AMS641 / CSE 638: Topics in Computational Geometry and Geometric Algorithms, Spring 2004

Instructors:  Joe Mitchell, Math Tower 1-109, 632-8366, jsbm@ams.sunysb.edu Office hours (tentative): Tue (11:30-1:00), Wed (9:00-9:45, 2:15-3:00), or by appointment, or whenever you drop by and I am free (don’t be shy!)
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Course Web Site:  http://www.ams.sunysb.edu/~jsbm/courses/641/ams641.html

Registering for the Course:  You may register either for AMS 641 – Special Topics in Math Programming, or for CSE 638 – Advanced Algorithms. Each is 3 credits.

Class Meeting Time:  Wednesday, 10:00-12:50 or 11:00-1:50 (depending on the week – watch for announcements by email!), in the CS Seminar Room, room 1306, CS Building

Pre/Corequisites:  None, officially, though you should have some background in algorithms and ideally some prior knowledge of computational geometry (e.g., AMS 545/CSE 555). If you have no prior background in computational geometry, I recommend doing some independent reading from Computational Geometry: Algorithms and Applications (2nd Edition), by de Berg, van Kreveld, Overmars, and Schwarzkopf. Also recommended is the excellent book, Computational Geometry in C, Second Edition, by Joe O’Rourke. A useful reference is the “classic” book, Computational Geometry, by Preparata and Shamos, as well as the two handbooks on computational geometry (in the library).

Course Requirements:  Each student taking the class for credit is expected to:

• attend class (while we will not pass around an attendance sheet, the class is small enough that absences will be noticed!)

• participate in discussions

• “scribe” one class period (80 minutes) of notes; a template latex file, with instructions, will be provided

• select a topic area (with approval of the instructors) and write a survey article summarizing the state of the current knowledge on that area, highlighting known results, techniques, and open problems. The survey should contain citations to recent papers. A list of potential topic areas will be maintained on the web site, but you are encouraged to seek out your own (approved) topic area, with readings of the recent literature.

• Submit at least one new entry to the “TOPP” (The Open Problem Project); see http://cs.smith.edu/~orourke/TOPP/ for the current list of open problems and instructions on how to submit entries. (The list is moderated; not all submissions are accepted and posted. You must submit a new entry that is clear, complete, and meaningful, but there is no requirement that your entry be accepted by the list moderators.)

Course Outline:  The following topics will be covered, with some variation depending on the availability of time:

• binary space partitions • “fatness” and realistic input models • optimal path problems • visibility graphs, visibility complex • arrangements, motion planning • kinetic data structures • approximation algorithms for geometric network optimization • memory hierarchies, cache-oblivious data structures • randomized algorithms • optimal covering and sensor placement • geometric applications of expander graphs • collision detection for 3D models • partition trees, simplex range searching, epsilon nets • geometric spanners

Disability Policy:  If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site: http://www.ehs.sunysb.edu/fire/disabilities.asp