Rensselaer Polytechnic Institute
Department of Electrical, Computer, and Systems Engineering
Fall 2008
ECSE 4969/6969: Computer Vision and Graphics for Digital Arts

COURSE OBJECTIVE: The main objectives of this course are to (1) expose students to advanced image processing, computer vision, and computer graphics techniques related to digital arts and visual effects, (2) provide a design experience that goes into depth in implementing or extending one of the topics presented in class, and (3) promote discussion between students from technical and artistic backgrounds.

LECTURES: Mondays and Thursdays, 4:00-5:20 PM, in Ricketts 212. You are expected to be present at every lecture. During some classes it may be useful to bring your laptop for viewing supplementary images/videos and working on your course project. (Laptops should not be used for web surfing or instant messaging during class time.)

PROFESSOR: Richard Radke, JEC 7006, 276-6483, email: `rjradke@ecse.rpi.edu`. Office hours Tuesdays 4-6 or by appointment.

TEXT: There is no textbook for the course, but you are all expected to purchase the bound course notes available at the bookstore (should be about $70). These contain copies of all the papers we will discuss in class. It is important that you bring these course notes to each class so that we can all refer to fine points of the papers together.

WEBSITES: Readings, assignments, and other course material will be available through the calendar website `http://www.ecse.rpi.edu/~rjradke/CVDAcalendar.html`. You should check this page often to keep current on the reading schedule and to find links to supplementary materials (videos, image galleries, etc.). We also have an RPILMS (formerly WebCT) page that you should be able to see when you log in to that system. Again, you should check this page often to post questions and to respond to others' questions. The RPILMS discussion board is the preferred means of asking a simple question, since the instructor will check for and respond to questions frequently, and not duplicate effort answering similar questions from several different people. It would be nice to see a healthy discussion of the papers here prior to class. If you don't have a RPILMS account or have not been automatically added to the RPILMS student list for this course, please contact the instructor.

TOPICS AND COURSE CALENDAR: The current course calendar is attached, but you must check the course calendar web page frequently to stay in sync with the readings!

COURSE ORGANIZATION: The majority of the scheduled classes will be used for 15-20 minute presentations by the students on the research papers assigned by the instructor, followed by 15 minutes of discussion of each paper by the whole class. We will usually cover 2 papers in each such class session. The set of topics and associated papers is listed on the course calendar website. Attendance is required at each class except in extraordinary circumstances, since class participation, discussion, and learning how to succinctly explain a technical paper are cornerstones of the course experience. Papers will be assigned based on student interest and scheduled in an order determined by the instructor. There are about 30 papers, so you should expect to present $30/N$ papers, where N is the number of students in the class.

For each class in which papers are discussed, each student will write a short **one page** "reaction" to **one** of the papers that is to be discussed that day. The first half of the report should contain discussion of one thing you liked or disliked about the paper. The second half should suggest an idea for "future work": a possible extension or improvement to the paper. Note that neither of the two parts is a simple summary of the paper- you can assume that I have read all the papers and already know what they are about. The reactions will naturally be more technical for ECSE/CS students and more artistic for ARTS/EMAC students, but please feel free to cross over to "the other side" as you see fit. My expectations for these reports will be slightly higher for the graduate students. You do not need to write a report for days on which you present a paper. The reports will be due at the beginning of each class (i.e., prior to the start of discussion).

We will also spend several classes watching making-of-effects DVD extras for many recent Hollywood movies, discussing how the polished effects relate to the papers discussed in class. As with the research papers, you will write one reaction report per such class period (these will be due at the start of the next class).

Students will perform one major design project during the semester. The project will take the form of a 2-3 minute music video (with music of your choice). You will prepare written and oral progress and final reports for the project and your grade will be based both on the technical quality of the design and on the write-ups themselves. The project can be done by yourself or in a group of two. The course will culminate in presentations of the projects by the students at the end of the semester.

GRADING: The final grade will be determined as follows:

Class attendance	10%
Class participation	20%
Research paper presentations	20%
Reaction reports	20%
Project proposal	5%
Midterm project report (written)	5%
Midterm project report (oral)	5%
Final project report (written)	5%
Final project presentation and quality	10%

The class attendance grade will be proportional to the number of classes attended. However, attendance isn't the same as participation. I expect everyone in class to contribute at least one comment per class session; to compute the participation grade, I will keep track of how talkative and insightful you are (but note that talking constantly is not the same as participating constructively).

