

S511: Database Design

Indiana University-Purdue University Indianapolis School of
Informatics and Computing
Department of Library and Information Science

Fall Semester, 2019

Meeting Time: Thursday, 6:00-8:40pm

Meeting Location: IT 271

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Office Hours: By zoom

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Zoom Personal Meeting Room: <https://iu.zoom.us/j/512268491>

Canvas Course Site: <https://iu.instructure.com/courses/1839010>

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Course Overview

Catalog Description

Concerned with a comprehensive view of the processes involved in developing formal access to information from a user-centered point of view. Considers various database models such as flat file, hierarchical, relational, and hypertext in terms of text, sound, numeric, image, and geographic data. Students will design and implement databases using several commercial database management systems.

Prerequisites

- ***School of Informatics and Computing Students***
INFO I501 or INFO B506 or INFO B519 or INFO B530 or INFO H541
- ***Library and Information Science Students***
S500, S501, S502 and S503

Technical or Skill Prerequisites

I expect you to have the ability to manage your own computer with respect to installing new applications. While not required, a curiosity about and interest in learning new technologies will serve you well in this course. Other than that, no specific database skills are necessary to be successful in this course.

Materials and Resources

Required Textbooks

The following texts are *required*, and you need to purchase them in order to work through this course. They are both available at the bookstore and online via retailers such as Amazon.

1. Coronel, C., & Morris, S. (2017). *Database systems: Design, implementation, and management* (12th ed.). Boston, MA: Cengage Learning.

This text is expensive. I apologize for the cost, but it is of superior quality, particularly in terms of quality, clarity, and instructional support (e.g., sample databases, sample SQL statements).

Additionally, the textbook is available through the IUPUI Main Library Course Reserves.

2. Limeback, R. (2008). *Simply SQL*. Collingwood, AUS: SitePoint.

This text is widely available used at a low cost, usually for less than \$11. An eBook copy is available via IUCAT using your IU account. It is accessible at <http://iucat.iu.edu/catalog/15953775>

However, the electronic copy is a single-user edition, which means that if *one* student selects “check out” on the ebook, it will be unavailable to *all*. If students *do not* select “check out,” multiple users will be able to read it online and/or print chapters. For everyone’s benefit please do not “check out” the ebook.

3. Kitchin, R. (2014). *The data revolution: Big data, open data, data infrastructures, and their consequences*. Los Angeles, CA: SAGE Publications.

The ebook is available through IUPUI Library here:

<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=801594>

Other Required and Supplementary Materials

Other book chapters, journal articles, miscellaneous readings, and media listed in the weekly modules are either openly accessible or available through eReserves associated with our online course site. I will make these available via Canvas.

Recommended Texts

The following texts are *recommended*, and they may help you to be successful in this course:

Beighley, L. (2007). *Head first SQL*. Sebastopol, CA. O'Reilly Media. Available via IUCAT or <http://goo.gl/izuGjy>

Free Online Resources

IU resources

- IU IT Training workshop materials (look for Access and SQL items):
<https://ittraining.iu.edu/downloads/>
- Books 24x7 IT Pro: <https://ittraining.iu.edu/learningoptions/books24.aspx>

Self-paced tutorials

- W3schools SQL Tutorial: <http://www.w3schools.com/sql/>
- Code School: <https://www.codeschool.com/courses/try-sql>
- Khan Academy: <https://www.khanacademy.org/computing/computer-programming/sql>
- Code Academy: <https://www.codecademy.com/learn/learn-sql>
- Lynda.com Access tutorials: <https://www.lynda.com/Access-training-tutorials/140-0.html>
- Lynda.com SQL tutorials: <https://www.lynda.com/SQL-training-tutorials/446-0.html>

Some self-paced tutorial sites require you to create an account. Lynda.com videos are available at no-charge by signing into the organizational portal at <https://www.lynda.com/signin/organization> by putting in iupui.edu as the organization name.

Technology

Basics

Internet and computer access is required. Your Internet speed should sufficiently support uploading and downloading of large file sizes. Your computer should be up-to-date with the latest operating system in order to support the required applications listed below; it should also have anti-virus software. The latter is especially important given the fact that we will be sharing files between ourselves.

Course Site

We have access to a Canvas course site (<https://canvas.iu.edu/>). I will use this site as a way to post updates, store documents, receive assignments, and for online learning activities, among other things. It is your responsibility to review the course site multiple times a week.

