

ISM 4212
Database Administration and Design
Syllabus Version 1.1

29 December 2022

DRAFT

Version history

Version	Description
1.0	First released draft

DRAFT

ISM 4212: Database Design and Administration

Spring 2023

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COMMUNICATION POLICY and PREFERRED METHODS:

I follow a standard business day, which means 0800 – 1700. If you choose to contact me through email, the response time will be no later than the close of the next business day. This means if you send me an email at 0800 on Friday, I will respond to that email no later than 1700 the next business day, Monday. Keep this in mind when timing your requests and inquiries.

I do not stand-by on my email server 24/7 waiting for new mail to arrive in my inbox. In fact, I do not have email notifications turned on, I check my email at the start of the business day for whatever arrived during the overnight cycle, and then again at the end of the business day for currency.

MANDATORY Fall 2021 SYLLABUS STATEMENT: COVID-19 PROCEDURES

All students must comply with university policies and posted signs regarding COVID-19 mitigation measures, including wearing face coverings and maintaining social distancing during in-person classes. Failure to do so may result in dismissal from class, referral to the Student Conduct Office, and possible removal from campus.

Additional details are available on the University's Core Syllabus Policy Statements page:

<https://www.usf.edu/provost/faculty/core-syllabus-policy-statements.aspx>

MANDATORY Fall 2021 SYLLABUS STATEMENT: CLASS RECORDING

Some sections of this course have classes that **may be** recorded and streamed online **but are not guaranteed to be so**. Any and all Student voices, faces and videos will be included in the class recordings. It is the student's responsibility to make sure the privacy of their surroundings and background is maintained.

TEXTBOOKS: I have listed here a few books that do a decent job explaining database design fundamentals. The "official" textbook for the class is the Gillenson book. In my experience, I have found there is no really good textbook for a database class. In this course, I teach the fundamentals based on my own experiences designing and building databases. If you are new to database and this is your first experience with the subject and concepts, then I strongly recommend the T-SQL book; it may be the best book on the market for learning the basics. For those of you who plan to work in this field as SQL Developers, I highly recommend the Atkinson book. I use it almost every day in my work.

Optional: Fundamentals of Database Management Systems, 2nd ed.,
by Mark L. Gillenson. Wiley (2012).

Recommended: T-SQL, 3ed., Itzik Ben-Gan, Microsoft Press (2016).

Beginning Microsoft SQL Server 2012 Programming,
by Paul Atkinson and Robert Vieira. Wiley (2012).

Database Systems Design, Implementation, and Management,
13th ed., by Coronel, Morris, Rob. Cengage (2019).

Database Concepts, 7th ed., Kroenke, Auer. Pearson (2015).

EQUIPMENT: Required: You must have access to a Windows based computer. If you do not, you will not be able to complete all the required assignments for this course. It helps to have a laptop so that you can follow along with in-class demonstrations, but it is not required that you do so.

DESCRIPTION: From Course Catalog: “This course is an introduction to the concepts and principles of database management. It is intended to provide potential designers, users, and managers of data-base systems with an understanding of physical vs. logical representations, data modeling, implementation, and data management. Database skills are developed through both individual and team projects.”
“In this course, students will be introduced to the design, construction, and use of relational databases. The content of the course has been selected to provide students with the knowledge and analytical skills in this subject that are needed to successfully enter professional management information systems careers.”

PREREQUISITE: ISM 3113 Systems Analysis and Design (with a grade of “C” or better)

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

- recognize the role of data management in the modern business organization
- demonstrate modeling skills used to identify organizational data structures
- describe the fundamental principles of relational database technology
- employ Structured Query Language to manipulate data in relational databases
- apply database technology to typical Business Analytics needs of organizations
- identify the primary organizational responsibilities of database professionals
- summarize the major issues affecting database design and use in environments involving client/server databases, distributed databases, and data warehouses

REQUIREMENTS: Database Assignments
Software Installation Assignments
Database Projects

GRADING:

WARNING: There is NO extra credit. There is NO rounding. What you get is what you get. You have all the assignments before you. There is no additional work available to you if you fail to complete the actual assignments in the syllabus.

Graded Assignments:	Letter Grades:
Average of Database Assignments	A >= 90.0 with no rounding
Final Assessment: Database Project	B >= 80.0
Software Install Assignments	C >= 70.0
Exam	D >= 60.0
	F < 60.0

Grade Curve Expectation: History has shown that the following grade curve has been consistently stable over the past 3 years. Some semesters it is higher, on rare occasion it has been slightly lower.

