

CIS 4301

Information and Database Management Systems I

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Department of Computer & Information Science & Engineering (CISE)

Course Syllabus – Spring 2023

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1 General Information

Credits	3
Course description from the under-graduate catalog	First part of a two-course sequence that studies the essential concepts, principles, and techniques of modern database systems. Topics include modeling and querying of data using conceptual data models as well as the development of a database application.
Course prerequisites	Formal: (COP 3504 or COP 3503) and COT 3100 Informal: Data structures and algorithms; web programming skills (e.g., PHP) needed (if a student does not have them, s/he must obtain them in self-study)
Instructor	Dr. Markus Schneider
Lecture times	Mondays, Wednesdays, and Fridays from 9:35 am – 10:25 am (period 3)
Location	PUGH 170
Office	CSE Building, room E450
Office hours	Online with Zoom. See the course home page in Canvas for office hour times, Zoom URL, and password. Individual appointments possible online with Zoom (please send an email to mschneid@cise.ufl.edu to set up a Zoom meeting)
Communication with student(s)	By using the UF email addresses of individual students or small groups of students, or by using the UF provided email address to the whole class; in all cases with the preceding special tag “[CIS 4301]” in the subject line, or by a Zoom meeting
Communication with the instructor	By using the UF email address (mschneid@cise.ufl.edu) of the instructor with the preceding special tag “[CIS 4301]”, or by a personal Zoom meeting Note: In emails students must use the tag “[CIS 4301]” in the subject line to indicate to the instructor to which course the student belongs; otherwise, the instructor takes the right to ignore the student’s email

2 Course Objectives

This course provides students with the essential concepts, principles, and techniques of modern database systems from a user perspective. This means that the course focuses on the functionalities that are offered by database systems and not on the methods to implement them. Specifically, the course teaches students the ability to develop (that is, design and implement) a solution to a real-world data management problem that requires the application of the theories and practices taught in this course.

From a theoretical point of view, this course covers the essential principles for the design, analysis, and use of computerized database systems. The design and techniques of conceptual modeling, database representation, and user/program interfaces are presented in a unified way. Specifically, this course has the following overall learning objectives:

- Understand the differences between file systems and database systems
- Understand the features and advantages of database systems
- Perform conceptual database design based on the Entity Relationship (E-R) model
- Understand the relational data model
- Be able to transform an Entity-Relationship diagram into a relational database schema
- Comprehend the Relational Algebra and be able to formulate queries as algebraic expressions
- Learn the SQL query language (both relational and object-oriented components) and be able to formulate SQL queries of high complexity
- Comprehend the foundations of relational database design theory including functional dependencies and normalization as well as appreciate their relevance for database practice
- Learn possible technologies for database application programming
- Understand the main concepts and benefits of object-relational database systems and their difference to purely relational database systems
- Obtain general knowledge of advanced database systems
- Work and get experience with a commercial database system (e.g., Oracle)
- Design and implement a sophisticated web-based database application project that includes database design, user interface design, and their web-based connection
- Learn to work in a project group, argue, discuss, compromise, write technical documents, and solve arising social conflict situations at a professional level

From a practical point of view, students learn to deal with a commercial database system (Oracle). They learn how to apply theoretically understood concepts in a professional database environment. For example, they practice how to formulate ad hoc queries or how to write application programs in a database context. They also learn the complete process from devising a conceptual database design up to its transformation into the database schema of a concrete database management system.

By providing a balanced view of theory and practice, the material covered should allow the student to understand and use practical database systems. The student is provided with a basic understanding of the issues and problems involved in database system development, knowledge of currently practical techniques for satisfying the needs of a database system, and an indication of the current research approaches that are likely to provide a basis for tomorrow's systems.

3 Course Information

3.1 Textbooks and Readings

Two *required* textbooks are used to augment the material presented in lectures:

R. Elmasri & S. B. Navathe. *Fundamentals of Database Systems*. Addison Wesley, 7th edition, 2016.

T. Connolly & C. Begg. *Database Systems - A Practical Approach to Design, Implementation, and Management*. Addison Wesley, 6th edition, 2014.

Two *recommended* textbooks extend the students' knowledge of database concepts:

A. Silberschatz, H. F. Korth & S. Sudarshan. *Database System Concepts*. McGraw Hill, 6th edition, 2010.

H. Garcia-Molina, J. D. Ullman & J. Widom. *Database Systems: The Complete Book*. Prentice Hall, 2nd edition, 2008.

The material covered in the lectures should be considered as the main definition of the scope of the course. Readings in the required textbooks are important to supplement lecture material. Homework assignments and exams will be based on the topics presented in the lectures and may involve issues addressed in the readings.

