Computer Science Department
cs.salemstate.edu

SYLLABUS **Fall, 2015**

CSC 425 Computer Graphics and Games **4.0 credits**
Prerequisite(s): MAT 108 or MAT 110 or any MAT course numbered 208 or above except MAT 247, plus CSC 260

Instructor: Beifang Yi **Office**: MH 211A **Phone**: (978) 542-7246
email: byi@salemstate.edu **Hours**: 12:50-3:00 (TR) **WebSite**: http://cs.salemstate.edu/~byi/
3:30-4:30 (W)

Section	Time	Room	Final Exam
01/L21/S1	W 4:30pm—9:30pm	MH206/202	**Wednesday 12/16, 7:30m-9:30pm MH 206**

Catalog description:
This course covers fundamental principles and applications underlying computer graphics and computer games. The course presents key aspects of computer graphics including graphics pipeline, scene graphs, 2D/3D geometric objects and transformations, viewing, shading, and modeling. Topics related to computer game development include game engines, animation, and behavior and interaction. The course will also introduce basic concepts of collision detection, illumination, game design and implementation, and will emphasize the application of the topics in game-related computer graphics programming projects with the use of graphics libraries and game engines and toolkits. Three lecture hours and three hours of scheduled laboratory time per week, plus programming work outside of class.

Course Goals:
The purpose of this course is to develop students' understanding of modern computer graphics and game development. The goals of this course are:

CG01: to develop an appreciation for the modern computer graphics and game design;
CG02: to understand the basic mathematics behind computer graphics;
CG03: to understand the fundamental concepts in creating graphical contents;
CG04: to present the design issues for game development;
CG05: to give students experience in the construction of visual elements and environment (including games).

Course Objectives:
Upon successful completion of the course, a student will have:

CO01: demonstrated knowledge of the mathematical foundations of computer graphics;
CO02: demonstrated knowledge of the rendering pipeline in computer graphics;
CO03: described scene graphs, 2D/3D transformations, 2D/3D viewing, lighting, and clipping;
CO04: utilized at least one graphics library and at least one programming language to construct 2D/3D graphical objects and apply transformations, material properties, illuminations, and camera models to the objects to create a graphical environment;
CO05: identified texturing, shading, curves and surfaces, rasterization, and z-buffer;
CO06: become acquainted with basic game programming theory and tools, game engine, game GUI and input devices, collision detection;
CO07: demonstrated the ability to design and develop an interactive game with the application of computer graphics techniques.

Course Topics:

A detailed topics list and a general course bibliography can be found on the Computer Science Department website at http://cs.salemstate.edu/dept/index.php?page=184. Select CSC 425 to access a PDF document.

Text(s): (required)

- **Computer Graphics Using Java 2D and 3D**, by H. Zhang & Y. Liang. Pearson & Prentice Hall, 2007 (ISBN: 0-13-035118-0).

Required Material:

(Required) Thumb (flash) drive (or other portable memory devices), 4 GB minimum**.**

Additional references (optional)**:**

- *Interactive Computer Graphics: A Top-down Approach with Shader-based OpenGL*, 6th Edition, by E. Angel, Addison-Wesley, 2014.
- *Killer Game Programming in Java*, by A. Davison. O'Reilly Media, 2005.
- *The Complete Guide to Blender Graphics: Computer Modeling and Animation*, 2nd edition, by John Blain. A K Peters/CRC Press, 2014.
- *Beginning Java SE 6 Game Programmin*, 3rd edition, by Jonathan Harbour. Cengage Learning PTR, 2011.
- *Fundamental 2D Game Programming with Java*, 1st edition, by Timothy Wright. Cengage Learning PTR, 2014.
- *Game Programming Patterns*, 1st edition, by Robert Nystrom. Genever Benning, 2014.
- *Pro Java 6 3D Game Development: Java 3D, JOGL, JInput, and JOAL APIs*, by A. Davison. Apress, 2007.
- *Computer Graphics with OpenGL*, 3rd Edition, by D. Hearn & P. Baker. Prentice Hall, 2003.
- *JavaFX Developer's Guide: Developer's Library*, by K. Topley. Addision-Wesley, 2011.
- http://www.java3d.org/index.html
- http://www.blender.org/
- Java Media APIs at http://www.oracle.com/technetwork/java/javase/tech/media-141984.html
- JavaFX at http://docs.oracle.com/javase/8/javase-clienttechnologies.htm
- WebGL at https://developer.mozilla.org/en-US/docs/Web/WebGL
- Learning WebGL at http://learningwebgl.com/blog/

Cell phones:

Turn the ringer off, or, better yet, *turn the phone off*.

Lecture/Lab Attendance:

Class attendance is highly recommended. You are responsible for all materials presented in class, examinations, and other announcements. No excuses of any nature will be construed as relieving you from the responsibility for completion of the work assigned. Each student is responsible for completing all course requirements and for keeping up with all that goes on in the course (whether or not the student is present).

We will use SSU's online course management system, Canvas (https://elearning.salemstate.edu/) to post assignments and announcements regarding the course topics and progress. You will need to visit Canvas (with your SSU Navigator use-name and password) for the course activities. Canvas uses your ***SSU-stored email*** box for the communication between you and the instructor and thus you ***must use that email*** address.

Labs will be used to review or present software tools, to discuss and investigate Java implementation details that time may not permit to be fully explored during the scheduled lecture periods, for design and implementation drills, for occasional short lab (programming) exercises, to assist with design and debugging problems that arise in longer lab / project exercises, and to check/examine/grade the exercises and homework.