Level of Mastery	Percentage Achieved	Number out of population of 40
90% or better – As	35%	13
80% or better – Bs	65%	26
70% or better – Cs	80%	33
Failed to reach 70% - Ds and Fs	20%	8

Assessment/Feedback on your performance: This section is explained here so that everyone knows where they stand in the class at any given time. Your letter grade is direct feedback to you of how well you can create a design, build a database from that design and execute select statements to produce result sets.

- ‘A’ level work means that you can correctly create a documented design (diagrams and notation) and correctly build tables with constraints and create select statements and programmable objects that produce correct result sets based on a narrative provided – there may be minor flaws that will not impact performance significantly.
 - ‘B’ level work means you can create documentation and build tables, and have some significant flaws that may impact performance of the database.
 - ‘C’ level work means your documented design and build has major flaws that will cause the database to fail.
 - Below ‘C’ level means you have not demonstrated a minimum amount of competence for creating a database design and build or that you cannot create select statements that can execute without error, or fail to produce correct result sets.

RUBRIC: Here is a more specific breakdown of how your database assignments are evaluated by percentage:

1. Narrative documents meet formatting requirements as listed below and continuing onto the next page (7): 20%.
2. ERD, EERD diagrams are not missing tables, have correct notation: 20%.
3. ERD, EERD diagrams have correct cardinality and optionality: 10-15%.
4. RS has correct tables, arrows, and notation: 20%.
5. RS matches EERD: 10%.
6. DD has correct tables, notation, data types, and constraints: 20%.
7. DD matches RS: 10%.
8. Database diagram has correct tables and referential integrity; PKs and FKs correct: 20%.
9. Database has correct tables, referential integrity and matches DD documentation: 30%.
10. Database has correct constraints: 20%.
11. Select statements execute with no errors: 20%.
12. Select statements produce result sets: 20%.
13. Result sets produced are correct: 10-15%.
14. SSDT reports include query builder: 20%.
15. SSDT reports produce correct result sets: 20%.
16. SSDT reports are formatting with proper columns, fonts and spacing: 10-15%.

Formatting Requirements:

- Please follow these formatting rules for any written work. The reason for these formatting rules is so that everyone knows the standard for which their work will be judged. This also provides a fair and equal means for comparing the work between individuals. This puts everyone on the same footing. These are the rules and requirements that control your submissions:
 - a. Document submissions must be typed, using Times New Roman, 12-point font, with double space.
 - b. Every individual written assignment should have a cover page containing your name, assignment title, date and course name. NO OTHER items should be on your cover page. This maintains the identity of your work when collected into one giant stack.
 - c. Your work must be well organized, using headers and titles to divide paragraphs and sections for clarity. You may consider the use of a variety of fonts and colors (**when appropriate**) for presentation.
 - d. You must use complete sentences. Use of bullets only when appropriate for content lists.
 - e. I should not be the first set of eyes on your paper: Typos and grammatical errors will count against you. I use the automated system TurnItIn to check for plagiarism, cut and pasting, grammar and spelling.
 - f. Formatting is important. Your work may be 100% correct, but if presented in the wrong format, or difficult for the reviewer to read, it might receive negative feedback, up to and including, rejection for failure to follow directions.
 - g. Any screen captures or figures must be centered, have a border framing the content, and be accompanied by a 2 – 3 sentence descriptive narrative below what is depicted. Above all, it must be readable, or it will not receive credit.
 - h. Your work must be thoughtful and demonstrate thorough thinking through of the problem as well as your proposed method for solving it.
 - i. Your work must be original.
 - j. Your work must be accompanied by a list of the sources for your information. APA is standard, but any style is accepted as long as it is consistent.
 - k. Your work must be easy to read (readability).
 - l. I should not have to hunt for your work; if I cannot find your work within the submission, you will not receive credit. I cannot grade what I cannot see.
 - m. Your work must be clear and to the point. I do not require a minimum amount of content, but you must include enough content to demonstrate to me that you have put satisfactory thought and effort into your work.
 - n. If your submission does not meet the requirements of the assignment or fails to follow directions, it is eligible to be awarded zero credit. Multiple submissions are not accepted.
 - o. I reserve the right to reject ANY assignment submission that I believe does not meet any requirement in this list, is not your own work, or fails to meet the standards for competent, university level work.
 - p. **Late work** receives a zero grade until submitted. Any late submission will receive a 20% penalty per day until submitted. A day is defined as a 24-hour cycle commencing from the deadline. This means that after 5 consecutive days past a deadline, the maximum awarded for a late assignment is zero. Eastern Time Zone is controlling.