3.2 Staff

Instructor:

Dr. Markus Schneider

Office: CSE Building, Room E450

E-mail: mschneid@cise.ufl.edu

Teaching Assistants and Graders:

Please look up the names, email addresses, and office hours of the teaching assistants and/or graders from the Canvas course home page and/or class emails.

4 Course Assessment

Student assessment will be based on *exams*, *homework assignments*, and a *software group project*.

4.1 Exams

There will be three exams, the first exam roughly after one third of the semester, the second exam roughly after two thirds of the semester, and the third exam at the end of the semester. The goal of writing three exams instead of two exams is to give the students a better insight into their performance in the course and, if necessary, the chance to improve it. The instructor will communicate the contents of each exam by class emails. All three exams will be based on the contents of the lectures *and* the corresponding readings. The reading sections can also contain material not covered by the lectures. Depending on the instructor's choice, all three exams will be written either in person in the classroom or online in Canvas under the supervision of Honorlock or ProctorU. The exam schedule will be made available in Canvas and in class emails. There will be *no* explicit midterm exam and *no* explicit final exam. Failure to take an exam will lead to 0 points in that exam.

4.2 Homework Assignments

Each student must submit solutions to five homework assignments in Canvas. These assignments, which accompany the different lectures, will take the student through the steps that are involved in building "real-world" database applications. All assignments must be solved by each student

individually. Working in groups is *not* allowed. The assignments consist of conceptual parts as well as practical parts dealing with the database system Oracle provided by the CISE department. The submission of homework assignments is performed through Canvas (and/or Gradescope if available). Failure to submit an assignment before the announced deadline for whatever reason will lead to 0 points for that assignment. Please note that *no exceptions* will be granted. The instructor allows and recommends uploading preliminary and incomplete versions of solutions to a homework assignment into Canvas; the most recent version will be graded. There is *no late policy*. No email submissions before or after the submission deadline will be accepted.

The student's solutions to homework assignments can be written down by using a single tool or several tools together (for example, be hand-written, be written by using text processing software such as Word or LaTeX, include hand-drawn figures, include figures produced by drawing software or screenshot software). The solutions must be readable and be printed or scanned into a *single* PDF file. Further, the *signed* and scanned title page must always be included as the first page. Forgetting the first page with the student's signature leads to a 5-point penalty.

4.3 Software Project

In parallel to the lectures and homework assignments, student groups will design and implement a larger, joint piece of database application software. This effort involves web-based database programming and has been devised to give the student some real “hands-on” experience with a full-fledged database management system. We will use the CISE Oracle database system and high-level web-based script languages such as Javascript or PHP. Specifically, students will design a relational database, load and query the database, and create a web-based database application program. Students who are not familiar with programming languages and script languages will have to learn such a language *on their own* in order to be able to implement the web-based project part. The instructor expects that all group members contribute to the project in equal parts. Students who do not or only in a limited manner contribute to a group's project efforts will get an appropriate lower grade than the other group members. In the worst case, such students will get 0 points.

The software project includes three project deliverables as well as the implementation and demonstration of the database application software. The submission of project deliverables is performed through Canvas. Failure to submit a project deliverable by a group before the announced deadline for whatever reason will lead to 0 points for that deliverable for the whole group. Please note that *no exceptions* will be granted. The instructor allows and recommends uploading preliminary versions of project deliverables into Canvas; the most recent version will be graded. There is *no late policy*. No email submissions before or after the submission deadline will be accepted.

At the demonstration days, which will be at the end of the semester, the student groups have to present their software system. For this purpose, student groups will have an online appointment with the instructor based on an assigned time slot for them. Demonstrations will last 30 to 45 minutes and will be conducted online with a web-based presentation tool (e.g., Zoom, Skype). The main rules for the project demonstrations are as follows:

1. The project software demonstration of a group can and will only be performed in the assigned time slot. There is no second chance.
2. If the system configuration and/or software of a group does not work during the assigned time

slot, it is the group's problem. There is no second chance.

3. All group members have to appear online for their presentation in the time slot assigned to their group. If a group member does not appear at all to the demonstration session in the assigned time slot, this group member will get 0 points. If a group member appears n minutes too late for the demonstration session, this group member will get a grade that is equal to the group grade minus n .
4. A working microphone, a working camera, and a working Internet connection are mandatory for each group member. Otherwise, the group member will not be admitted to the project software demonstration and get 0 points.
5. In the demonstration session, the group will first give a fluent and informative presentation of their software, its theme, its functionality, and its highlights. The group presentation can be held by one or more group members. The presentation should take about 10 to 15 minutes. In the next 10 to 15 minutes, the TA/grader and I will ask you some questions about your implementation with an emphasis on the database part, of course. Both phases will take 25 to 30 minutes together. In the last 5 to 15 minutes, the TA/grader and I determine your score as a performance value between 0 and 100 with the normal grade interpretation known from the syllabus and based on the rubric for project demonstrations posted in the project specification document.
6. What is needed from each group is full concentration and full effort for 45 minutes. The atmosphere during these demos is usually very relaxed. The TA/grader and the instructor will play the role of customers that gave each group the order to produce a web-based database application software. This means groups should check whether their software is usable and makes sense from a customer/user perspective.
7. A requirement is that each group has at least 250,000 tuples in their database. During the demonstration each group should be able to prove this. For this purpose, each group must have a button available in their application that sends a query to the database and returns the number of tuples in all tables of their database in a popup window or something similar. Each group should also state in their demo how they found their data and how they got them into their database.

