recommendations provided by the curriculum committee at the end of the previous semester about the course.

<ul style="list-style-type: none">• Encouraging the students to participate in active learning by offering tutorials and assignments.• Relate the course topics with the Course Learning Outcomes in each chapter.
<p>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)</p> <ul style="list-style-type: none">• The question papers for the mid and final exams are checked and reviewed by the course coordinator.• Framing questions in the exam to be compatible and consistent with the course learning outcomes.
<p>5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none">• Preparing course report and action plans every semester.• Planning to update course syllabus every two years (the course coordinator are reviewing the courses and the references).• Curriculum committee updates the syllabus based on the student outcomes.

Name of Course Instructor: **Md. Selim Reza**

Signature: _____ Date Specification Completed: August 2017

Program Coordinator: Dr. Abdulrahman Thaqfan

Signature:  _____ Date Received: _____