Final Grade:

Final grade will be determined using the following grading weights:

assignments/projects	65%
midterm examination	10%
final examination	25%

Attendance is not used to calculate the final grade: *however*, note that you are at all times responsible for assignments and materials presented in class.

The following table shows how the course work is assessed against the course objectives:

	Assignments/Projects	Examinations
CO01	✓	✓
CO02	✓	✓
CO03	✓	✓
CO04	✓	✓
CO05	✓	✓
CO06	✓	✓
CO07	✓	

Assignments/Projects:

There will be a series of assignments for this course: question-answering, calculations, and projects (the programming projects will be the major and the most important portion of the assignments).

There is a deadline to each assignment and ***penalty*** will be imposed for late submissions (see the Due Dates/Time below).

All the assignments must be submitted at Canvas (https://elearning.salemstate.edu/) unless otherwise noted.

For each project, a write-up should be submitted which describes the problem, solutions, and other requirements (usually, there are additional requirements for the assignments). For a programming project, it should provide the following: (a) instructions on how to compile and run the program, (b) testing results, (b) source code, and (d) input data (if applicable).

Each assignment may have different full score points, depending on the difficulty and the amount of the work of the exercises. There might be one or two extra assignments given in the semester and these extra assignments will be used as make-up assignments for possible late submissions. All the assignment (including the extra assignments) questions might be in the examination. Any assignment may be used as the extras. The average score for the overall assignments will be the total scores received for all the assignments divided by the total scores of the *required* assignments. You may ***not*** move the extra points to the final grade. For example, if there are about 1100-point assignment questions throughout the semester and the required assignment total scores will be about 1000 points, and if students A and B have completed 1050-point and 800-point assignments, their overall semester assignment (written) grades will be 100% and 80% respectively for A and B).

*There will be **Challenging Programming Projects**, or **Challenging Questions** in assignments, which will be graded separately. **No** late submission of these projects or solutions to these questions will be accepted. **Grades earned from these Challenging Projects or Questions will be directly added to the final grade**. For example, if student C has earned 5 points from Challenging Projects or Questions, these 5 points will be added to his/her final grade calculated from the table illustrated in Final Grade above.*

Readings will be assigned from the text on a regular basis: for the maximum benefit from reading, do the readings before the material is covered in class. Supplementary material will be distributed on a regular basis, *and will be the primary focus of class discussions*.

Examinations/Tests:

There will be one midterm and one final (comprehensive) examinations. The midterm examination will be held in week 8 *depending* on class progress. **Note:** Make-ups are given for examinations only under exceptional circumstances and with documented circumstances.

Missed Tests:

Missed tests will be made up *only under extreme conditions/emergency with the proper documentation*. Students who know in advance that they must be absent on an exam day for an excusable reason should notify the instructor prior to the exam day. Students who are absent on the day of the exam for an excusable reason should contact the instructor immediately following their absence. Makeup work will be permitted *only when* the instructor is presented with acceptable documentation for acceptable absences. It is your responsibility to notify your instructor of any excused absence as far in advance as possible.

Due Dates/Time:

- **There will be a 10% penalty for each week an assignment (lab/project/short-answer exercise…) is late**; penalties accrue at the due time of the assigned due date.
- **No assignments (lab/project/short-answer exercise…) will be accepted after the final examination**.

Study Groups:

While I strongly encourage study groups, I require that each student hand in his/her answers in her/his own words - if two answers are highly similar to each other, neither will receive credit.

When working on your programming projects, you may discuss with others the project topics, the algorithms and methodologies related to the project; but when you work on writing the code, this coding work should be 100% of your own work. **If two answers/written code segments come out exactly the same or highly similar, neither will receive credit and/or further actions will be taken** (such as reporting to the department and/or university). Given the nature of most of the projects, homework questions and writing assignments, it will be almost impossible for two people to come up with highly similar answers UNLESS they copy.

Academic Integrity:

Academic Integrity Policy and Regulations can be found in the University Catalog and on the University's website (http://catalog.salemstate.edu/content.php?catoid=13&navoid=1295#Academic_Integrity). The formal regulations are extensive and detailed - familiarize yourself with them if you have not previously done so. A concise summary of and direct quote from the regulations: "Materials (written or otherwise) submitted to fulfill academic requirements must represent a student's own efforts". *Submission of other's work as one's own without proper attribution is in direct violation of the University's Policy* and will be dealt with according to the University's formal Procedures.

"Salem State University is committed to providing equal access to the educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids and adjustments. Any student who has a documented disability requiring an accommodation, aid or adjustment should speak with the instructor immediately. Students with Disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services."

In the event of a University declared critical emergency, Salem State University reserves the right to alter this course plan. Students should refer to http://www.salemstate.edu for further information and updates. The course attendance policy stays in effect until there is a university declared critical emergency. In the event of an emergency, please refer to the alternative educational plans for this course via the course link at Canvas (https://elearning.salemstate.edu/).

Please remember that if, for any reason, you decide to drop this course, you **MUST** do so officially through the Registrar's office. The last day to withdraw from a course this semester is **November 20th**.

Note: This syllabus represents the intended structure of the course for the semester. If changes are necessary, students will be notified in writing and via all regular class communication mechanisms (class discussion, emails, and/or the course link at Canvas https://elearning.salemstate.edu).