A Course Syllabus

for

CS 5600

**Advanced Database Systems**

(Three semester hours credit)

in the

School of Computer Science and Mathematics

of the

# COLLEGE OF HEALTH, SCIENCE, AND TECHNOLOGY

Catalog Description:

An in-depth study of advanced topics in the field of database systems such as data storage, query processing and optimization, transaction management, concurrency control, recovery, data warehouse and data mining, NoSQL databases, and advanced application development. Prerequisite(s): CS 4600 or instructor consent.

UNIVERSITY OF CENTRAL MISSOURI

Warrensburg, Missouri

# 2022-2023

1. Purpose of the Course

This course is designed for computer science graduate students. It provides an in-depth study of advanced topics in the field of database systems such as data storage, query processing and optimization, transaction management, concurrency control, recovery system, data warehouse, NoSQL databases, and advanced application development.

1. Objectives and Desired Student Competencies

Upon completion of this course the student should be able to:

* Understand Storage and File Structures, Indexing and Hashing.
* Understand Query Processing and Optimization.
* Understand Transaction Management, Concurrent Control, and Recovery.
* Understand core concepts of NoSQL database.
* Develop Data Warehouses, Analyze and Retrieve Information.
* Perform Database Performance Turning.
* Develop Advanced Web Database Applications.

1. Student Learning Outcomes

**Outcome 1:** Apply algorithmic principles and computing theories to solve advanced problems in Computer Science.

**Outcome 2:** Apply design and development principles in construction of computer-based systems of varying complexity.

**Outcome 3:** Be able to use current techniques, skills, and tools necessary for  computing practice.

**Outcome 4:** Communicate effectively with a range of audiences, work effectively in a team environment, and demonstrate an understanding of ethical concerns related to computing.

**Outcome 5:** Recognize the need for, and engage in, continuing professional  development.

IV. Course Content Outline

Text: Database System Concepts, 7th Edition, Silberschatz, Korth, and Sudarshan, McGraw-Hill 2019.

1. Data Storage and Querying
   1. Storage and File Structure
   2. Indexing and Hashing
   3. Query Processing
   4. Query Optimization
2. Transaction Management
   1. Transaction
   2. Concurrency Control
   3. Recovery System

1. System Architecture
   1. Database-System Architectures
   2. NoSQL databases

1. Data Analysis and Mining
   1. Data Warehousing
   2. Data Mining
   3. Information Retrieval

1. Advanced Application Development
   1. Performance Turning
   2. Advanced Web Database Programming

V. Procedures/Assessment

The lecture format will be the basic mechanism used in the course. Computer demonstrations in the classroom will be used whenever appropriate.

Assessment of student performance will use a criterion-referenced model which will include programming assignments, written assignments, regular examinations, a semester project, and a comprehensive final exam.

A typical grading scale will be as follows:

Points Grade

450 - 500 A

400 - 449 B

350 - 399 C

300 - 349 D

Below 300 F

VI. Americans With Disabilities Act

Students with documented disabilities who are seeking academic accommodations should contact the Office of Accessibility Services, Union 220, (V) (TTY) 660-543-4421.

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| --- | --- |
| Name: | Dr. Khomsun Singhirunnusorn |
| Office: | MIC-D162 |
| Phone: | 660-5436623 |
| Office Hours: | W 09:00AM – 4:00PM,  R 01:00 – 4:00PM. |
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Instructor Information

Sexual Misconduct

The University of Central Missouri seeks to foster a safe and healthy environment built on mutual respect and trust. Sex discrimination, including sexual harassment, sexual violence, and other forms of sexual misconduct will not be tolerated. All faculty and most staff are considered mandated reporters by the University and must disclose all information they receive about sexual misconduct to the Title IX Coordinator. As a faculty member of the University, I am a mandated reporter.  
If you, or someone you know, has experienced sexual misconduct, please know assistance and options are available. UCM strongly encourages all members of the community to seek support and report incidents of sexual misconduct to the Title IX Office. Anyone who wishes to report sexual misconduct should visit

<https://www.ucmo.edu/consumer-information/title-ix-sex-discrimination-and-sexual-assault/reporting-options/>. To learn more about the University process and options available, please visit <https://www.ucmo.edu/consumer-information/title-ix-sex-discrimination-and-sexual-assault/support-and-resources/>

COVID-19 Policy

As required by UCM policy, a face covering that covers your nose and mouth must be worn inside UCM buildings and classrooms. You must follow the UCM policy guidelines any time you are on university property. Only students with a documented exemption from UCM’s Office of Accessibility Services are excused from these requirements. Conditions and requirements may change during the semester. You can stay up-to-date by visiting <https://www.ucmo.edu/news/media-resources/corona-virus-covid-19/>

Accessibility Services

Students with disabilities who are seeking accommodation should contact the Office of Accessibility Services at Union 222, 660-543-4421. If you want to share information about your needs that I should be aware of, such as emergency medical information or special arrangements for field trips or internships, please see me privately after class or during office hours.

Sexual Discrimination and Sexual Misconduct Statement

The University of Central Missouri seeks to foster a safe and healthy environment built on mutual respect and trust. Sex discrimination, including sexual harassment, sexual violence, and other forms of sexual misconduct will not be tolerated. All faculty and most staff are considered mandated reports by the University and must disclose all information they receive about sexual misconduct to the Title IX Coordinator. As a faculty or staff member of the University, I am a mandated reporter. This means I am required to report information shared with me regarding sex discrimination and sexual misconduct.

If you, or someone you know, has experienced sex discrimination or sexual misconduct, please know assistance and options are available. UCM strongly encourages all members of the community to seek support and report incidents of this nature to the Title IX Coordinator. Anyone who wishes to report sexual misconduct, to learn more about the University process and options available, or to utilize a confidential resource, please visit [ucmo.edu/titleix](http://ucmo.edu/titleix).

Diversity, Equity, and Inclusion

The University of Central Missouri strives to develop a campus environment that welcomes and recognizes all dimensions of diversity and inclusiveness. What this means is that all students are welcomed in the classroom, and differences are to be recognized rather than erased or denied. Dimension of diversity can include sex, race, age, national origin, ethnicity, gender identity and expression, intellectual and physical ability, sexuality, income, faith, and non-faith perspectives, socio-economic class, primary language, family status, military experience, and more. Inclusive learning is facilitated by creative and innovative thought and mutual respect; being in this classroom means that you, your faculty member, and your peers pledge to foster a welcoming and equitable environment for all.

Late Submission Penalty

The late submission for any written and programming assignments are unacceptable for this course.

The penalty is 50% deduct from the assignment’s total marks.