Course Syllabus

SIE 550
Engineering Databases and Information Systems Design

Course Description

Theoretical foundation for representation of knowledge in information systems. Introduces students to the fundamental concepts necessary to design and implement information systems. Uses logic programming as a tool for fast design and prototyping of data models. Covers formal languages and formal models, conceptual modeling techniques and methods for data abstraction, introduces major data models including relational, object-relational, and object-oriented models.

Credits: 3

Course Goals and Objectives:

• to introduce students to formal languages and formal modeling approaches that underlie information systems, that is, theoretical foundation for representing knowledge in information systems,
• to use logic-based programming as a tool for fast prototyping and design of data structures,
• to understand conceptual modeling techniques and methods for data abstraction,
• to introduce major database models including relational, object-relational, and object-oriented models,
• to discuss the suitability of these data models for spatial data

Expected Outcomes:

- Understand formal languages and formal theories
- Understand the conceptual modeling for databases
- Understand the logic of formulating possibly complex queries

Faculty Information

Professor Max J. Egenhofer
max@spatial.maine.edu

Office Hours
I am available in my office during the hour immediately following class. In addition, I am in the office most hours of the day and feel free to drop by if you have a short question or two. If you want to arrange a longer session E-mail is the simplest way to get a message through and a response.
Instructional Materials and Methods

All slides from the lectures will be made available on the Web after each class.

Grading and Course Expectations

*Grading criteria:*
  - labs – 20%
  - mid term – 30%
  - final – 30%
  - paper reviews – 10%
  - class participation – 10%

If you are absent due to illness or similar valid excuse, please notify me of your situation at max@spatial.maine.edu immediately prior to or after your absence.

*Tentative exam schedule:*

Final: take-home problem-solving exam during final’s week.

Course Schedule

See the attached tentative schedule of class session topics and reading assignment due dates.

Class Policies

Attendance and class participation are expected. Thirty percent of the course grade is dependent on participation in class.

*Late assignments, make-up, retake and rescheduled exams, and extra credit:*

A late submission of the written summary after the due date will be docked 10 percent per day and will not be accepted for credit after a week. If you miss your oral presentation due to an illness or emergency, you must send notification prior to the exam by email and special arrangements must be made with the instructor to consider your situation.

*Incomplete work:*

Incomplete or insufficient work may not be made up. It merely receives a low grade.

*Academic honesty:*

Academic honesty is expected. Plagiarism is unacceptable in this course and will result in a failing grade. “Although a writer may use other persons’ words and thoughts, they must be

Students with disabilities:

If you have a disability for which you may be requesting an accommodation, please contact either me or Ann Smith, Coordinator of Services for Students with Disabilities (Onward Building, 581-2319), as early as possible in the term.

Course Schedule

Week 1: Perception and cognition, communication, data vs. information
Week 2: Formal languages, Backus-Naur Form, testing wffs
Week 3: Truth tables, first-order languages, non-logical axioms, Horn clauses
Week 4: Logic-based databases
Week 5: Prolog as a query language
Week 6: Predicates for entities, relations, and attributes, databases as formal models
Week 7: Conceptual data modeling, relations between relations, data models
Week 8: Entity-Relationship diagrams and ER modeling, midterm exam
Week 9: Abstraction mechanisms: classification, generalization, aggregation
Week 10: Object orientation and object-oriented modeling
Week 11: Inheritance and propagation
Week 12: Relational data model
Week 13: Relational operators and SQL
Week 14: Normalization and functional dependencies
Week 15 Transactions, Final exam