Required Applications

The following applications are required for you to participate successfully in this course. I will not make accommodations for alternative applications, because these are directly related to exercises, assignments, and learning objectives.

1. Kaltura

We will use Kaltura to create and share screencasts, as well as your final Virtual Symposium presentation. Screencasts can capture our desktop and applications as we interact with them, which allows us to demonstrate our processes and technical questions in an easy way. Kaltura is available for free using your IU account.

To capture your desktop, you will need to use [Kaltura](#), which is free and available for PC and Mac users. You can manage all of your recordings by logging in and going to your my media page. Once you've created some media, you can share it. Watch this instructional screencast to find out how.

Here are instructions on how to use Kaltura with Canvas: <https://uits.iu.edu/kaltura>

2. Microsoft Access 2013

We will use Access for some of our database exercises.

For PC: Access is available to download for free within the Microsoft Office 2013 package via the IUware software system at <https://iuware.iu.edu/Windows/title/1786>.

For Mac users: Access is available for free using the IUanyware desktop virtualization platform available at <https://iuanyware.iu.edu/>. See the following knowledge base document for help: <https://kb.iu.edu/d/bclt>

Note that you must have an Internet connection in order to use IUanyware.

3. MySQL

We will use MySQL for some of our database exercises.

MySQL is available for free using the IUanyware desktop virtualization platform available at <https://iuanyware.iu.edu/>. See the following knowledge base document for help: <https://kb.iu.edu/d/bclt>.

Note that you must have an Internet connection in order to use IUanyware.

4. Microsoft Visio 2013

We will use Visio to create entity relationship diagrams using Crow's Foot notation.

For PC AND Mac users: Access is available for free using the IUanyware desktop virtualization platform available at <https://iuanyware.iu.edu/>. See the following knowledge

base document for help: <https://kb.iu.edu/d/bclt>. Note that you must have an Internet connection in order to use IUanyware.

5. Other Entity Relationship Diagramming Software

We will be creating entity relationship diagrams using Crow's Foot notation. While Microsoft Visio is the industry standard, we will also examine two free ERD software programs. Draw.io can be downloaded here: <http://draw.io>. ERDPlus can be downloaded here: <https://erdplus.com/>.

Privacy Policies

The technologies we use in this course have different privacy policies. I believe that the technologies we will use respect your privacy in that they do not negatively impact your ability to develop ideas and beliefs by interfering in the educational process. Regardless, you should review their policies to see if they respect your privacy preferences.

The privacy policies:

- [Canvas](#)
- [Kaltura](#)
- [Zoom](#)
- [Microsoft](#)

Other Resources

Adaptive Educational Services (AES)

(317) 274-3241, <https://diversity.iupui.edu/offices/aes/index.html>

What AES does for students and on your behalf:

- AES receives students' documentation of disabilities, evaluates it in order to determine the correct accommodations and services students are entitled to receive.
- AES provides some accommodations for students and directs them to other campus or off-campus groups that can provide other assistance.
- AES works to educate the IUPUI staff and faculty both in Indianapolis and at Columbus regarding the university's and its employees' legal responsibilities regarding students with disabilities.
- AES works with academic units to provide academic substitutions and waivers for students with disabilities which do not fundamentally alter those programs' standards.
- AES serves as an advocate for students with disabilities, working as a mediator with faculty over classroom issues, with administrators regarding campus policies, and encouraging the university to expand its vision and policies regarding persons with disabilities.

Counseling and Psychological Services

(317) 274-2548, <https://studentaffairs.iupui.edu/health/counseling-psychological/index.html>
(317) 251-7575 for the 24 hours crisis hotline.

Counseling and Psychological Services provides the following services to students:

- group counseling
- individual counseling
- medication management
- testing

Libraries

(317) 274-8278, <http://www.ulib.iupui.edu>

Library staff take an active interest in serving the teaching, research and scholarly activities of IUPUI students, faculty, staff, and the citizens of Indiana as well as visiting scholars. Beyond its immense physical collection, the libraries offer a breadth and depth of online resources. Additionally, and most importantly for your needs, the librarians can provide custom research support for whatever project you have. Our liaison, Willie Miller (wmmiller@iupui.edu), should be your first point of contact for this service.

University Information Technology Services (UITS)

Access the UITS website (<https://uits.iu.edu/>)

Access the knowledge base (<https://kb.iu.edu/>)

Get help using live chat (<http://ithelplive.iu.edu/>)

ithelp@iu.edu

(317) 274-4357

If you have any questions about or issues with any of the technology used in this course, please contact the University Information Technology Services (UITS) support team. For Canvas questions, please search for “Canvas” in the knowledge base.