Further information about the project software demonstration and the rubrics applied to grading can be found in the *Group Project Specification* document, which is available on the course home page in Canvas.

4.4 Oracle

We will be using the *CISE Oracle database server* for our project and homework assignments. This requires that you apply for a CISE Oracle account, install some Oracle related software, and study some web pages for your information. The steps to be performed are as follows:

- **Step 1:** Install and activate the [Gatorlink VPN client](#) on your computer. Remote, off-campus access to CISE Oracle and the CISE help pages is only possible if this VPN client is installed.
- **Step 2:** Students that are *not* CISE students have to apply for a *CISE class* account on the [Account Creation and Management](#) web page.
- **Step 3:** All students have to apply for a CISE Oracle account by either starting from the [Oracle Database](#) web page or directly going to the [Creating and Maintaining a CISE Oracle Database Account](#) section of the *Oracle Database* web page.

Information (i) about the Oracle database system installation in the CISE department, (ii) how to remotely access and connect to the CISE Oracle database server, (iii) how to obtain a new Oracle account, and (iv) how to renew your existing Oracle account can be found on the [Oracle Database](#) web page.

A well-known user interface to Oracle is the *Oracle SQL Developer* that you can [download](#) and install on your personal computer both on a [Linux platform](#) and on a [Windows platform](#). Further, a [Database SQL Language Reference](#) from Oracle is available. Information how to join Oracle resources for a common database group project can be found on the [Giving Other Users Access to Database Schema](#) section of the *Oracle Database* web page. The students of a group will have to grant *table privileges* to each other by Oracle commands in order to get access to tables that are stored under the account of another group member. The course talks in a section about authorization about these privileges. Further details should be found out by each group.

4.5 Grading

During the semester a student can only earn *points* and *not* letter grades. The maximum number of points that can be achieved in an exam, a project deliverable, the project software, and a homework assignment is always 100 points. Note that these points are relative and unweighted. The table below shows the *weighted percentage* of and the *maximum absolute point number* for each exam, each project deliverable, the project software, and each homework assignment.

Exam		Project		Homework	
Exam 1	15	Project Deliverable 1	4	Homework 1	6
Exam 2	15	Project Deliverable 2	4	Homework 2	6
Exam 3	15	Project Deliverable 3	1	Homework 3	6
		Project Software	16	Homework 4	6
				Homework 5	6

In total, a maximum of 100 absolute points can be earned for the whole course. A student's performance p , which is expressed in percent or, equivalently, as an absolute (decimal) number of points, will be calculated according to the following formula:

$$p = 15 \cdot \sum_{i=1}^3 \frac{ex_i^r}{ex_i} + 4 \cdot \sum_{i=1}^2 \frac{pd_i^r}{pd_i} + 1 \cdot \frac{pd_3^r}{pd_3} + 16 \cdot \frac{ps^r}{ps} + 6 \cdot \sum_{i=1}^5 \frac{hw_i^r}{hw_i}$$

where the variables have the following meaning:

- p student's performance in percent
- ex_i maximum number of points for exam i (usually 100 points)
- ex_i^r received number of points for exam i
- pd_i maximum number of points for project deliverable i (usually 100 points)
- pd_i^r received number of points for project deliverable i
- ps maximum number of points for the project software (usually 100 points)
- ps^r received number of points for the project software

- hwi maximum number of points for homework i (usually 100 points) r
- hwi^r received number of points for homework i

Point assessments (grades) will be changed only when a grading error has been made. If a student thinks a grading error has been made, the student should let the TA and/or grader know about her doubt and provide some argumentation. If no agreement can be achieved, the student should contact the instructor who will make the final decision. Note that in this course it is the student's right to defend their solutions in exams, homework assignments, and project deliverables and ask for a regrade. The entire exam or assignment will then be reevaluated. A student must submit a regrade request for a graded item *within 5 workdays* after its return to the student. Later regrade requests are not allowed. The instructor will post the regrade period for each graded item.

At the end of the semester the overall student's performance is mapped to a grade. The following grading policy will be applied:

Student's Performance in % or absolute points	Grade
>94-100	A
>88-94	A–
>82-88	B+
>76-82	B
>70-76	B–
>64-70	C+

Student's Performance in % or absolute points	Grade
>58-64	C
>52-58	C–
>46-52	D+
>40-46	D
>34-40	D–
0-34	E

Based on the graded items (exams, homework assignments, project deliverables) at any time, students will regularly obtain information about their individual grades, current performance, and current overall grade. They will also be able to see how they compare to the other students in class.

