CS 450/550: Database Concepts – FALL 2025.

Course Name: Database Concepts

Course Number: CS450/550

Prerequisites: CS381/CS330/CS361

Semester/Year: FALL 2025.

Time: TR 3pm-4:15 PM.

Course Instructor:

Dr. Santosh Kumar Nukavarapu.
E-mail: snukavar@odu.edu, Phone: (757) 683-7759

Course Delivery Method:

This course will be delivered in person.

Office Hours:
Tuesday 1pm-2pm or by Zoom link: https://odu.zoom.us/j/8830769453 Links to an external site.

Office: DRAGAS HALL, 1103C

Content:

https://canvas.odu.edu/

Course content will be delivered fully online, asynchronously via Canvas weekly modules.

Motivation

According to the US Bureau of Labor Statistics, the median annual wage for database administrators was $96,710 in May 2021. The median annual wage for database architects was $123,430 in May 2021. In small companies, there is usually only one database job. The person in that position may be an architect one day, a designer the next day, a programmer another day, an administrator the day after that, and sometimes even an analyst or even a data scientist. In large companies, you'll find a wide variety of database-related jobs. The figure below shows common database-related jobs that depend on specific preferences, knowledge, and skills (https://vertabelo.com/blog/database-jobs).

CS450/550 aims to prepare Computer Science students for obtaining a fundamental understanding of the database concepts and hands on skills to analyze and implement a well-defined database design. It introduces relational database design, data modeling, SQL query language, and instructors' choices on database applications and advanced concepts. Students will learn to use a real-world open-source database management system. Upon taking CS450/550, students should be able to understand the implications and future directions of databases and database technologies.

Topics

Course outline and Syllabus discussion.

Introduction to Databases - Part #1

Introduction to Databases - Part #2

Introduction to RDBMS - Part #1

Introduction to RDBMS - Part #2

Normalization - Part #1

Normalization - Part #2

Entity Relationship Diagrams - Part #1

Entity Relationship Diagrams - Part #2

More about Entity Relationship Diagrams - Part #1

More about Entity Relationship Diagrams - Part #2

ERD/Database Design - Part #1

ERD/Database Design - Part #2

Database Design (DDL) - Part #1

Database Design (DDL) - Part #2

Relational Algebra #1 - Part #1

Relational Algebra #1 - Part #2

Relational Algebra #2 - Part #1

Relational Algebra #2 - Part #2

Go over SQL Interview Drill #1.

Odu Holiday, Election Day

Go over SQL Interview Drill #2

Discussion on the course project

MySQL Workbench labs.

Go over SQL Interview Drill #3

MySQL Workbench labs.

Case Study

MySQL Workbench labs.

SQL Interview Drill #4

Case Study

SQL Interview Drill #5

MySQL Workbench labs.

MySQL Workbench labs.

Odu Holiday, Thanksgiving Day

All hands -in class project

All hands -in class project

Course Description

From the ODU Catalog

Laboratory work required. Three level database architecture. The relational database model and relational algebra. SQL and its use in database procedures and with conventional programming languages. Entity relationship modeling. Functional dependencies and normalization. Transactions, concurrency and recovery. Prerequisites: CS 252 and a grade of C or better in CS 381 and either CS 330 or CS 361.

Goals and Objectives

After completing this course, students should have a strong foundation in the principles of three-level database architecture, database modeling using the relational database model and relational algebra, SQL and its use in database procedures and with conventional programming languages, entity relationship modeling, functional dependencies and normalization, and transactions, concurrency and recovery.

Course Delivery Method

Lectures will be delivered live on Zoom and in-person on Tuesday and Thursday from 3:00 - 4:15pm. The Zoom link is provided in Canvas. Video recordings of all the lectures will be available on Canvas in Media Gallery (but not guaranteed!). As this is a synchronous online course, therefore you must have access to a computer with high-speed internet. If you are an on-campus student, you may use the university computer labs or Computer Science computer labs. Otherwise, you must provide your own computer and internet access.

