Application for New Course

1. Submitted by the College of Engineering
   Date: August 1, 2000
   Department/Division offering the course: Computer Science

2. Proposed designation and Bulletin description of this course:
   (a) Prefix & Number: CS 637
   (b) Full Title: Exploring Virtual Worlds
       Abbreviated Title (≤ 24 characters): Exploring Virtual Worlds
   (c) Lecture/Discussion hours per week: 3
   (d) Laboratory hours per week: 0
   (e) Studio hours per week: 0
   (f) Credits: 3
   (g) Course description:
       This course covers a mixture of core techniques related to systems for constructing and
       modeling virtual environments, such as model-building, image-based rendering, head-
       mounted hardware, stereo image generation, head-tracking, and immersive display
       technology. The core topics will be presented using textbooks and papers from the current
       literature. A substantial group project will provide hands-on experience with the
       concepts, algorithms and technology.

   (h) Prerequisites (if any): Prerequisites: CS 335 and CS 635
   (i) May be repeated to a maximum of: N/A

4. To be cross listed as: N/A
   Signature of cross-listing chair: ________________________________

5. Effective date: Fall 2001

6. Course to be offered: Fall Spring Summer
   X

7. Will the course be offered annually; explain if not: Yes

8. Why is the course needed? This course covers new material in an emerging scientific
   area. No coverage of this topic is currently offered in the Computer Science curriculum.

9. (a) By whom will the course be taught? Brent Seales or Chris Jaynes
    (b) Are facilities for teaching this course now available? Yes
        If not, what plans have been made for providing them?

10. What enrollment may reasonably be expected? 15

   FEB 14 2001
11. Will this course serve students in the Department primarily? Yes
   Will it be of service to a significant number of students outside the Department? No
   If yes, under what area?

12. Check the category most applicable to this course:
    __ traditional; offered in corresponding departments elsewhere;
    __ relatively new, now being widely established;
    ___ not yet found in many (or any) other universities

13. Is this course part of a new proposed program? No
    If yes, which?

14. Will adding this course change the degree requirements in any programs? No
    If yes, explain:

15. Attach a list of the major teaching objectives of the proposed course and outline
    and/or a reference list to be used: See attached

16. If the course is a 100-200 level course, please submit evidence (e.g., correspondence)
    that the Community College System has been consulted.
    Not applicable

17. Within the Department, who should be contacted for further information about the
    proposed course?
    Name: Brent Seales   Phone: 257-6750

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1Approval of this course will constitute approval of the program change unless other program modifications are proposed.
Signatures of Approval:

Department Chair: ____________________ Date: 11/14/2020

Dean of the College: ____________________ Date: 2/18/01

Date of Notice to the Faculty: 1/26/01

Undergraduate Council: ____________________ Date: _____

University Studies: ____________________ Date: _____

Graduate Council: ____________________ Date: 5/24/01

Senate Council: ____________________ Date: _____

Date of Notice to the University Senate: _____

Action other than approval: ____________________

2If applicable, as provided by the Rules of the University Senate
Needed Skills
Students should be capable of structured functional/object-oriented programming, graphical user interface design, image processing and core concepts in multimedia/graphics/imaging systems. Mathematical skills should cover calculus, linear algebra, basic statistical methods, and numerical methods.

Learning Outcomes
Students will learn the core technologies involved in systems that create a virtual computer environment. These component technologies, such as advanced raster graphics architectures, geometric models, image-based rendering algorithms, and head-mounted display technologies, will be presented and critiqued. Students will begin to understand the state-of-the-art and the difference between the current and the fundamental limitations of such systems. Students will develop a skill-set in this course that will enable them to use tools, algorithms and hardware to implement a solution to a substantial problem in a virtual-reality environment.

Topics
- Introduction
  History (origins)
- Advanced raster graphics architectures
- VR systems and component technologies
- Images meet 3-D models
  Image warping
  Image-based rendering
  Texture-mapping
  3-D modeling
  Calibration
- Display technology
  Head-mounted displays
  Stereo displays
  Emmersive display environments (Case study: the CAVE)
- Interaction techniques and Haptics/force Feedback
- Tracking
- Augmented reality
- Human factors

Examinations
Exact details about examinations in this course will be determined by the instructor offering the course. Typically there will be two in-class examinations during the semester and a two-hour final examination. Specific details will be made available in the syllabus at the start of each semester in which the course is offered.
Grading
A student's grade will be determined by a weighted average of homework assignments, programming exercises, projects, midterm examinations, and the final examination. The faculty offering the course will make the details available at the start of the course.
A typical weighting is:

Homework and programs: 40%
Midterm Examinations (2 @ 15%): 30%
Final Examination: 30%

Possible Textbooks
Will be selected later

Papers
Selection of readings from SIGGRAPH and journals like Presence, IEEE CG&A, Image and Vision computing, etc.