

# INLS 523, DATABASE SYSTEMS I

Design and implementation of database systems. Semantic modeling, relational database theory, including normalization, query construction, and SQL.

## ACKNOWLEDGMENTS:

The design, materials, and implementation of this online version of INLS 523 is the product of a collaborative effort of SILS database instructors: Joan Boone, Rob Capra, Arcot Rajasekar, and myself. Special thanks to Reema Bhattacharya for the Sakai design and technical assistance, and Brian Sturm for coaching and filming the Unit Introductions.

## COURSE DESCRIPTION

This course will introduce the basic concepts and applications of relational database management systems, including semantic modeling and relational database theory. Topics include: user requirements and specifications, semantic data modeling, the relational model, SQL, normalization and data quality, and emerging technologies.

## PREREQUISITE:

Undergraduates:	INLS 161 or equivalent.
Graduates:	Satisfactory completion of the SILS Information Technology Competency Requirement <a href="https://sil.unc.edu/programs/graduate/msis/curriculum-new#Technology_Requirement">https://sil.unc.edu/programs/graduate/msis/curriculum-new#Technology_Requirement</a>

## COURSE OUTLINE:

- Introduction and Database Concepts
- Entity-Relationship Models
- Relational Theory and Concepts
- SQL
- Good Design
- Functional Dependencies and Normalization
- Data Quality

## LEARNING OBJECTIVES:

- Understand the basic concepts of databases, with emphasis on the relational model
- Gain experience with both the theoretical and practical aspects of database design and implementation
- Develop proficiency with entity-relationship modeling

- Be able to weigh, discuss, and justify database design decisions
- Learn to use SQL to create, manipulate and query databases
- Apply practical techniques for improving database design quality
- Gain an understanding of important ideas for databases in the future

## TEXTBOOK:

There is no required textbook for this course. Readings or links to readings will be included in the Sakai modules. The Tools and Resources document gives information about the tools and resources you need for this course. I have suggested chapters from one textbook for those who would like to see additional examples or explanations of concepts and processes: Elmasri, R. & Navathe, S. (2011). Fundamentals of Database Systems, Sixth Edition, Addison-Wesley. We will use some examples from this textbook in the course.

## COURSE REQUIREMENTS:

All enrolled students should have access to the UNC Sakai site for this course: <https://sakai.unc.edu/>  
We will use Sakai for almost all course activities.

When you are in Sakai, you can find help on Sakai tools by clicking on Help in the menu at the left. You can also view tutorial videos at [http://sakaitutorials.unc.edu/?How\\_to\\_...](http://sakaitutorials.unc.edu/?How_to_...) | [Students](#)

### About this Sakai Site

- [Mozilla Firefox](#) is the preferred browser for use with Sakai.
- Contact the [UNC Help desk](#) for technical assistance

# SCHEDULE OVERVIEW

This tentative schedule outlines the major topics and events planned for the semester. See the Unit Lessons in the Sakai site for details.

## GENERAL RECOMMENDATIONS:

- Units open on Tuesday at 8:30 am: you will be able to see the list of all materials, exercises, and assignments at that time.
- Complete materials and exercises in the order shown in each unit. (Sakai will enforce the sequence – you will not be able to skip over any items.)
- You will be able to read assignment and project specifications when the Unit opens, but you should learn the Unit's material before completing them.
- You may work at your own speed during each unit. I have marked what I would consider to be a week's worth of work within each unit, to serve as a rough guideline.
- Discussions, Assignments, and Project Deliverables have specific due dates; be sure you submit your work by the deadline. (Of course, you are welcome to submit them earlier!)
- Tests have specific opening and closing dates; be sure you are ready to take each test during the testing window.

Unit Start Date	Unit End Date	Topic	Graded Assignment (with Due Date)
UNIT 1 Tuesday 2020-08-11	UNIT 1 Monday 2020-08-24	Database Concepts [2 weeks]	<p>Welcome and Introduction</p> <p>Assignment 1: Official course documents, introductions, survey of DB experience. <b>Due Monday 2020-08-17, 11:55 pm</b></p> <p>Videos: Orientation, Movie DB</p> <p>Exercise: Movie DB Exercise</p> <p>----- <b>end of week</b> -----</p> <p>Videos: DB Concepts Part 1, DB Concepts Part 2</p> <p>Discussion: What's in CC? <b>Complete any time before 2020-08-24, 11:55 p.m.</b></p> <p>Slides: DB Environment</p> <p>Exercises: DB Concepts Exercises 1, DB Concepts Exercises 2</p> <p>Database Concepts Test: <b>opens Saturday 2020-08-22 8:00 a.m., due Tuesday 2020-08-25, 11:55 pm.</b></p>
UNIT 2 Tuesday 2020-08-25	UNIT 2 Monday 2020-09-14	ER Models [3 weeks]	<p>Introduction to the Unit</p> <p>Videos and documentation: How to draw an ER model, Entities and Attributes,</p>

