Course Syllabus

This course covers database management systems (DBMS) and the development of applications that utilize databases including relational/SQL and NoSQL types. Topics include the evolution of data storage and databases, data modeling, relational and NoSQL databases, SQL, document, graph and key-value storage and retrieval, application development using databases, database scaling, database trends, and popular database systems.

You must own, or have access to, a computer to take this course on which you can install software.

Format: in-seat

Credit hours: 3

Prerequisites: none

Course Objectives

- Explain and understand the differences between relational and non-relational database systems and the most appropriate use for each.
- Install and configure MySQL and MongoDB database systems in the development environment
- Describe, define, and apply the major components of relational and non-relational database models to their design process.
- Apply Structured Query Language (SQL) and NoSQL query language for database definition, manipulation, and maintenance.

- Implement principles of information integrity and security in database development.
- Develop software systems integrated with relational and non-relational database systems

Topics Covered

- The evolution of data storage and databases
- Data modeling
- Relational and NoSQL databases

- SQL
- Document
- Graph and key-value storage and retrieval
- Application development using databases and Python

- Database scaling

- Database trends
- Popular database systems

Class Schedule

Class times are T/TH 9:30am - 10:45am in **Arts & Science 1**.

Module 1: Sat, Jan 13 - Fri, Jan 19 . . . . . 0 days (0%) completed | 112 days (100%) remaining . . . . . 0 hours since start
Module 2: Sat, Jan 20 - Fri, Jan 26 . . . . . 7 days (6%) completed | 105 days (94%) remaining . . . . . 168 hours since start
Module 3: Sat, Jan 27 - Fri, Feb 02 . . . . . 14 days (12%) completed | 98 days (88%) remaining . . . . . 336 hours since start
Module 4: Sat, Feb 03- Fri, Feb 09 . . . . . 21 days (19%) completed | 91 days (81%) remaining . . . . . 504 hours since start
Module 5: Sat, Feb 10 - Fri, Feb 16 . . . . . 28 days (25%) completed | 84 days (75%) remaining . . . . . 672 hours since start
Module 6: Sat, Feb 17 - Fri, Feb 23 . . . . . 35 days (31%) completed | 77 days (69%) remaining . . . . . 840 hours since start
Module 7: Sat, Feb 24 - Fri, Mar 01 . . . . . 42 days (38%) completed | 70 days (62%) remaining . . . . . 1008 hours since start
Module 8: Sat, Mar 02 - Fri, Mar 08 . . . . . 49 days (44%) completed | 63 days (56%) remaining . . . . . 1176 hours since start
Module 9: Sat, Mar 09 - Fri, Mar 15 . . . . . 56 days (50%) completed | 56 days (50%) remaining . . . . . 1344 hours since start (Midterm Exam)
Module 10: Sat, Mar 16 - Fri, Mar 22. . . . . 63 days (56%) completed | 49 days (44%) remaining . . . . . 1512 hours since start
Spring Break: Sat, Mar 23 - Sun, Mar 29 . . . . . 70 days (62%) completed | 42 days (38%) remaining . . . . . 1680 hours since start
Module 11: Sat, Mar 30 - Fri, Apr 05. . . . . 77 days (69%) completed | 35 days (31%) remaining . . . . . 1848 hours since start
Module 12: Sat, Apr 06 - Fri, Apr 12 . . . . . 84 days (75%) completed | 28 days (25%) remaining . . . . . 2016 hours since start
Module 13: Sat, Apr 13 - Fri, Apr 19 . . . . . 91 days (81%) completed | 21 days (19%) remaining . . . . . 2184 hours since start
Module 14: Sat, Apr 20 - Fri, Apr 26 . . . . . 98 days (88%) completed | 14 days (12%) remaining . . . . . 2352 hours since start
Module 15: Sat, Apr 27 - Fri, May 03 . . . . . 105 days (94%) completed | 7 days (6%) remaining . . . . . 2520 hours since start (Final Exam and Final Project)

Academic calendar: https://registrar.missouri.edu/academic-calendar/

Your access to Canvas and the first week's modules are available on Saturday, August 19. Each week you are provided with new modules on Saturday and the work needs to be completed by the following Friday. Assignment, quiz and test solutions are posted the week following their assignment. This means there can be no extensions on assignments. **Assignments must be submitted by 11:59pm on the Friday due date each week to receive credit**.