A C– (or lower grade) will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: A C– average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit the web page titled [Grades and Grading Policies](#).

5 Other Important Issues

5.1 Academic Honesty

Students are required to respect the ethical standards for academic honesty established by the Office for Student Judicial Affairs. The University of Florida student body voted in Fall 1995 to approve the following *Student Honor Code*:

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

Work submitted must be produced *individually* by each student, except for tasks explicitly

assigned to a group by the instructor. All work submitted individually in the form of exams, homework assignments, presentations, reports, software projects, etc., is subject to the following implicitly or explicitly **required** pledge:

On my honor, I have neither given nor received unauthorized aid in doing this assignment.

Violations of academic honesty and integrity in this course will not be tolerated. The instructor will deal strictly with any violations. Since ethical behavior in science and engineering is equal in importance to specific knowledge, the instructor will assign a non-passing letter grade to students who violate academic honesty standards, regardless of the violator's grade performance in exams, homework assignments, quizzes, and other assignments. Official sanctions issued by the Office of Student Judicial Affairs **will become permanently noted in the student's official transcript.**

The instructor's advice to the student is: be active in the course, learn the material, do your tasks (homework assignments, exams, project group work). The benefit and enjoyment you will receive as a result of hard work will be much more valuable than any penalty you might receive as a result of cheating.

5.2 Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If a student feels that his/her performance in class is being impacted by discrimination or harassment of any kind, please contact the instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

5.3 Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#) (DRC) by visiting the [Get Started With The DRC](#) web page. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

5.4 Online Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via [GatorEvals](#), which is UF's course evaluation system. Guidance on how to give feedback in a professional and respectful manner is available at the [student section of GatorEvals](#). Students will be notified when the evaluation period opens. They can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under *GatorEvals*, or via [this web page](#). Summaries of course evaluation results are available to students via [this web page](#).

5.5 In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

5.6 Software Use

All faculty, staff, and students at the University of Florida are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

5.7 Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see [this web page](#).

5.8 Campus Resources: Health and Wellness

The following campus resources are provided for health and wellness:

- *U Matter, We Care*: Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team

can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

- [Counseling and Wellness Center](#), phone 352-392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
- *Sexual Discrimination, Harassment, Assault, or Violence*: If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](#), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu.
- *Sexual Assault Recovery Services (SARS)*: Student Health Care Center, 392-1161.
- [University Police Department](#) at 392-1111 (or 9-1-1 for emergencies)

The following in class expectations hold for each student due to COVID-19:

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home, and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive, or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

5.9 Campus Resources: Academic Resources

The following academic resources are provided on campus:

- [E-learning technical support](#), 352-392-4357 (select option 2), email to Learning-support@ufl.edu
- [Career Resource Center](#), Reitz Union, 352-392-1601: Career assistance and counseling
- [Library Support](#): Various ways to receive assistance with respect to using the libraries or finding resources.
- [Teaching Center](#), Broward Hall, 392-2010 or 392-6420: General study skills and tutoring
- [Writing Studio](#), 302 Tigert Hall, 846-1138: Help brainstorming, formatting, and writing papers

- *Student Complaints Campus:* [Student Honor Code and Student Conduct Code](#), [Dean of Student Office - Care](#)
- [On-Line Students Complaints](#)

5.10 Specific Course Guidelines

For this course several rules hold which should be observed by the student:

1. If a student should have a problem that could have a negative influence on the student's course performance such as sickness or project group conflicts, the student should talk to the instructor immediately and on time before it is too late to find a solution.
2. The homework assignments must be performed individually. Teamwork is not allowed. The time period for working on a homework assignment is fixed.
3. The first page of a submitted homework solution should be the signed cover page of the homework assignment. The readability of the homework assignments is inevitable.
4. Students are not allowed to perform project work individually. Students must demonstrate that they can be team players.
5. Class-relevant announcements are made by class emails based on the students' official UF email addresses.

5.11 Final Advice

The students who get the most out of this course will be the ones who put in the most effort. If you want to do well, study all the lectures, read the sections of the textbook assigned to each lecture, and start early on your homework assignments and the software project. If you are having difficulty, you owe it to yourself to get help. The instructor and the teaching assistants/graders sincerely want all of you to do well and be successful in this course. If you work hard and master the material presented in this course, you will learn some powerful, fundamental concepts of database management systems as well as valuable application development skills, which are both very marketable in today's high-tech industry. Further, you will gain social competence and learn to become a team player. The instructor will try his best to make the course as interesting and stimulating as possible and an enriching experience for you.