			<p>Composite Attributes, Keys, Relationships: Degree and Cardinality, Relationships: Participation and Practice, Meet the Grants Database: Overview of the Grants DB, Reading the Grants ER</p> <p>Exercises: Entity Relationship (1), Entity Relationship (2)</p> <p>Project 1: Select database problem, read requirements, draw ER. <b>Due Monday 2020-09-21, 11:55 pm</b></p> <p><b>----- end of week -----</b></p> <p>Videos: Ternary Relationships, Weak Entities</p> <p>Exercises: Entity Relationship (3), Entity Relationship (4)</p> <p>Assignment 2, ER Models. <b>Due Monday 2020-09-14, 11:55 pm.</b></p> <p><b>----- end of week -----</b></p> <p>Videos: Extended ER Concepts, Extended ER Design</p> <p>Exercise: More Design Practice</p> <p>ER &amp; EER Test: <b>opens Saturday 2020-09-12 8:00 a.m., due Tuesday 2020-09-15, 11:55</b></p> <p><i>Note: Diagrams in Extended ER Concepts and Extended ER Design are from Elmasri &amp; Navathe, 2011: (8.1, 8.3 8.4, 8.5)</i></p>
<p>UNIT 3</p> <p>Tuesday 2020-09-15</p>	<p>UNIT 3</p> <p>Monday 2020-09-28</p>	<p>Relational Concepts &amp; Mapping [2 weeks]</p>	<p>Introduction to the Unit</p> <p>Videos: Relational Concepts (Capra), The Nursery, or What does a PK Identify?</p> <p>Exercises: Relational concepts (1), Relational concepts (2)</p> <p>Discussion: Implications of Design Decisions: <b>Contributions and responses due Monday 2020-09-21, 11:55 pm</b></p> <p><b>----- end of week -----</b></p> <p>Read Elmasri &amp; Navathe, (2011) Fundamentals of Database Design, Addison Wesley. Ch. 9, Relational DB Design by ER and EER to Relational Mapping, 285-299</p> <p>Videos: ER-DB Mapping: The Grants DB, Mapping the Movie ER</p> <p>Exercises: ER to Schema, Schema to ER, ER-DB</p> <p>Assignment 3: Mapping. <b>Due Monday 2020-09-28, 11:55 pm.</b></p> <p>Relational Concepts and Mapping Test: <b>opens Saturday 2020-09-26 8:00 a.m., due Tuesday 2020-09-29, 11:55 pm.</b></p>
<p>UNIT 4</p> <p>Tuesday 2020-09-29</p>	<p>UNIT 4</p> <p>Monday 2020-10-19</p>	<p>SQL Part 1 [3 weeks]</p>	<p>Introduction to the Unit</p> <p>Videos and documentation: Introduction to SQL, Creating Tables, Inserting Records, Download Instructions: DB Browser for SQLite, DB Browser for SQLite Demo, Using SQLite with the Grants Database</p>

			<p>Exercises: Mapping Practice, SQL (1), Exercise: SQL (2)</p> <p>Assignment: DB Practice. This brief exercise is practice for submitting the types of materials you will submit for your final project. <b>Due Monday 2020-10-19, 11:55 pm.</b></p> <p><b>----- end of week -----</b></p> <p>Videos: Basic Queries, Joining Tables, More about Queries, Aggregate Queries</p> <p>Exercises: SQL (3), Schema Practice, Exercise: SQL (4)</p> <p>Project 2: schema, data dictionary, create statements. Expect to revise P1 based on my comments and suggestions, before you start P2. <b>Due Monday 2020-10-26, 11:55 pm</b></p>
<p>UNIT 5</p> <p>Tuesday 2020-10-20</p>	<p>UNIT 5</p> <p>Monday 2020-11-02</p>	<p>SQL Part 2 [2 weeks]</p>	<p>Introduction to the Unit</p> <p>Videos: More About Joins</p> <p>Exercises: SQL (5), SQL (6)</p> <p><b>----- end of week -----</b></p> <p>Videos: Set Operators, Nested and Correlated Queries, Views and Triggers, Anatomy of a Query</p> <p>Exercises: SQL (7) Query Practice, SQL (8): More SQL Practice</p> <p>Assignment 4, SQL: <b>Due Monday 2020-11-02, 11:55 pm.</b></p> <p>SQL Test: <b>opens Saturday 2020-10-31 8:00 a.m., due Tuesday 2020-11-03, 11:55 pm.</b></p>
<p>UNIT 6</p> <p>Tuesday 2020-11-03</p>	<p>UNIT 6</p> <p>Monday 2020-11-16</p>	<p>Design, Normalization, and Data Quality [2 weeks]</p>	<p>Introduction to the Unit</p> <p>Videos: Good Design, Introduction to Functional Dependencies, Introduction to Normalization</p> <p>Exercises: SQL (9) Even more SQL Practice, SQL (10) The final SQL, FDs &amp; Normalization (1), FDs &amp; Normalization (2)</p> <p><b>----- end of week -----</b></p> <p>Videos: Normalization: 1NF &amp; 2NF, Normalization: 3NF &amp; Summary, Data Quality, Reverse Engineering the Tour Company</p> <p>Exercises: Normalization (1), Normalization (2), Reverse Engineering</p> <p>Discussion: Databases in you/our/society's future. <b>Contributions and responses due Monday 2020-11-16, 11:55 pm</b></p> <p>Assignment 5, FDs and Normalization: <b>Due Monday 2020-04-20, 11:55 pm.</b></p>

			<p>Test 5, Good Design, Functional Dependencies, and Normalization: opens Saturday 2020-04-18 8:00 a.m., due by Tuesday 2020-11-16, 11:55 pm.</p> <p>Project 3: records, queries, lessons learned. Expect to revise P2 based on my comments and suggestions, before you start P3. Due Thursday 2020-11-24, 4:00 pm.</p>
<p>UNIT 7</p> <p>Tuesday 2020- 11-17</p>	<p>UNIT 7</p> <p>Thursday 2020-11- 24, 4:00 pm</p>	<p>Project Completion</p>	<p>Introduction to the Unit</p> <p>Project 3 due 2020-11-24, 4:00 pm.</p> <p><i>Note: There is no final exam in this course.</i></p>