The midterm project and midterm exam is given in module 9. The final project and final exam is given in module 15 and is due by the end of module 15. For the midterm and final exams, you have one week to complete them.

Assignments:

Late Policy: All assignments (quizzes, exams, activities, challenges, and projects) must be completed by the due date/time to receive full credit. A grade is automatically reduced by 15% for each day a submission is late for a maximum of two days. Submissions that are received more than two days after the due date receive a 0.

You must fulfill the requirements of an assignment submission to receive credit for that assignment. Any information you are asked to provide and files you are asked to supply must be present to receive credit for the assignment. If you are asked to follow a specific procedure or utilize a convention you must do so to receive credit. For example, if you are asked to name a project in a specific way and you do not follow the rules provided you may receive a zero on the assignment. If you are unsure of what you are to do you must ask and receive clarification before submitting your work.

Grading Policy

Assignments are to be submitted by 11:59 pm on the Friday due date each week to receive **full credit**. A grade is reduced by 15% for each day it is late for a **maximum of two days**. Submissions that are received more than two days after the due date receive a 0. To handle the situation where a student is unable to complete an assignment or receives a low grade on an assignment, retrospective, or quiz due to unforeseen circumstances, the lowest two (2) scores in Assignments, the lowest two (2) scores in Retrospectives, and the lowest two (2) scores in Quizzes are dropped and the remaining scores are used to determine the grade for that category.

If a submission is a copy of the solution, a copy of a post on Chegg, or of another person's work, a grade of 0 is assigned and the incident will be reported. Exceptions to the policy above, and further extensions will only be granted in cases of extreme circumstance such as hospitalization or overseas deployment, etc.

Textbooks:

There is no required textbook for this course. The cost of textbooks can pose a significant financial strain on the student and can be a limiting factor on the student's performance and success. In this course, required learning materials are curated and provided online.

Websites:

The following are some of the sites that will be used during the course. Other sites are provided during the course.

This course utilizes Canvas for course materials, communications, and assignments: https://courses.missouri.edu

Git
https://git-scm.com

GitHub
https://github.com

Accounts:

You are to use GitHub with this course. If you already have a GitHub account then you can use it. If you don't have a GitHub account, you need to create one by signing up at github.com

Hardware and Software:

You must own, or have access to, a macOS or Windows computer to take this course **on which you can install software**. You need to be able to watch online videos because some of the course content is video-based. If you can watch YouTube videos at HD resolution you have the needed ability. All of the required software is available at no cost.

Instructor(s):

Kristofferson Culmer
Instructor
Assistant Professional Practice Professor, IT
Office: E2437 K Laferre Hall
Campus mailbox: 201 Naka Hall
573.239.6412 (voice/text)
culmerk@missouri.edu
https://www.linkedin.com/in/kristofferson/

Learning Support:

The course on Canvas has a module at the top of the list of modules called **Support - How to Get Help** that provides information on how to get support for this course. The instructors and learning support staff monitor the support servers on Discord for the course.

If you have any course requests, disability accommodation requests, complaints, concerns, or grade disputes, email the instructor, Kristofferson Culmer, directly at:

culmerk@missouri.edu

Emails sent to the course resource account or to the instructor will be responded to within 24 hours.

Personal Learning Assistants (PLAs) and Graduate Teaching Assistants (GTAs) are undergraduate and graduate students who are employed to support courses. They are part of the learning support staff for the course.

