Syllabus  C.S. 615 Spatial Databases

Texts for this topic:
1. Spatial Databases: with Application to GIS, Rigaux et al, Morgan Kaufmann (or the other popular book in the field: Spatial Databases: A Tour, Shekhar and Chawla, Prentice-Hall); having one of these available as a reference is recommended
2. PRO Oracle Spatial, Beinat et al, APress (required)
3. Computational Geometry, de Berg et al, Springer (good source for Voronoi)

Expected preparation:
Experience in some programming language, object oriented.
The equivalent of an Intro to Data Bases class is desirable.
Some class preparation in data structures is expected.

For a c.s. major, cs310, cs514 are expected, and cs560 would be nice. Since this is a bit of an interdisciplinary venture, holes in a particular student's background can be remedied to a reasonable extent by additional outside self study.

Topics:
1. Intro to GIS (about two weeks)
2. Intro to Oracle as a DBMS (one week)
3. Spatial models (one lecture)
4. Extensions to DB models for spatial data (one lecture)
5. Spatial query languages (intro with details in 10.)
6. Data structures and index strategies to accommodate spatial data (2.5 weeks for this and the next topic)
7. Optimization for spatial queries (scattered topic)
8. Role of ODBMS and OR-DBMS (one week)
9. Computational geometry (two weeks--scattered)
10. Existing approaches, e.g. ESRI ArcView, shape files, Oracle spatial, shape2sdo utility. This is the topic on which the most time will be spent, particularly Oracle Spatial, including Oracle's MapViewer for viewing maps. (4 weeks)
11. Using Java's JDBC to access Oracle tables. (1 lecture)

The listed topics might not be in the order of coverage in class. The class will have elements of data bases, GIS, algorithms, data structures, and some math as a bonus. These topics will be interleaved in a way that appear to be, but hopefully will not actually be, whimsical.

The intro to GIS will come fairly early so as to provide a sense of context to the more abstract topic of spatial databases. The Rigaux book will be useful early, the other book later.
Students will be given Oracle accounts during the first week.

Exams and HW: some pencil and paper hw, some hw in an oop language, some Oracle Spatial hw. One midterm and one final, worth 30% and 40% respectively. Those who have mastered subtraction and addition can deduce what the hw is worth without asking. :)

As in any class, copying and plagiarism are forbidden, with severe grade penalties if this rule is violated. At a minimum, 90% of the work on hw and labs should be strictly your own. Working in a complete vacuum is not required, or even advisable, but treating hw as a team project is cheating.

Labs will focus on Oracle spatial, and Oracle Map viewer, but some work on PostGIS is also possible. ArcView labs are possible, as an introduction to what to exact from GIS software, as opposed to spatial database software. Some pencil and paper hw will also be given.

The only midterm usually covers material up to but not including B-trees. The final is not comprehensive and treated as a second major midterm.

Grading: assume the class is based on 110 points, with each midterm at 40 points, with labs and hw the other 30 points.

My philosophy about syllabi evolves from never having seen one in my 9 university years as a student. Older is not always better, but neither is newer. But you understand that I survived and got degrees, so I can not see a syllabus as a necessary part of teaching anything. On the other hand, I took a graduate class once with no graded work of any kind for 14 weeks, at which point a comprehensive final worth 100% of the grade was announced. So yes, I can see both sides of the argument, based on experience. Please note, however, that not one ph.d. student in that class was ever impolite enough to ask anything about course grading. We were however responsible enough to attend every class and be ready for anything with no complaints. The culture has steadily evolved from courtesy and responsibility toward entitlement, and this is one symptom among thousands. It is worth asking if this is really a net improvement. Or not. Darned if I know.