COURSE AND CLASSROOM CONDUCT:

Academic integrity is an absolute course requirement. (See link to USF Academic Integrity policy below.) Any instance of academic dishonesty will result, at the least, in a grade of zero being assigned to the work involved. This policy covers both the Exams and all Assignments. It is considered cheating to either give or receive assistance of any kind on these assignments. It is your responsibility to ensure that your work does not become available to other students.

UNIVERSITY POLICIES

In addition to the specific course policies listed above, information on the following university standard course policies can be found at the web address shown for each item:

Final Examinations – <http://www.ugs.usf.edu/policy/FinalExams.pdf>

General Attendance – <http://www.ugs.usf.edu/policy/GeneralAttendance.pdf>

Religious Days – <http://www.ugs.usf.edu/policy/ReligiousDays.pdf>

Academic Integrity – <http://www.ugs.usf.edu/policy/AcademicIntegrityOfStudents.pdf>

Academic Disruption – <http://www.ugs.usf.edu/policy/DisruptionOfAcademicProcess.pdf>

Academic Grievance – <http://www.ugs.usf.edu/policy/StudentAcademicGrievanceProcedures.pdf>

Students with Disabilities –

<http://www.usf.edu/student-affairs/student-disabilities-services/documents/sds-staff-handbook.pdf>

This is the planned list of items that will be covered. I may revise it if needed:

Week 1:

1. What is a database?
2. Elements of a relational database system: Tables, Columns, Constraints, Programmable Objects
3. CRUD: Create statements, Alter Statements, Select statements; Insert and Update statements, delete
4. Introduction to SQL Express, SSMS, SQLCMD
5. DDL, DML, T-SQL, PL/SQL, MDF and LDF

Week 2:

6. Data modeling: Conceptual ERD and EERD, Logical RS, Physical DD
7. ERDs, EERDs, Entities, Attributes, Relationships, Cardinality, Optionality
8. Data Dependencies, mandatory versus allow nulls
9. Associate Entities, Junction, Bridge, Join Tables
10. Dependent Entities and Entities with Multi-Value Attributes

Week 3:

11. RS: Relational Schema, Functional Dependency, Referential (Integrity) Dependency
12. Keys: Natural, Surrogate, Primary, Foreign, Unique, Candidate, Alternate
13. Normal Forms, Normalization, Multi-valued attribute, Partial and Transitive Dependency

Week 4: Catch up Week

14. Review first 3 weeks
15. Exam One

Week 5: Hospital Database

16. DD: Data Dictionary
17. Constraints: Checks, Defaults.
18. Referential Integrity, PK-FK constraints, Cascade and No Action
19. Creating Tables, Columns, Identity, Calc column, default values, allow nulls

Week 6:

- 20. Insert Statements
- 21. Select Statements (select, from, where, order by)
- 22. Join Keyword for multiple table selects: Inner, Outer (left/right), Full, Cross, Self
- 23. SPROCs (stored procedures) and Views (virtual tables)
- 24. @Parameters for SPROCs
- 25. Deleting Rows, Tables, Drop Keyword
- 26. Update Statements

Week 7:

- 27. Bulk Inserts
- 28. Indexes, Composite, Filtered
- 29. Indexing a View, with schemabinding
- 30. Setting Column as Unique Key
- 31. Execution Plans, covered and covering queries

Week 8:

- 32. Aggregators (count, sum, min, max, avg), Group By clause
- 33. Advanced Operators and Keywords
- 34. Where versus Having

Week 9:

- 35. Reporting, Using SSDT for generating reports from queries
- 36. Triggers (for, instead of)
- 37. History Tables (deletes and updates)
- 38. Adding history tables to Join queries to capture deleted events

Week 10: Soccer Database Build and Database Theory Week

- 39. DBDD – Database design document
- 40. Database build: tables, constraints, indexed, triggers
- 41. Database General Concepts: ACID, CAP

Week 11: Soccer Database Queries

- 42. ETL, Bulk Records entered, SSDT reports generated
- 43. With keyword and CTE
- 44. Nested Queries, Correlated and Uncorrelated

Week 12: Smallville Database Design and Intro to Subtype Entities

- 45. Working with Sub-type entities and tables

Week 13: Smallville Database Build, Insert and Selects

- 46. Self-Join

Week 14: HDAR database design and build

- 47. HDAR Database design (ERD, EERD, RS, DD)
- 48. HDAR build, insert, and selects
- 49. Cube and Rollup
- 50. Truncate
- 51. Interview Questions

Week 15: Final Database Design Project **Test Free Week**

- 52. Your database design (narrative, ERD, EERD, RS)

Week 16: Final Database Build **Finals Week**

- 53. Your database build, insert and selects
- 54. Creating dynamic filtered dashboards using Tableau