The instructor and learning support staff hold online office hours on Discord. Information about online office hours and how to setup and use Discord is provided on Canvas in the **Support - How to Get Help** module.

Grading:

The course grade is calculated as a weighted average of grades in seven categories. In each category, a grade is earned as a percentage from 0% to 100% that is based on an equal averaging of items in that category. The percentage grade for each category is multiplied by the weighting percentage to determine the category's contribution to the total grade. The sum of contributions from the six categories yields the final grade.

Categories and Weights
Quizzes: 15%
Challenges: 15%
Retrospectives: 10%
Midterm Exam: 15%
Projects: 15%:
Final Exam: 15%
Final Project: 15%

Grading Scale
A+ = 98-100%, A = 93-97%, A- = 90-92%
B+ = 87-89%, B = 83-86%, B- = 80-82%
C+ = 77-79%, C = 73-76%, C- = 70-72%

D+ = 67-69%, D = 63-66%, D- = 60-62%
F = 59% and below

Challenge Grading

Unless otherwise specified, challenges will be graded on effort. Effort is measured on a number of different criteria; including, but not limited to, correctness, amount of work attempted, amount of work completed, using support material, asking for help, and meeting challenge requirements.

Project Grading

Projects will be graded on correctness and the quality of the work. There will be a total of four (4) projects in this course during the semester, a midterm project, final project, and two other projects during the semester.

Grades for challenges, activities, projects, and retrospectives will be posted one week after the due date. Quizzes and exams are auto-graded in Canvas and grades will be posted immediately once the quiz or exam is submitted.

Course Policies:

- All challenges, activities, quizzes and exams have to be submitted by their due dates to receive credit.
- You are responsible for keeping up-to-date on the work you are to be doing for this course. While reminders will be sent out based on the schedule, it is up to you to complete the work in a timely manner.
- You must fulfill the requirements of a challenge submission to receive credit for that challenge. Any information you are asked to provide or files you are asked to supply must be present to receive credit for the challenge.

Using Artificial Intelligence (AI) Assistants

Use of AI assistants like Chat GPT is permitted in this course. GitHub Co Pilot and tools similar to it are not permitted for use in this course. The work that you submit, however, must be your own. AI assistants may be used as tool to assist the student but should not be used to complete the student's work. Any time an AI assistant is used the student must submit a reference page that contains the prompts issued to the AI assistant and screenshots of the the responses produced. The professor provide more guidance on this topic during the first week of class.

Inclusive Environment, Respect, and Reporting

It is of principle importance that the faculty, and supporting staff of this course foster an inclusive educational environment for all students to thrive. This means an active process of inclusion. Disrespect and discrimination of any kind are not tolerated. The instructor of this course pledges to provide to the best of their ability an inclusive course with appropriate materials that meets the needs of all students, while also engaging and representing voices, perspectives, and experiences of diverse and underrepresented backgrounds. As is the case with the Faculty and student support team, all students are expected to be facilitators of this practice and principle. In the event that students utilize a collaborative tool outside the scope of this course, it is expected that faculty, staff, and students alike follow these policies regardless of platform. It is important that any breach of this behavior by a student be reported to the course instructor, and the director of the IT Program as soon as possible. Links to associated resources may be found at the bottom of this syllabus.

Netiquette & Community Policies:

The University of Missouri-Columbia is committed to providing courses that meet the highest standards of excellence with the mission of preparing students to become productive members of society and good citizens of the world (University Standard of Conduct), University of Missouri-Columbia. As such, students are expected to maintain a standard of conduct. A challenge in the online classroom is understanding the meaning of communications without the visual and auditory clues from the speaker. Netiquette provides some basic guidelines about how to behave in an online format, such as not using all capital letters online because that represents the vocal equivalent of shouting.

All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's nondiscrimination statement, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambiance. In addition to these basics, please remember that this is an academic course where much of the work is taking place online. It is not the same as communicating with friends via social media, nor is it equivalent to sending text messages to friends or colleagues. These guidelines below will help you reduce online miscommunications in this course.