How the Course Works

Methods of Delivery/Learning Activities

This online course employs several methods of delivery and learning activities including live lectures, online videos and screencasts, discussions/feedback, readings, homework assignments, drills, quizzes, case studies, etc.

The course material is divided into modules. All the modules will be available during its week on Canvas.

Almost every week there will be a quiz.

Homework assignments will be announced through out the semester.

"SQL Tech Interview Drill" is a hands-on assessment designed to simulate real-world scenarios, evaluating students' ability to navigate complex SQL queries, optimize database designs, and showcase their technical proficiency in preparation for tech industry interviews.

The course project and a case study will be announced as per the course schedule.

Grading Criteria

Your grade is this class will be based on the following:

Criteria
Homework (5 total)
SQL-Oriented Laboratory Work (10 total)
Course Project (1 total)
SQL Tech Interview Drill (5 total)
Case Study (1 total)
Quiz (10 total)
Discussion (10 total)
Total

Grading Scale

The grading scale is a follows (+ and - modifiers will be applied as appropriate):

Letter Grade	Range
A	93 – 100
A-	87 – 92
B+	84 – 86
B	80 – 83
B-	77 – 79
C+	74 – 76
C	70 – 73

Letter Grade	Range
C-	67 – 69
D+	64 – 66
D	60 – 63
D-	57 – 59
F	0 – 56

Graduate students: see the graduate policies and procedures page for specific requirements of grades (https://catalog.odu.edu/graduate/graduatepoliciesandprocedures/)

Late Submissions

Any submission after its deadline is considered late. The following penalties for late submissions apply:

- 0-24 hours late: -10%
- 25-48 hours late: -20%
- after 48 hours: not accepted

This time limit includes weekends--they are counted just like weekdays.

I reserve the right to specify that late submissions will not be accepted for specific submissions.

Course Materials

Required/Recommended Text

There is no required textbook. Two recommended books are

Database Concepts 9th EditionLinks to an external site.Links to an external site. by David Kroenke (Author), David Auer (Author), Scott Vandenberg (Author), Robert Yoder (Author)

Learning SQLLinks to an external site.Links to an external site.: Generate, Manipulate, and Retrieve Data 3rd Edition by Alan Beaulieu (Author)

Optional Materials

- Learning PHP, MySQL & JavaScriptLinks to an external site.Links to an external site.: With jQuery, CSS & HTML5 (Learning PHP, MYSQL, Javascript, CSS & HTML5) 5th Edition by Robin Nixon

Student Responsibilities

Time Management

Apart from attending the weekly lecture, students are expected to spend 8 hours per week on the course materials and assignments. Out of 8 hours, students are expected to spend approximately 4 hours/week to read the material and/or watching the recommended videos, approximately another 4 hours/week for the homework assignment/lab/quiz/discussions.

Attendance

Attendance in live Zoom lectures is NOT mandatory. However, students are highly recommended to attend the live lectures. You are expected to actively participate in assignments, labs and projects. Each of these components is graded and counted toward the final grade.

Hardware and Software Requirements

Students will need frequent access to a PC (with Windows 10), a Mac (with MacOS 10.14+), or a Linux (with Ubuntu 20.04 LTS) computer capable of hosting software development activities or of connecting to remote servers where such activities can be performed. For this class, students will connect to virtual machines (VMs) provided by the ODU CCI Academic Environment. Students will be attending network conferences requiring the use of a microphone. Webcams are required. For both remote access to servers and for network conferencing, a good-quality internet connection is important.

Students will have Zoom installed on their computers. The course will introduce students some basic software packages (not including MySQL, which will be hosted on a department provided server). All of these are open-source and free software, but students will need to install some of these on their chosen development machine.

Exam Schedule

No Midterm or Final exams.

