

# CMSI 486T

## INTRODUCTION TO DATABASE SYSTEMS

<http://myweb.lmu.edu/dondi/summer2011-2/cmsi486>

**Summer Session II 2011** — Doolan 106  
Variable sessions and meetings, 3 semester hours  
Office Hours: by appointment

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### Objectives and Outcomes

Long after the course concludes, my hope is that you will:

- remember and understand the essential principles that guide the design, implementation, and management of systems capable of managing large amounts of data efficiently, and
- be able to apply this knowledge when implementing database-related functionality in new or existing software.

Gaining this knowledge and experience will be accomplished through guided individual study alongside the implementation of new database functionality for the XMLPipeDB open source project.

### Course Requirements

While there are no absolute prerequisites to this course, intermediate to advanced programming proficiency in any language will be helpful.

### Materials and Texts

- Jeffrey D. Ullman and Jennifer Widom. *A First Course in Database Systems*, Third Edition. Pearson, 2008: [Chapters 1–6](#); [Section 9.6](#); [Chapter 11](#).
- Michael Rys. “Scalable SQL.” *Communications of the ACM* **54**(6):48–53, June 2011.
- Supplementary handouts on the course web site.

In addition, do not hesitate to look for further information regarding the concepts, techniques, tools, and paradigms that we will discuss.

### Course Work and Grading

Graded coursework consists of 1 online study journal (20%), 1 final study report (40%), and modifications or extensions to the XMLPipeDB open source code base (40%). Letter grades are determined as follows:  $\geq 90\%$  get an A– or better;  $\geq 80\%$  get a B– or better;  $\geq 70\%$  get a C– or better. I may curve grades upward based on qualitative considerations such as degree of difficulty, ef-

fort, class participation, time constraints, and overall attitude throughout the course. Grades are never curved downward.

### Work/Study Journal

You will maintain an online work/study journal of your progress in the XMLPipeDB public wiki:

<http://sourceforge.net/apps/mediawiki/xmlpipedb>

This site should contain as complete a record as possible of your tasks, methods, and results throughout the term. Your study journal will be graded according to the same criteria as the final paper (see below). The frequency and number of journal entries affects the content and organization components of the study journal’s grade.

The study journal will be graded at the end of the summer term, [August 5](#).

### Final Study Report

You will formally document the overall result of your studies in the form of a final report to be submitted at the end of the term, consisting of:

1. A literature review describing the source materials studied (including for the specific questions listed below),
2. A summary or survey of what was learned during the summer term, and
3. Answers to the following questions:
  - Suppose you are asked which, among the entity-relationship model, UML, the relational data model, and XML, is “the best approach for representing data.” Is this a valid question? Why or why not?
  - Supplement the provided material on relational algebra with some research on relational calculus. Identify a key theoretical result that connects the two approaches and state how you think this theoretical result affects real-world relational database implementations.
  - Supplement the provided material on relational databases with some research on so-called

*NoSQL* databases. Provide a survey of some prominent systems within this category and compare this approach to traditional relational database management systems.

This report should occupy its own, clearly-identified page on the XMLPipeDB public wiki. There are no hard limits on length, but 10–20 pages at the wiki’s default print styles, not including the list of references cited, is typical. The report will be evaluated along the following criteria:

1. *Content (40%)*: What is the quality of the work? Are the background and motivation relevant and well-stated? Is the literature review thorough and well-described? Is the summary or survey complete and substantive? Are the summative questions answered effectively?
2. *Organization (30%)*: Is the text structured well? Are its ideas and flow easy to follow? Are distinct sections or topics clearly identified?
3. *Writing (20%)*: Are statements clear and easy to follow? Is the language precise and grammatically correct? Is the paper’s tone appropriate?
4. *Polish (10%)*: Is the content properly proofread? Are there any misspellings, typos, or other formatting faux pas?

The final study report is due at the end of the summer term, August 5.

## Open Source Contributions

You will apply what you learn in the form of modifications or extensions to the XMLPipeDB code base. This work will be graded along these criteria:

1. *Design (30%)*: Clarity, flexibility, and ease of maintenance; elegance and innovation; applies proper separation of concerns; satisfies the “one change, one place” property
2. *Functionality (30%)*: Works as intended; produces correct answers/results; performs in a reasonable amount of time; includes tests that demonstrate correct behavior
3. *Naming (20%)*: Clarity and consistency; names correspond to roles, types, or actions
4. *Documentation (15%)*: Presence of README or overview material; abundance of comments in code; genuinely useful information
5. *Version control (5%)*: Sufficient frequency; informative commit log

The state of any code at the end of the term, August 5, will serve as the basis for this grade.

## Version Control

Version control is an indispensable part of today’s computer science landscape in industry, the academe, and the open source community. Take full advantage of the functionality afforded by the Subversion repository that is provided by the XMLPipeDB SourceForge project site.

## Attendance

Meeting and session schedules are determined individually, and may vary according to the specific subject matter and/or course work.

## University Policy on Academic Honesty

Loyola Marymount University expects high standards of honesty and integrity from all members of its community. All students are expected to follow the LMU honor code, as stated in the *LMU Undergraduate Bulletin 2010-2011*.

## Americans with Disabilities Act

Students with special needs as addressed by the Americans with Disabilities Act who need reasonable modifications, special assistance, or accommodations in this course should promptly direct their request to the Disability Support Services (DSS) Office. Any student who currently has a documented disability (physical, learning, or psychological) needing academic accommodations should contact DSS (Daum Hall, Room 224, x84535) as early in the term as possible. All discussions will remain confidential. Please visit <http://www.lmu.edu/dss> for additional information.

## Topics and Important Dates

Dependent on the specific subject matter and ongoing progress.