General Netiquette Rules:

- **Make the Connection**. Electronic communication (email, discussion forums, Discord, etc.) is how you share ideas with other participants in this course. Online environments can separate the person from the ideas received in this course. Remember, like you, someone is on the other side of an email or discussion posting. Communicate with fellow participants as you would in a face-to-face course.

- **Be Professional**. Your coursework is more than learning facts; you are preparing for a career. You are learning to interact with your fellow course participants as you would in your future professional life. Your conduct in this course should reflect this. Your communication should follow standard rules for grammar and spelling (unless in an online chat) and be clear, concise and intelligent.
- **Have Opinions**. Everyone is entitled to have an opinion. In discussion forums, everyone is encouraged to share them.
- **Respect Disagreement**. People have the right to disagree with you. However, disagreement should never be personal. Online discussions are a means to share ideas and practice the skill of persuasion. Persuasive speech cannot be achieved with hurtful, hateful or inappropriate language. Review your posts before you publish and reread them for unintended meanings.
- **Ask Questions**. Cultural influences can influence communication in terms of phrasing and word choice. The lack of visual and auditory clues may affect meaning, as well. Before jumping to conclusions, ask for clarification.
- **Be Forgiving**. For the majority of participants, online communication is straightforward. Sometimes unintended meanings are conveyed.

If Conflicts Arise:

Online behavior is not always perfect. In fact it can venture into disrespectful and hurtful areas and needs to be addressed. If you experience any questionable or outright inappropriate behavior from your fellow course participants, please contact the instructor.

This Netiquette policy was adapted from Howard Community College's [Netiquette Statement] and Virgina Shea's The Core Rules of Netiquette.

Exepectations for Students:

- Be responsible for yourself, your work, and your actions.
- Attend to the work you have to do. Do not put it off. Make it part of your schedule.
- Do not try to do all of the work just before a deadline.
- Ask questions if you do not understand something.
- Engage in discussions with other students and faculty.
- Ask for help if you get lost. Use the learning support staff.
- Communicate!
- Do not wait until late in the semester to address problems.
- Do not ask the instructor to break class policies.
- Plan.
- Be creative, curious, inventive, resourceful, and proactive.

- Be playful in your approach to learning and the work you do.
- Play nice with others.
- Have fun.

Decreasing the Risk of COVID-19 in Classrooms and Labs

If you have tested positive for COVID-19 or have been identified as someone who needs to quarantine, do not attend class in person until the mandated period for isolation or quarantine has passed. Your instructor will work with you on arrangements to access class material while you are in isolation or quarantine.

Additionally, if you are experiencing any COVID-related symptoms, or are otherwise feeling unwell, do not attend in-person classes and contact your health care provider and/or student health immediately. COVID symptoms include: fever greater than 100.4 or chills; cough, shortness of breath or difficulty breathing; fatigue; unexplained muscle or body aches; headache; new loss of taste or smell; sore throat; congestion or runny nose; nausea or vomiting; diarrhea.

Instructors or students with concerns about how a student is following any University-mandated COVID-19 policies and protocols should report those concerns to the Office of the Dean of Students. Concerns can be documented on a COVID Safety Measures Reporting Form.

Please consult Show Me Renewal for further guidelines. This statement will be updated as information changes.

Mental Health

The University of Missouri is committed to supporting student well-being through an integrated network of care, with a wide range of services to help students succeed. The MU Counseling Center offers professional mental health care, and can help you find the best approach to treatment based on your needs. Call to make an appointment at 573-882-6601. Any student in crisis may call or go to the MU Counseling Center between 8:00-5:00 M-F. After hours phone support is available at 573-882-6601.