Each reaction report will be graded on a relatively coarse scale of 0 (missing or unacceptable), 1 (satisfactory), or 2 (exceptional). To get a 2, I want to see some insight or comment that makes me feel like you really understood the paper or had thought carefully about an extension or application. Keep in mind there will be many (more than 30) reaction reports that will be averaged to get the reaction report grade. My feeling is that the large number of these balances out the lack of exams or computational homeworks in the class.

Each paper presentation will be graded on a scale of 0 to 12, with 0, 1, or 2 points in each of the following categories: (1) overall quality of presentation (organization of information, speaking clearly, appropriate level of detail, helpful sketches on the board), (2) level of understanding of the paper (I welcome you to visit my office hours or make an appointment to discuss points of the paper you're not familiar with or the overall organization of your presentation), (3) timing of the presentation (not too long, not too short), and (4) ability to respond to questions from me and the rest of the class before the main discussion begins. The grades for all the presentations you give will be averaged for the final presentation grade.

The written and oral progress reports will be graded on a scale to be determined; details will be provided separately in advance of the due dates.

You are fully expected to be present for each class, barring excused absences previously discussed with the instructor. Family trips, vacations, etc. are not viable excuses for missing class. There is a 50% penalty for late submission of any assignment. Assignments submitted after 1 week from the original due date will not be accepted and will receive a grade of 0.

PREREQUISITES: The course is intended for anyone with an interest in the subject, but specifically CS, ECSE, ARTS, or EMAC graduate students and upperclassmen. The papers we read will be mathematical and technical- you will be more comfortable if you have some background in probability, statistics, linear algebra, image processing or computer graphics. However, ARTS students familiar with digital media have taken the course and done well in it, so you need not be a math whiz (as long as you put effort into thoroughly understanding the papers you are to present). Part of the course (especially for undergraduates and non-ECSE/CS majors) is learning how to approach and parse an unfamiliar research paper, which may be intimidating at first but gets easier with experience. The biggest prerequisite is enthusiasm for and commitment to learning concepts outside your coursework/research experience!

COURSE POLICIES: You are responsible for knowing all the information posted in this syllabus, including the course policies. You are also responsible for keeping up with any announcements made in class or on the RPILMS/course calendar pages.

You are expected to communicate to the instructor any issue regarding your performance in class ahead of time. This includes absence from important class meetings, late assignments, inability to perform an assigned task, problems with your group members, the need for extra time on assignments, etc. You should be prepared to provide sufficient proof of any circumstances on which you are making a special request as outlined in the Rensselaer Handbook of Student Rights and Responsibilities. Notifying me of absences ahead of time is especially important due to the level of interactivity of the class, and the scheduling of paper presentations.

Students with disabilities should inform the instructor of their needs at the beginning of the semester. Students must register as disabled in order to receive proper attention and benefits. Please contact Debra Hamilton (Assistant Dean of Students, ext. 2746, `hamild@rpi.edu`). Students who cannot attend some classes due to religious observance should inform the instructor at the beginning of the semester.

Cheating and academic dishonesty will not be tolerated. All your course work should provide an honest effort in solving the assigned problems by yourself (and by your group partners for group assignments). You are encouraged to discuss course material (especially the research papers) with other students, but your project submission must be your own, with no copying or sharing of code. Any student found to have participated in academic dishonesty will receive an "F" in the class, and may be subject to further disciplinary action. The University Code of Academic Integrity prohibits students from committing the following acts of academic dishonesty: academic fraud (e.g. changing solutions to appeal a grade), copying or allowing one's work to be copied, collaboration (e.g. giving or receiving old homework solutions for others to reuse), fabrication/falsification, plagiarism, sabotage of others' work, substitution (e.g. doing a homework/exam for someone else). For more details, see `http://www.pde.rpi.edu/academics/policies/dishonesty.shtml`.

Letter grades will not be assigned until the end of the class, after the final exam has been graded. Any letter grade assignment posted before the end of the class should be regarded as tentative and subject to change. For grade appeals procedures, see `http://www.pde.rpi.edu/academics/policies/appeals.shtml`.