

IST659 Data Administration Concepts and Database Management

Syracuse University Graduate Course Syllabus

Fall 2021 Sections Meeting Times

M001 Mondays: 9:30 AM – 12:15 PM Link Hall 105

Course Information

Instructor

Michael Fudge

Professor of Practice

314 Hinds Hall

mafudge@syr.edu

<https://ischool.syr.edu/people/directories/view/mafudge/>

Office Hours: On Microsoft Teams, 12-2pm Thursdays.

Description

Definition, development, and management of databases for information systems. Data analysis techniques, data modeling, and schema design. Query languages and search specifications. Overview of file organization for databases. Data administration concepts and skills.

Additional Course Description

This is an introductory course in database management systems. It examines data structures, file organizations, concepts, and principles of database management systems (DBMS); as well as, data analysis, database design, data modeling, database management and database implementation. More specifically, it introduces hierarchical, network and relational data models; entity-relationship modeling; basics of Structured Query Language (SQL); data normalization; and database design. This course provides hands-on experience in database design and implementation through assignments, lab exercises and course projects. This course also introduces advanced database concepts such as transaction management and concurrency control, distributed databases, multi-tier client/server architectures, database applications, improving query performance through indexing, and advanced data query patterns for extract-transform-load.

Prerequisite / Co-requisite: None

Audience: This is an introductory course and required no prior knowledge in the subject area.

Credits: 3

Learning Objectives

Upon completing this course, the learner should be able to:

- Describe fundamental data and database concepts including various storage models.
- Explain and use the database development lifecycle and data models.
- Analyze business problems and design and implement appropriate data-oriented solutions using the relational data storage model.
- Solve problems by constructing database objects and queries using the SQL language.
- Identify performance and data integrity improvements of existing database designs and implementations.

- Evaluate and select approaches for data migrations, temporal data, and data normalization.
- Critique the effectiveness of DBMS in computer information systems.

Course Fees and/or Costs

- None

Required Textbooks and Supplies

- Applied Database Management, By Michael Fudge. ISBN 9781644965900. The book is an online text available within Blackboard. You will take quizzes through the textbook.
- Students are expected to have a laptop computer to participate in the class sessions, run the lab software, and complete the problem sets. Requirements are any Mac OSX, Windows 10, or Chromebook with 8GB RAM and 8GB free disk space.

Understanding the Approach Used in This Course

To instill good habits and routine, the approach used in this course is the same each week. It is designed to allow you to progress as a learner, ask questions, and grow comfortable with the material throughout the week. There are three phases to the approach:

- **Coursework Before Class** consists of a chapter reading from the textbook and a video lecture. Both are active learning tools, and you will be asked questions as you read and watch. Your responses are not graded but will be reviewed by your instructor to prepare for the in-class session. As part of your engagement with the learning process, it is expected you will review your own answers and prepare any questions or doubts you have about the coursework. Your learning outcomes at this stage are to recall key terms and understand the concepts presented to you.
- The **In-Class session** allows you to reinforce what you have learned and to begin to apply it to new problems and situations. We begin each class with students posting their coursework questions to the community board. Your questions should be based on concepts that remain unclear to you. These questions will guide out class discussions and activities. We then review the previous week' homework / problem sets, discussing strategies and sharing answers to them.
- **After Class** you will complete a lab and problem set. The lab contains a walk-through to guide you through the application of the problem-solving approaches relevant to this week's material. The problem set is your opportunity to self-measure your knowledge of the material and application of it to new situations and scenarios. Included with your problem set is a metacognitive activity where you are asked to reflection upon your experiences as a learner that week and asses your comfort level with the material.

Tools we will use in this Course

It is suggested that you install and configure these tools on your laptop before the course begins.

- **Microsoft Teams.** Teams is collaboration tool. Integrating with email and calendaring Teams offers presence awareness and chat / messaging. These chats can be elevated into a video conference. We will use teams for class discussions, homework questions and office hours. You are welcome to contact me whenever my status says I am available. Your Office 365 account is linked to your NetID. Logon to teams by visiting <https://portal.office.com> entering your SU email netid@syr.edu and then your NetID password. One you are signed into Office 365, click the Teams icon.
- **Google Docs.** We will use Google Docs as a collaborative note-taking tool to work in class on problems and breakout activities. Login with your SU Google account <https://g.syr.edu>.

- **Docker.** Docker is a containerization platform, allowing you to run applications in isolation from your host computer. In this course we use it to run the DBMS itself and their supporting tools. You can download and install docker by following the instructions here: <https://docs.docker.com/get-docker/>
- **Azure Data Studio.** Azure Data studio (ADS) is a SQL Database client. While you can get away with using the web tools provided with the learn-databases setup, the ADS experience is better. To install, follow the instructions here: <https://docs.microsoft.com/en-us/sql/azure-data-studio/download-azure-data-studio>
- **Learn Databases.** Learn Databases is a suite of docker containers which create a database lab environment on your computer. There are containers for the SQL Server database management system itself, and 3 web tools for provisioning sample databases, database administration and writing SQL scripts. After you have installed Docker, follow the instructions at <https://github.com/mafudge/learn-databases#walkthrough> to set it up. Do not create any sample databases at this time – you will do this as part of the first problem set.