Course Policies

Academic Integrity

You are responsible for understanding the policies and procedures in the undergraduate catalog that pertain to academic integrity. Violations of the academic honesty code will be dealt with in the strictest terms. Students are advised to become familiar with the university's academic honesty code (also posted on Canvas). It is the student's responsibility to ensure that both the

letter and intent of this code are met in all circumstances. Ignorance of this code, or of proper rules of citation, provides no defense. The instructor's policy concerning enforcement of this code is inflexible; no exceptions will be made. Cheating or plagiarizing an assignment will result in an automatic "F" for the course and a referral to university authorities.

Course Disclaimer

Every attempt is made to provide a complete syllabus that provides an accurate overview of the courses. However, circumstances and events may make it necessary for me to modify the syllabus during the semester. This may depend, in part, on the progress, needs, and experiences of the students who registered for the course.

University Policies

Class Conduct

The following standards are intended to define acceptable behavior that preserves academic integrity and ensures that students have optimum environmental conditions for effective learning.

1. Students should notify instructors in advance when falling behind. In the event of an emergency that might affect the progress in the course, instructors must be notified as soon as possible.
2. Students will activate their Old Dominion email accounts and check them before each class. If the student chooses to have his/her messages forwarded to another account, it is the student's responsibility to take the necessary steps to have them forwarded.
3. Offensive language, gestures and the like are disrespectful and disruptive to the teaching-learning process.

Academic Integrity

Old Dominion University is committed to students' personal and academic success. In order to achieve this vision, students, faculty, and staff work together to create an environment that provides the best opportunity for academic inquiry and learning. All students must be honest and forthright in their academic studies. Your work in this course and classroom behavior must align with the expectations outlined in the Code of Student Conduct, which can be found at www.odu.edu/oscai. The following behaviors along with classroom disruptions violate this policy, corrupt the educational process, and will not be tolerated.

- **Cheating:** Using unauthorized assistance, materials, study aids, or other information in any academic exercise.

- **Plagiarism:** Using someone else's language, ideas, or other original material without acknowledging its source in any academic exercise.
- **Fabrication:** Inventing, altering or falsifying any data, citation or information in any academic exercise.
- **Facilitation:** Helping another student commit, or attempt to commit, any Academic Integrity violation, or failure to report suspected Academic Integrity violations to a faculty member.

Academic dishonesty will be reported to the Office of Student Conduct & Academic Integrity and may result in sanctions up to and including expulsion from the University.

Plagiarism

No plagiarism will be tolerated under any circumstances. As faculty, I am bound to report any instances of plagiarism. All cases are heard before the honor council. If found guilty, the student automatically receives a failing grade in the course, and a notice is entered into the permanent record for a period of time.

College Class Conduct

The following standards are intended to define acceptable classroom behavior that preserves academic integrity and ensures that students have optimum environmental conditions for effective learning.

1. Students must turn off cell phones and pagers during class or have them set to vibrate mode.
2. Classes are expected to begin on time, and students will respect the time boundaries established by the professor.
3. Students should notify instructors in advance when a class will be missed. In the event of an emergency that causes a class to be missed, instructors must be notified as soon as possible.
4. Instructors may require that cell phones and other electronic devices be left on their desks during tests or examinations.
5. Students must not engage in extraneous conversations during classes. Such acts are considered to be violations of the Code of Student Conduct.
6. Students will activate their Old Dominion e-mail accounts and check them before each class. If the student chooses to have his/her messages forwarded to another account, it is the student's responsibility to take the necessary steps to have them forwarded.

7. Offensive language, gestures and the like are disrespectful and disruptive to the teaching-learning process.

Honor Code

The Old Dominion University Honor Code will be strictly enforced. By attending Old Dominion University, you have signed a pledge accepting the responsibility to abide by the following Honor Code found at Office of Student Conduct and Academic Integrity.

We, the students of Old Dominion University, aspire to be honest and forthright in our academic endeavors. Therefore, we will practice honesty and integrity and be guided by the tenets of the Monarch Creed. We will meet the challenge to be beyond reproach in our actions and our words. We will conduct ourselves in a manner that commands the dignity and respect that we also give to others. ODU Honor Code

This is an institutional policy approved by the Board of Visitors. The University Honor Code applies to all assignments.