The Writing Center

(317) 274-2049, <http://liberalarts.iupui.edu/uwc/>

The Writing Center offers individual writing instruction, online assistance and classes to students. It is an excellent resource for any type of writing assignment. Unfortunately, the Writing Center only offers on-campus tutoring.

Course Policies

Participation and Absences

I expect active, substantive, and thoughtful participation in my class, both in-class and online. Should your participation be substandard, I may deduct points from your grade.

Additionally, regular attendance is required and necessary. The material for the class can be difficult and missing class will impact your learning and your grade. I assume that each student will miss no more than one session. Contact me as soon as possible if you cannot attend class.

If you will be absent from class, you must:

- Inform me in advance or as soon as possible after class
- Submit any work due from the missed class period
- Obtain notes, handouts, etc. from Canvas
- Check with classmates for notes, announcements, etc.

Acceptable reasons for absence from class include:

- Illness
- Serious family emergencies
- Special curricular or job requirements (e.g., professional conferences)
- Military obligation
- Severe weather conditions
- Religious holidays
- Participation in official university activities such as music performances, athletic competition or debate
- Obligations for court imposed legal obligations (i.e., jury duty, subpoena)

Missing more than one class meeting for reasons other than those listed above will have a negative impact on your course grade.

****Special note on course readings and lectures:***

As discussed above, the material for this course can be difficult and challenging. Classroom lectures/activities will not substitute readings, nor will readings substitute lectures and classroom activities. Please keep this in mind throughout the course.

Academic Integrity and Misconduct

Please review the academic misconduct policy in the IUPUI Policies section below. I expect my students to strictly adhere to that policy. Academic dishonesty in any form will result, in a minimum, of a grade of 0 for the assessment in which it was demonstrated; further, I reserve the right to pursue the university level academic misconduct processes.

Should you be at all concerned about:

- Plagiarizing the work of others
- Always cite and refer your sources appropriately using APA style
- Contact me with any questions

Communicating with Your Instructor

Should you have any questions regarding the course, please feel encouraged to contact me. Please use the Canvas Inbox to send a message. Also make sure that the subject line has the word “S511”.

For questions about the syllabus, assignments, and readings that are not private in nature, I encourage you to use the appropriate forums in our course site. Open questions may be answerable by your peers, and open answers may be appreciated by your peers.

Please note that I respond to your emails (or other virtual communications) within 24 hours.

Completing Assessments

Assessments of all types must be completed by their due date and time. Pay careful attention to due dates and times, as well as the method by which you should “turn in” the assessment. **The course calendar is useful to view when assessments are due.**

When assessments require feedback or I feel you could use feedback, I will provide it using mechanisms built into our course site or by writing on your completed work and returning it to you. You can expect feedback on most assessments within one week after their submission.

I understand that life gets in the way, and I recognize that graduate school should not always be your first priority. In cases where you experience an unexpected emergency or life crisis, I will negotiate extended deadlines. For religious observances, I expect that you will contact me about these and we can negotiate an extended deadline. For work and family obligations where events are scheduled ahead of time, I expect you to finish your work on time.

Course Evaluations

Please complete the anonymous and confidential online course evaluation at the end of the semester when you receive an email invitation from the university assessment office. Thanks for your participation in this important process.

Office Hours

Office hours are by appointment. Please contact me via Canvas message or after class to make an appointment. I can meet you via zoom.

Link: <https://iu.zoom.us/j/512268491>

Reading

You need to be aware of the fact that the material in this course is, at times, conceptual and highly technical. It will require focused effort in order to understand and put into practice. You need to take the time to read it carefully. Failure to do so will negatively impact your performance in class assessments.

Final Grades

Final grades are available by December 26 by 8:00pm.

IUPUI Policies

Disability Accommodations

Students needing accommodations because of disability will need to register with Adaptive Educational Services and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling (317) 274-3241.

Religious Holidays

IUPUI respects the right of all students to observe their religious holidays and will make reasonable accommodation, upon request, for such observances. Students seeking accommodation for religious observances must submit a request in writing to the course instructor by the end of the second week of the semester and should use the Request for Course Accommodation Due to Religious Observance Form. More information on the IUPUI Policy on Religious Holidays is available here: <http://registrar.iupui.edu/religious.html>.