Visit our website at https://wellbeing.missouri.edu/ to take an online mental health screening, find out about workshops and resources that can help you thrive, or learn how to support a friend. Download Sanvello, a phone app that teaches skills and strategies to help you maintain good mental health. Log in with your Mizzou e-mail to unlock all the tools available through Sanvello at no additional cost to you.

Academic Integrity:

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain

an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor or the Office of Academic Integrity.

Students are expected to adhere to this honor pledge on all graded work whether or not they are explicitly asked in advance to do so: "I strive to uphold the University values of respect, responsibility, discovery, and excellence. On my honor, I pledge that I have neither given nor received unauthorized assistance on this work."

FERPA

The Family Educational Rights and Privacy Act (FERPA) of 1974 is a federal law designed to protect the privacy of educational records; to establish the rights of students to inspect and review their education records; and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. The law applies to any individual who is or has been in attendance at an institution and regarding whom the institution maintains educational records. Once students have matriculated to the University of Missouri, i.e. enrolled in course work, FERPA rights transfer to the student, regardless of the student's age.

Students can enable certain individuals to have access to their education records by signing a FERPA waiver. The consent must specify records to be disclosed, state the purpose of the disclosure and identify the party or class of parties to whom the disclosure must be made.

Statement on Academic Dishonesty from the Director and Director of Undergraduate Studies of the IT Program:

According to the Faculty Handbook, it is mandatory for every faculty member of the University of Missouri to report academic dishonesty to the Office of Academic Integrity within the Provost's office. This includes any cheating, plagiarism or sabotage as defined by the Student Standard of Conduct for Academic Integrity https://oai.missouri.edu/students/. Your instructor may go into greater detail on what constitutes academic dishonesty for this course.

According to the Office of Academic Integrity's website, "Once an instructor suspects that a student has violated academic integrity standards, the instructor must notify the student within 10 calendar days that the suspected misconduct will be reported to the Office of Academic Integrity." https://oai.missouri.edu/reporting/

You can find out more about this topic as well as what to do if you are accused of academic dishonesty at MU's Office of Academic Integrity's

website.

Intellectual Property Notice:

All course materials including but not limited to the syllabus, course assignments, study guides, learning guides, online lecture videos and content, and lab book (i.e. course pack) are property of the instructor and/or University and may not be shared online or distributed in any manner to others. Students are prohibited from posting course materials or notes online and from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Violations of copyright laws could subject you to civil penalties and criminal liability. Violations of academic integrity may subject you to disciplinary action under University policies.

Classroom Misconduct:

Classroom misconduct is defined by the University of Missouri's collected rules and regulations are also outlined in the M-Book Student Code of Conduct.

https://www.umsystem.edu/ums/rules/collected_rules/programs/ch200/200.010_standard_of_conduct
https://accountability.missouri.edu/university-policies/

Classroom misconduct includes forgery of class attendance; obstruction or disruption of teaching, including late arrival or early departure; failure to turn off cellular telephones leading to disruption of teaching; playing games or surfing the Internet on laptop computers unless instructed to do so; harassment, bullying, physical abuse or safety threats; theft; property damage; disruptive, lewd or obscene conduct; abuse of computer time; repeated failure to attend class when attendance is required; and repeated failure to participate or respond in class when class participation is required.

IMPORTANT: Entering a classroom late or leaving a classroom before the end of the period can be extremely disruptive behavior. Students are asked to arrive for class on time and to avoid early departures. Instructors have the right to deny students access to the classroom if they arrive late and have the right to dismiss a student from the class for early departures that result in disruptions.

Under MU policy, your instructor has the right to ask for your removal from the course for misconduct, disruptive behavior or excessive absences. The instructor then has the right to issue a grade of withdraw, withdraw failing or F. The instructor alone is responsible for assigning the grade in such circumstances.

Dishonesty and Misconduct Reporting Procedures:

MU faculty are required to report all instances of academic or classroom misconduct to the appropriate campus officials. Allegations of classroom misconduct will be forwarded immediately to MU's Vice Chancellor for Student Affairs. Allegations of academic misconduct will be forwarded immediately to MU's Office of the Provost.

