

CSC 9000 – Guided Study: Advanced Topics in Nanocomputing

Syllabus

Instructor	Dr. Thomas Way Mendel Science Center 160A thomas.way@villanova.edu
Prerequisites	CSC 8400, CSC 8410

Course Description

The main goal of this course is to establish an understanding of the science of nanotechnology, its application to computing and computer science, and the current state of research in this area. Towards this goal, students will perform a guided study of background and current research in the area of nanotechnology-based computing, and complete a guided research project on a topic that builds upon this background. Students will be required to prepare a 5-7 page conference-style research paper that contains a literature review (background), related work (current research), and preliminary results (based on their own research project). Other sections may be included as needed. The scope of the research project will be limited to a single semester, although students will be encouraged to view the project as something that could continue in the future. Additional assignments will include participating in weekly research meetings with the instructor and other students performing research in this area, if any, and creating a personal research website which includes a research plan and regular progress reporting. The research paper will be treated as a final exam, and will be graded for breadth and depth of topic coverage and writing quality, with both written and oral examinations of the student's mastery of the subject.

The student also will be encouraged to present the results of their work to fellow students near the end of the semester, such as at a departmental colloquium or during the meeting of a relevant computer science course, and to submit the resulting paper to an appropriate conference.

Student Learning Outcomes

1. The student will demonstrate an ability to formulate research questions.
2. The student will successfully develop and write a research plan and maintain a research website.
3. The student will demonstrate an ability to critically read and synthesize research papers of an advanced level in the area of nanotechnology-related computing.
4. The student will demonstrate an ability to perform guided study and research in an advanced computing topic relating to the field of nanotechnology.
5. The student will successfully write a conference style research paper of high quality, consisting of background, related work and preliminary results sections.
6. The student will demonstrate a breadth of knowledge in nanotechnology as it relates to computing, and a depth of knowledge in the topic of focus.

Course Requirements

1. **Research Website.** The student will prepare a research website containing a description of their research project, an initial research plan, and a collection of annotated links to relevant online resources such as websites and research papers.
2. **Background Study/Progress Reviews.** After identifying, in collaboration with the instructor, a suitable research area, the student will perform a guided study of relevant research and material in the area of nanotechnology-related computing in general, and in the specific topic of interest. The instructor will provide ample required reading material from online resources, and the student will supplement these readings with the results of his or her own online information gathering. The results of this effort will be a significant collection of annotated references, as well as an initial draft of a background section for a research paper. Weekly meetings with the instructor will include an oral examination and review of student materials to assess student progress and learning.
3. **Research Plan.** As part of the background study, the student will refine the research plan to incorporate a list of reasonable goals, milestones and deliverables that will enable the student to complete the goals of the course by the end of the semester. The instructor will work closely with the student to keep the scope and scale of the project reasonable for one semester.
4. **Research Project.** Once an area of specialization is identified (likely by the 3rd or 4th week of the semester), the student will conduct a focused research project, which may include elements of modeling, simulation, implementation and experimentation. The results of this research project will be written up in conference paper style, and will comprise a “Results” section of the student research paper.
5. **Final Exam/Research Paper.** The culmination of the course will be the production of a 5-7 page conference-style research paper of high quality, consisting of a background, related work, preliminary results and other sections to be determined based on the specific project. The paper will be graded as a final exam, and will include an oral examination in the final meeting of the semester.

Time permitting, the student will present the research paper at a department colloquium or at the meeting of a related computer science course. If the paper is of suitable quality, the student will be encouraged to submit the research paper to a relevant conference.

Tentative Grading Procedure

The following allocation of points is tentative and may change during the semester:

Research Website	10%
Background Study/Progress Reviews	20%
Research Plan	10%
Research Project	20%
Final Exam/Research Paper	40%

Academic Integrity

The student is responsible for and will be expected to follow standard industry, academic and University guidelines for academic integrity. Any deviation from these policies will be dealt with accordingly.