Academic Expectations

Requirements

As an enrolled student in this course, it is expected that you will:

1. **Be Prepared.** It is expected you will complete the assigned readings and video coursework as prescribed.
 - Participation in the assigned reading and video coursework is required and will be measured.
 - Attendance of online or face-to-face sessions are required and there are no excused absences other than medical illness documented by the university.
 - While in attendance you are expected to be engaged, an active participant in class. You should be prepared to and answer questions to the best of your ability when called upon.
 - If you are participating virtually it is expected you will have your microphone muted until you need to speak and your video camera on.
 - In some classes an ungraded pop-quiz or other type of diagnostic instrument will measure your comprehension of coursework and passing will count as your participation grade for that week.
 - Attendance does not count towards your grade, but excessive absence or unpreparedness (more than 10% of the course) will decrease your final grade by one Registrar Grade. (For example, A to A-) You will be warned before this happens.
2. **Complete 12 Homework Problem Sets.** These problem sets are technical activities which enforce key concepts learned in the lesson through problem-solving and practice. They must be completed and turned in to Blackboard by the due date, which is the evening prior to our class session. It is important to remember that the homework is practice, if you do not have the right answer, it is expected you will have questions. You are expected to reflect on your learning. Each Problem Set is assigned a grade of:
 - High Pass (10 points) the assignment is complete and correct with very minor errors, and student contributes to homework discussion in class and a reflection on your learning for that week.
 - Pass (7 points) the assignment is complete and mostly correct, or student has little to no contributions to homework discussions in class, or little to no reflection on your learning for the week.
 - Needs Improvement (3 point) the assignment is incomplete or has several errors or is late, no reflection.
 - Fail (0 points) the assignment was not turned in after 1 week.

3. Take 12 **Quizzes**. The intention of the quiz is to ensure you are keeping pace with the coursework and to measure your understanding of the class material. Quizzes are issued in the online textbook.
 - You will get one attempt at the quiz and your attempt must be complete on or before the date posted on the syllabus.
 - Quizzes are open book.
 - Quizzes consist of multiple choice and/or short answer questions.
 - Quizzes individual effort.
 - You must complete the quiz on your own time, outside of class.
 - Due dates are posted on the syllabus.
4. Complete a **Group Project**, which demonstrates your ability to work in a team to design and implement a functional system with a database, based on what you have learned in the course. Guidelines:
 - Work in self-assembled teams of 2-3 students.
 - Devise your own database to design and implement. Project idea must be pre-approved prior to beginning work.

Required artifacts for submission

1. Document with team name, group members and which project you will work on. If your own a requirements document must be submitted and approved.
2. Data analysis of the facts listing entities, attributes, and relationships in the data model.
3. Conceptual Data Model Diagram
4. Logical Data Model Diagram
5. Identification of your external data model and data logic.
6. Basic layout of all application screens
7. Diagram of each screen used in the application.
8. SQL Up/Down script to implement the internal model with initial data.
9. SQL Up/Down Script to load / migrate in existing data.
10. SQL Up/Down script of data logic for the external data model
11. Implementation of the application itself.
12. A team log recording individual and group contributions to the project including when and by whom.
13. A slide deck of your presentation
14. A Video recording of your team presentation
15. A Video reflection of what you learned from the experience what you would do better if you had the time, etc.

Grading:

| Type of Activity | Quantity | Points | Notes | Total |
|---------------------|----------|--------|--|------------|
| 1. Problem Sets | 12 | 10 | 12 Total. Can be handed in late for a 3. | 120 |
| 2. Quizzes | 12 | 10 | 12 Total. Issued through textbook. | 120 |
| 3. Team Project | 1 | 60 | Refer to project document for details. | 60 |
| Total Points | | | | 300 |

Grading Scale:

| Student Achievement | Percentage | Grade Points | Registrar Grade |
|---------------------|------------|--------------|-----------------|
| Mastery | 285 - 300 | 4.0 | A |
| | 270 - 284 | 3.667 | A - |
| Satisfactory | 255 - 269 | 3.333 | B + |

| Student Achievement | Percentage | Grade Points | Registrar Grade |
|---------------------|------------|--------------|-----------------|
| | 225 - 254 | 3.0 | B |
| Low Passing | 210 - 224 | 2.667 | B - |
| | 195 - 209 | 2.333 | C + |
| Unsatisfactory | 180 - 194 | 2.0 | C |
| | 165 - 179 | 1.667 | C - |
| | 0 - 164 | 0 | F |