Academic Integrity

The IU Code of Student Rights, Responsibilities, and Conduct states that students must uphold and maintain academic and professional honesty and integrity; the code defines academic misconduct as any activity that tends to undermine the academic integrity of the institution.

Students engaging in academic misconduct may therefore receive penalties from their course instructor and disciplinary action from the university. Policies against academic misconduct apply to all course-, department-, school-, and university-related activities. Academic misconduct may involve human, hard-copy, or electronic resources and includes but is not limited to the following: cheating, fabrication, plagiarism, interference, violation of course rules, and facilitating academic dishonesty.

For definitions of these activities, visit <http://studentcode.iu.edu/responsibilities/academic-misconduct.html>. For information on how faculty and students are expected to handle cases involving academic misconduct, visit <http://registrar.iupui.edu/misconduct.html>. Additional information about the rights and responsibilities of IU students is available at <http://studentcode.iu.edu/>.

Sexual Misconduct

As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help.

If you are seeking help and would like to speak to someone confidentially, please visit <http://stopsexualviolence.iu.edu/help/index.html> for contact information

It is also important that you know that federal regulations and University policy require me to promptly convey any information about potential sexual misconduct known to me to our campus' Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been harmed.

Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist.

I encourage you to visit stopsexualviolence.iu.edu to learn more about available resources on campus and in the community.

Education and Title VI

Title VI of the Civil Rights Act of 1964 protects people from discrimination based on race, color or national origin in programs or activities that receive Federal financial assistance.

Programs and activities that receive ED funds must operate in a non-discriminatory manner. These may include, but are not limited to: admissions, recruitment, financial aid, academic programs, student treatment and services, counseling and guidance, discipline, classroom assignment, grading, vocational education, recreation, physical education, athletics, housing and employment, if it affects those who are intended to benefit from the Federal funds.

Important Dates

Academic Calendar: <http://registrar.iupui.edu/enrollment/4188/cal4188.html>

You can check important dates here: <https://studentcentral.iupui.edu/calendars/official-calendar.html>

Outcomes, Assessment, and Grading

Student Learning Outcomes

Course Learning Outcomes (Revised Blooms Taxonomy)

Upon completion of this course, students should be able to:

1. Design and implement relational databases using tables, keys, relationships, and SQL commands to meet user and operational needs.
2. Diagram a relational database design with entity–relationship diagrams (ERDs) using crow’s foot notation to enforce referential integrity.
3. Evaluate tables for compliance to third normal form and perform normalization procedures on noncompliant tables.
4. Write triggers to handle events and enforce business rules and create views within a relational database.
5. Formulate queries in relational algebra using selection, projection, restriction, Cartesian product, join, and set operators.
6. Demonstrate an understanding of the data lifecycle, including data curation, stewardship, preservation, and security.
7. Evaluate the social and ethical implications of data management.

Late Work:

You are responsible for completing each deliverable (e.g., assignment, homework) by its deadline and submitting it by the specified method. Deadlines are outlined in the syllabus or in supplementary documents accessible through Canvas. In fairness to the instructor and students who completed their work on time, a grade on a deliverable shall be reduced 10%, if it is submitted late and a further 10% for each 24-hour period it is submitted after the deadline.

Grade	Description	Percentage
A	Outstanding achievement. Student performance demonstrates full command of the course materials and evinces a high level of originality and/or creativity that far surpasses course expectations.	96-100
A-	Excellent achievement. Student performance demonstrates thorough knowledge of the course materials and exceeds course expectations by completing all requirements in a superior manner.	91-95
B+	Very good work. Student performance demonstrates above-average comprehension of the course materials and exceeds course expectations on all tasks as defined in the course syllabus.	87-90
B	Good work. Student performance meets designated course expectations, demonstrates understanding of the course materials, and performs at an acceptable level.	83-86
B-	Marginal work. Student performance demonstrates incomplete understanding of course materials.	79-82
C+	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course materials.	76-78
C	Unacceptable work	73-75
C-	Unacceptable work	69-72
D/F	Student has failed the course. An incomplete is not an available option.	68 and below

Notes:

1. I will calculate final grades to the first decimal point. If your final grade is at .5 or above, I will round up. For instance, if you receive a 93.5 on your final grade, I will round this up to a 94.
2. Students must receive a B- or above for a course to satisfy core requirements (e.g. S501, S502). Students must receive a C or above for an elective course applied to the MLS. Students must maintain a 3.0 GPA overall and must finish coursework with a 3.0 GPA. If in any semester a student receives less than a 3.0 for that semester, they will be placed on probation and will need to achieve a 3.0 overall GPA during the next semester.
3. A “B” grade is the norm for graduate students. A+ grades are not given in the department.
4. Incompletes are only available when unexpected events prevent completion of the course requirements in the usual time frame. No student with multiple incompletes may register for additional courses. Left unchanged, an Incomplete automatically becomes an F after one year. See registrar.iupui.edu/incomp.html for more information.