Honor Pledge

I pledge to support the honor system of Old Dominion University. I will refrain from any form of academic dishonesty or deception, such as cheating or plagiarism. I am aware that as a member of the academic community, it is my responsibility to turn in all suspected violators of the honor system. I will report to Honor Council hearings if summoned. ODU Honor Pledge

By attending Old Dominion University you have accepted the responsibility to abide by this code. This is an institutional policy approved by the Board of Visitors. For more information, please visit Policies and Student Responsibilities.

Educational Accessibility

In compliance with PL94-142 and more recent federal legislation affirming the rights of disabled individuals, provisions will be made for students with special needs on an individual basis. The student must be identified by the university and provide a letter from the Office of Educational Accessibility (OEA), located at 1021 Student Success Center. Any accommodations will be based upon written guidelines from the Office of Educational Accessibility (OEA). All students are expected to fulfill all course requirements.

Old Dominion University is committed to ensuring equal access to all qualified students with disabilities in accordance with the Americans with Disabilities Act. The Office of Educational Accessibility (OEA) is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you experience a disability which will impact your ability to access any aspect of my class, please present me with an accommodation letter from OEA so that we can work together to ensure that appropriate accommodations are available to you.
- If you feel that you will experience barriers to your ability to learn and/or testing in my class but do not have an accommodation letter, please consider scheduling an appointment with OEA to determine if academic accommodations are necessary.

The Office of Educational Accessibility is located at 1021 Student Success Center and their phone number is (757)683-4655. Additional information is available at the OEA Website.

University Email & Electronic Messaging Systems Policies

Electronic messaging systems and communication services are provided by Old Dominion University for the purpose of enhancing productivity and maintaining effective communication.

Old Dominion University employees, students, employees of affiliated organizations, and guests, volunteers, and researchers who are provided official email accounts must activate and maintain regular access to these accounts. These accounts must be used to send and receive electronic communications related to official University business.

Failure to access the email account will not exempt individuals from their responsibility of being aware of and meeting requirements and responsibilities included in electronic communications.

Message content is the sole responsibility of the individual sending the message and users must adhere to University Policy 3500, Use of Computing Resources, and Information Technology Standard 09.1.0, Acceptable Use Standard. Users are also encouraged to practice generally accepted online etiquette.

Instructors retain the discretion of establishing class expectations for email and other electronic messaging communication as a part of the course requirements.

Alternative messaging services should be arranged in cases where users' access to information technology resources is limited or unavailable.

Incomplete

Documented illnesses, deaths in family, car accidents, or other traumatic occurrences call for flexibility and good judgment on the part of the student and instructor. These situations are rare and are handled individually. Should such a situation occur, students **MUST** contact Student Outreach & Support. Email oducares@odu.edu or by phone 757-683-3442 to acquire the necessary documentation. An incomplete grade will only be given under the following circumstances

1. The student has completed ½ or more of the course requirements with a C or better
2. There is legitimate deficiency due to the illness or emergencies deemed acceptable to the instructor
3. There is not neglect on the student's part.

Withdrawal

A syllabus constitutes an agreement between the student and the course instructor about course requirements. Participation in this course indicates your acceptance of its teaching focus, requirements, and policies. Please review the syllabus and the course requirements as soon as possible. If you believe that the nature of this course does not meet your interests, needs or expectations, if you are not prepared for the amount of work involved - or if you anticipate that the class meetings, assignment deadlines or abiding by the course policies will constitute an unacceptable hardship for you - you should drop the class by the drop/add deadline, which is located in the ODU Schedule of Classes. For more information, please visit the Office of the Registrar.

Student Acknowledgement

The first quiz in the first week will have you certify the following:

"I, _____ , have completely read this syllabus and understand and agree to the course requirements".