Course Calendar

Course Schedule

| Week | Dates | Topic for That Week | What is Due? |
|------|---------------|---|---------------------------------|
| 1 | 8/29 – 9/4 | Unit 1 – Introduction to Databases | |
| 2 | 9/5 – 9/11 | No Classes – Labor Day | |
| 3 | 9/12 – 9/18 | Unit 2 – The Relational Model | Problem Set 1, Quiz 1 (9/13) |
| 4 | 9/19 – 9/25 | Unit 3 – Introduction to SQL | Problem Set 2, Quiz 2 (9/20) |
| 5 | 9/26 – 10/2 | Unit 4 – SQL Select Part I | Problem Set 3, Quiz 3 (9/27) |
| 6 | 10/3 – 10/9 | Unit 5 – SQL Select Part 2 | Problem Set 4, Quiz 4 (10/4) |
| 7 | 10/10 – 10/16 | Unit 6 – SQL Advanced Patterns | Problem Set 5, Quiz 5 (10/11) |
| 9 | 10/17 – 10/23 | Unit 7 – Conceptual Data Modeling | Problem Set 6, Quiz 6 (10/18) |
| 10 | 10/24 – 10/30 | Unit 8 – Logical Data Modeling | Problem Set 7, Quiz 7 (10/25) |
| 11 | 10/31 – 11/6 | Unit 9 – Database Applications | Problem Set 8, Quiz 8 (11/1) |
| 12 | 11/7 – 11/13 | Unit 10 - Database Programming | Problem Set 9, Quiz 9 (11/8) |
| 13 | 11/14 – 11/20 | Unit 11 – Transactions and Concurrency Control | Problem Set 10, Quiz 10 (11/15) |
| 14 | 11/21 – 11/27 | No Classes – Thanksgiving Break | |
| 15 | 11/28 – 12/4 | Unit 12 – Performance and Indexing | Problem Set 11, Quiz 11 (11/29) |
| 16 | 12/5 – 12/10 | Unit 13 – Data Normalization | Problem Set 12, Quiz 12 (12/6) |
| 17 | 12/11 – 12/16 | Final Project Presentations and Demos, online via appointment | Team Project (12/16) |

PLEASE NOTE: Assigned readings and specific due dates for quizzes and problem sets posted to Blackboard.

University Policies

Academic Integrity Policy

Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy in effect at the School of Information Studies defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The pilot policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The pilot policy also prohibits

students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the pilot policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and on the policy, see <http://academicintegrity.syr.edu>.

Disability-Related Accommodations

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), disabilityservices.syr.edu, located at 804 University Avenue, room 309, or call 315.443.4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue "Accommodation Authorization Letters" to students as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. Our goal at the iSchool is to create learning environments that are useable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please meet with me to discuss additional strategies beyond official accommodations that may be helpful to your success.

Religious Observances Notification and Policy

SU's religious observances policy, found at supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes through an online notification form in MySlice listed under **Student Services/Enrollment/My Religious Observances/Add a Notification**.

Student Academic Work Policy

Student work prepared for University courses in any media may be used for educational purposes, if the course syllabus makes clear that such use may occur. You grant permission to have your work used in this manner by registering for, and by continuing to be enrolled in, courses where such use of student work is announced in the course syllabus.

I may use academic work that you complete this semester in subsequent semesters for educational purposes. Before using your work for that purpose, I will either get your written permission or render the work anonymous by removing all your personal identification.

Course Evaluations

There will be an end of course evaluation for you to complete this term, described below. This evaluation will be conducted online and is entirely anonymous. You will receive a notification from the Syracuse University Office of Institutional Research & Assessment (OIRA) department in your email account with the evaluation website link and your passcode.

We faculty work hard to do the best possible job when preparing and delivering courses for our students. Please understand that not only does the school use the course evaluations to make decisions about the curriculum in order to improve where necessary, but they also use them to make decisions about faculty members. Please take the time and fill out this evaluation as your feedback and support of this assessment effort is very much appreciated.

Other Course Policies

- All work is due on the dates provided. No late work is accepted. The reasoning is the grading is participation / effort-based and most of the content time-sensitive.
- Final grades will not be rounded up. 94/100 is an A-, please don't ask.
- I take academic integrity seriously, and so should you. Cheating on quizzes or copying homework will result in an F in the course. Do not work together unless the assignment instructions state explicitly.

Office Hours

You are welcome to stop by during office hours without an appointment. Should you need to make an appointment to see me outside of office hours, you must request via email and include the following:

- State your reason for the appointment.
- Include 3 times in which you can meet.
- Make sure 2 times are on different days.

I will respond to you within 24 hours.

Group Work

The only group work permitted in this course is the Group Project. All other gradable work in this course should be considered individual effort. It is assumed that each of you know the difference between simply discussing work with your classmates and working collaboratively. When in doubt, ask.