Semester Structure

Overview

This course covers 16 weeks excluding the Thanksgiving week. 13 of those weeks included substantive content, discussion and classwork; three weeks account for the hands-on practice and final submission discussion.

The semester has been broken down into four thematic units with their own interconnected modules. There is a new module each week.

Unit and Module Overview

Full descriptions of each module and related readings are available at the course site.

Unit 1 - Database Concepts

Module 1 - Intro

Module 2 – Database Systems and Data Models (Chap 1& 2)

Unit 2 - Database Design and Management

Module 3 - Entity Relationship Modeling, Part 1 &2 (Chap 3&4)

Module 4 - Advanced Data Modeling (Chap 5)

Module 5 - Database Normalization (Chap 6)

Unit 3 - Data Access and Reporting Using Structured Query Language (SQL)

Module 6 – Introduction to SQL Syntax and Programmatic Database Creation

Module 7 – Advanced SQL

Module 8 – Database Design

Module 9 – Transaction Management & Concurrency Control

Unit 4 – Advanced Concepts

Module 10 – Database Performance Tuning & Query Optimization

Module 11 – Business Intelligence and Data Warehouses

Module 12 – Database Connectivity and Web Technology

Module 13 – Database Administration and Security

Module 14, 15 – Practice of SQL

Module 16 – Final

Semester Grid

Week	Unit	Module	Date
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1	1	1	8/29
2	1	2	9/5
3	2	3	9/12
4	2	4	9/19
5	2	5	9/26
6	3	6	10/3
7	3	7	10/10
8	3	8	10/17
9	3	9	10/24
10	4	10	10/31
11	4	11	11/7
12	4	12	11/14
13	4	13	11/21
<i>Thanksgiving Week Break</i>			
14	4	14	12/5
15	4	15	12/12
16	Final	Final	12/18

Acknowledgments

A special thanks to Dr. Angela Murillo and Dr. Kyle Jones for sharing her syllabi and database materials used here to construct this course structure.

FOR DLIS Students Only

Departmental Master of Library Science Learning Outcomes

The Master of Library Science (M.L.S.) program prepares students to become reflective practitioners who connect people and communities with information. Upon completion of the MLIS program, graduates are prepared to:

1. Approach professional issues with understanding
 - 1.1. Understand the social, political, ethical, and legal aspects of information creation, access, ownership, service, and communication
 - 1.2. Anticipate emerging trends and respond proactively
2. Assist and educate users
 - 2.1. Analyze and identify the information needs of diverse communities of users
 - 2.2. Educate users and potential users to locate, use, and evaluate information resources and tools
 - 2.3. Analyze and evaluate information systems and services in a variety of settings
3. Develop and manage collections of information resources
 - 3.1. Design and apply policies and procedures that support the selection and acquisition of information resources for particular communities of users
 - 3.2. Manage, evaluate, and preserve physical and virtual collections of information resources
 - 3.3. Uphold ethical and legal standards in acquiring, leasing, preserving, and providing access to information resources
4. Manage and lead libraries and other information organizations
 - 4.1. Perform basic managerial functions, including planning, budgeting, and performance evaluation
 - 4.2. Communicate effectively to a variety of audiences
 - 4.3. Apply theories of organizational behavior and structure
5. Represent and organize information resources
 - 5.1. Understand and apply principles of representation and organization
6. Use research effectively
 - 6.1. Design, conduct, interpret, and take action based upon research and evaluation
7. Deploy information technologies in effective and innovative ways
 - 7.1. Implement and evaluate information and communication technologies for efficiency, usability, and value to users

Student Learning Outcome Map

Course Outcomes	MLS Outcomes
1	2.1. 2.3. 3.1. 5.1. 7.1.
2	7.1.
3	2.1.
4	1.1. 1.2. 3.3.
5	3.1 3.2 5.1
6	1.1 3.3