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| Course #: | CSCI-B 481 |
| Course Title: | Interactive Computer Graphics |
| Course Type: | Upper level elective |
| Prerequisites: | C243 Data Structures, M301 Linear Algebra |
| Credits: | 3 |
| Text Book: | Interactive Computer Graphics: A Top-Down Approach Using OpenGL, Addison Wesley, E. Angel. |
| References: | <ul style="list-style-type: none"> • Class notes • P. Rick (2002): Computer Animation: algorithms and techniques, Morgan Kaufmann Publishers. • Watt, F. Policarpo (2001): 3D Games: real-time rendering and software technology, ACM Press. • D. Shreiner (2000): OpenGL Reference Manual: the official reference document to OpenGL, version 1.2, 3rd edition, Addison-Wesley. • D. Hearn, M. P. Baker (1997): Computer Graphics, C Version, 2nd edition, Prentice Hall. • D. M. Bourg (2002): Physics for Game Developers, O'Reilly. • A. Griffith (2000): GNOME/GTK+ Programming Bible, IDG Books. |
| Current Catalog Description: | An introduction to interactive programming: design and implementation of graphical user interfaces (GUI). Fundamentals of modern interactive graphics: image representation and processing, geometrical modeling, data structures, rendering, animation, virtual reality, hardware and software. |
| Course Goals | <p>The student who completes this course:</p> <ol style="list-style-type: none"> 1. Will be introduced to basic and advanced concepts in 2D and 3D graphics. 2. Will be introduced to geometric modeling, transformations and rendering. 3. Will be introduced to event driven and GUI programming. |
| Major Topics Covered in the Course | <ol style="list-style-type: none"> 1. Image representation Graphical user interfaces 2. Image manipulations 3. Scan conversion, surface filling, anti-aliasing. 4. 2D and 3D transformations 5. Introduction to OpenGL and to Gnome 6. Introduction to 3D graphics 7. Projection 8. Representation and modeling |

| | <p>Geometrical modeling Complex geometrical objects in OpenGL Scene graphs Hidden surfaces 9. Rendering, local and global illumination models 10. Interpolation methods Shadow, reflection and refraction Texture mapping Fractal terrain Ray tracing Ray casting Radiosity 11. Introduction to animation</p> | | | | | | | | | | | | | | | | | | |
|--|---|----------|------|----------|------------|--|----|-----------------|--|---|-------------|--|--|-----------------|--|----|-----------------|--|---|
| Laboratory projects (specify number of weeks on each) | <p>One lab, 1.5h, half a week Compiling and executing a small program using the Gnome library.</p> | | | | | | | | | | | | | | | | | | |
| Estimate Curriculum Category Content (Semester hours) | <table border="1"> <thead> <tr> <th>Area</th> <th>Core</th> <th>Advanced</th> </tr> </thead> <tbody> <tr> <td>Algorithms</td> <td></td> <td>25</td> </tr> <tr> <td>Software Design</td> <td></td> <td>5</td> </tr> <tr> <td>Comp. Arch.</td> <td></td> <td></td> </tr> <tr> <td>Data Structures</td> <td></td> <td>20</td> </tr> <tr> <td>Prog. Languages</td> <td></td> <td>3</td> </tr> </tbody> </table> <p>Additional hours may be dedicated to curriculum categories not listed above. For example explanation of concepts and theories. Discussion of social and ethical issues, discussion of interpersonal relationships and working within groups.</p> | Area | Core | Advanced | Algorithms | | 25 | Software Design | | 5 | Comp. Arch. | | | Data Structures | | 20 | Prog. Languages | | 3 |
| Area | Core | Advanced | | | | | | | | | | | | | | | | | |
| Algorithms | | 25 | | | | | | | | | | | | | | | | | |
| Software Design | | 5 | | | | | | | | | | | | | | | | | |
| Comp. Arch. | | | | | | | | | | | | | | | | | | | |
| Data Structures | | 20 | | | | | | | | | | | | | | | | | |
| Prog. Languages | | 3 | | | | | | | | | | | | | | | | | |
| Oral and Written Communications | <p>Every student is required to submit at least <u>1</u> written reports (not including exams, tests, quizzes, or commented programs) of typically <u>2</u> to <u>15</u> pages and to make <u>1</u> to <u>2</u> oral presentations of typically <u>15</u> minute's duration.</p> | | | | | | | | | | | | | | | | | | |
| Social and Ethical Issues | <p>Not a course objective.</p> | | | | | | | | | | | | | | | | | | |
| Theoretical Content | <ul style="list-style-type: none"> • Geometric modeling, interpolation 3h • Transformations and projection, 4h • Illumination models, 3h • Ray tracing, ray casting, radiosity, 3h | | | | | | | | | | | | | | | | | | |
| Problem Analysis | <p>Each of the programming assignments (about 12) consisted in implementing a specific problem related to computer graphics and GUIs. The general outline of the program and the implementation issues were discussed in class for each of the problems.</p> | | | | | | | | | | | | | | | | | | |
| Solution Design | <p>Implementation of solutions to the problems discussed above.</p> | | | | | | | | | | | | | | | | | | |

Prepared By

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