Title IX Information:

The University of Missouri prohibits all forms of sex or gender discrimination, including sex-based violence. If you or someone you know has experienced sex discrimination or been harassed or assaulted, you can get help at the Relationship & Sexual Violence Prevention (RSVP) Center, a confidential resource, at rsvp@missouri.edu or (573) 882–6638, or go to https://rsvp.missouri.edu . You can also contact the Title IX Office (title9@missouri.edu; (573) 882–3880; or http://www.title9.missouri.edu). Mizzou employees are required to report all incidents of sex discrimination to the Title IX Office.

Religious Holidays & Accommodations

Many religious faiths are represented in the student body. The University of Missouri does not restrict student free exercise of religion, unless 1) the restriction is in the form of a rule of general applicability, and does not discriminate against religion or among religions; and 2) it can be demonstrated that the application of the restriction is essential to furthering a compelling university interest, and is not unduly restrictive considering the relevant circumstance. The policy of the University attempts to strike a reasonable balance between accommodating the religious practice of students and meeting academic needs and standards.

Consult IDE's Guide to Religions for the form that can be used to notify an instructor of an absence associated with religious practice. Students are expected to notify their instructor(s) by completing and submitting this form in a manner that is consistent with the procedure outlined in the university's policy on student religious accommodation. Providing false information regarding sincerely held religious practice is a violation of the university's Standard of Conduct and will not be tolerated.

Students with Disabilities:

The goal of the University of Missouri is to ensure an inclusive learning environment for all students. The University of Missouri Disability Center provides services and accommodations for students to participate fully in the learning experience and to experience equitable evaluation of their performance. Students (including online students) with a documented disability can contact the Disability Center to establish an Accommodation Plan. Documented disabilities include hearing, vision, mobility, learning and attention, psychological health, and physical health. Students' accommodations are implemented with the input of students to maximize the learning experiences. The MU Disability Center keeps information about a student's disability confidential.

Please notify me of your eligibility for accommodations as soon as possible. Additionally, if there are aspects of the course that present as barriers, such as inaccessible course content (e.g., learning assessments, PowerPoints, non-captioned videos, images, tables, PDFs) or if you need an immediate accommodation due to an injury, please contact me or the Disability Center as soon as possible.

Intellectual Pluralism:

The University community welcomes intellectual diversity and respects student rights. Students who have questions or concerns regarding the atmosphere in this class (including respect for diverse opinions) may contact the departmental chair or divisional director, the Office of Academic Integrity , or the MU Equity Office.

Notice of Nondiscrimination:

The University of Missouri does not discriminate on the basis of race, color, national origin, ancestry, religion, sex* (including gender), pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, and any other status protected by applicable state or federal law. Discrimination includes any form of unequal treatment such as denial of opportunities, harassment, and violence. *Sex discrimination includes rape, sexual assault, sexual harassment, unwanted touching, stalking, dating/domestic violence, stalking, and sexual exploitation. Retaliation for making or supporting a report of discrimination or harassment is also prohibited.

If you experience discrimination or sexual violence, you are encouraged (but not required) to report the incident to the MU Office for Civil Rights & Title IX. Learn more about your rights and options at civilrights.missouri.edu or call 573-882-3880. You also may make an anonymous report online.

If you are a survivor, or someone concerned about a survivor, and need immediate information on what to do, see RSVP Resources page. Both the Office for Civil Rights & Title IX and the RSVP Center can provide assistance to students who need help with academics, housing, or other issues.

In the event that you choose to write or speak about having experienced any of these forms of prohibited discrimination or harassment, Mizzou policies require that, as your instructor, I share this information with the MU Office for Civil Rights & Title IX. They will contact you to offer information about resources, as well as your rights and options as a member of our campus community.