Course Information

- **Course Name:** Analytics and AI for Health Strategies, DH 5160, 500-level
- **Department:** Kinesiology
- **Semester/Year:** Fall 2024
- **Credit Hours:** 3 credits
- **Course Prerequisites:** Admission to MDH (or related online MS) program; credit or concurrent enrollment in Foundations of Digital Health, credit or concurrent enrollment in Research Methods and Ethics of Health Technology.
- **Meeting Days and Times:** Online
- **Course Delivery (Format):** Asynchronous

Instructor Information

- **Instructor's Name:**
- **Email:**
- **Phone:**
- **Office Address:**
- **Student (Office) Hours:** By email/appt.
- **TA Information:**

Optional Textbook

- The Pragmatic Programmer: Your Journey To Mastery, 20th Anniversary Edition (2nd Edition)

Softwares Requirement:

- MySQL (or your preferred platform)
- Jupyter Notebook / PyCharm / VS Code (or your preferred IDEs)
- R Studio
- Microsoft PowerBI
- Tableau Student https://www.tableau.com/academic/students
- Azure Machine Learning - Automated machine learning

Course Description

Structured query language (SQL), power BI/Tableau BI, R/Python, machine learning, and artificial intelligence (AI) to analyze exercise and health data. Data analytics applications

and health systems, data mining and visualization, predictive modeling for health outcomes.

Course Learning Objectives

By the conclusion of this course, the student-learners will:

1. Analyze exercise and health data using: Structured Query Language (SQL), Power BI/Tableau BI, and R/Python, machine learning, or artificial intelligence
2. Apply data analytics, visualization, and mining in health systems and healthcare
3. Apply predictive modeling with health outcomes and health behaviors
4. Utilize business intelligence tools to enhance exercise and health strategies
5. Applymachinelearningtechniquestoanalyzeandderiveinsightsfromhealthrelateddata, enabling data-driven decision making in the context of exercise and health strategies

Course Philosophy

This course is rooted in the principles of independent, self-paced learning. Students will be equipped with career-ready skills by fostering a culture of autonomous exploration. With a comprehensive array of asynchronous resources, including readings, lectures, self-guided activities, quizzes, and a final project, students have the flexibility to chart their learning journey. This course extends beyond knowledge acquisition, emphasizing the practical application of behavioral health and technology insights. Students are encouraged to become lifelong learners, capable of adapting to the ever-evolving digital health landscape. While embracing independent learning, this course will foster a collaborative and supportive online community, recognizing the value of peer interactions.

This course centers on empowering students to take charge of their education, develop career-relevant skills, and thrive as proactive, adaptable professionals in the dynamic realm of digital health.

Department of Kinesiology Learning Outcomes:

1. Communication. Uses clear and effective written, oral, visual, and electronic (WOVE) communication techniques to foster inquiry, collaboration, and engagement in physical activity and health related settings.
2. Lifelong learning, assessment, and self-reflection. Analyzes and evaluates one's own knowledge, abilities and actions relative to professional standards, seeks

opportunities to grow professionally, and utilizes self-assessment and assessment of others to foster physical, cognitive, social, and emotional well-being.
3. Content knowledge, discovery, and critical thinking. Understands fundamental concepts of physical activity and health, conducts scientific inquiry, and applies critical thinking to solve problems from personal, scholarly, and professional perspectives.
4. Ethics, diversity, and social justice. Demonstrates leadership and social responsibility to improve quality of life for others and ensures equitable access for diverse groups by creating appropriate environments to initiate and maintain a physically active, healthy lifestyle.

Grading

Your final grade in this course will be determined based on a weighted system that takes into account various assessments and homework activities. The following is an overview of the grading components and their respective weights:

Assignment	20%
Quiz	20%
Weekly Projects	45%
Final Project	15%
TOTAL	100%

Grading Scheme

The following standard grading scale will be utilized to assess your performance in this course:

Grade	Range
A	93% - 100%
A-	90% - 92.9%
B+	87% - 89.9%
B	83% - 86.9%
B-	80% - 82.9%
C+	77% - 79.9%
C	73% - 76.9%
C-	70% - 72.9%
D	60% - 69.9%
F	0% - 59.9%

Assignment: Problem Solving with Coding

In this course, you will engage in a series of assignments designed to enhance your problem-solving skills through the application of coding. The "Problem Solving with Coding" assignment requires you to tackle real-world problems by developing efficient and effective algorithms. This exercise will not only test your understanding of analytical methods but also your ability to implement solutions in a programming language of your choice. You will be expected to analyze the problem, devise a plan, code the solution, and evaluate the results. The assignment emphasizes critical thinking, creativity, and precision, and aims to prepare you for complex problem-solving scenarios in both academic and professional settings. Through this hands-on experience, you will build a robust skill set that combines theoretical knowledge with practical coding expertise.

Weekly Quizzes

To ensure that you are consistently understanding and assimilating the core concepts covered in the course, there will be weekly quizzes. These quizzes are designed to test your grasp of the material presented during lectures and readings, including theoretical concepts, analytical techniques, and coding practices. Each quiz will consist of a mix of multiple-choice questions, short answers, code debugging, and code completion. By regularly assessing your knowledge through these quizzes, you will be able to identify areas where you need further study and practice. This continuous evaluation approach helps reinforce learning and provides timely feedback, ensuring you stay on track throughout the course.

Weekly Project

Each week, you will undertake a project that involves cleaning and preparing data, applying machine learning models, and deriving meaningful insights from the data. These projects are designed to give you hands-on experience with real-world datasets and to develop your skills in data preprocessing, feature engineering, model selection, and evaluation. You will learn how to handle missing data, normalize and scale features, and apply various machine learning algorithms to uncover patterns and make predictions. Additionally, each project will include a case study component, where you will analyze a specific problem or scenario, apply your machine learning model, and interpret the results to provide actionable insights. These projects aim to bridge the gap between theoretical knowledge and practical application, preparing you for data-driven decision-making in professional environments.

GitHub Repositories

To showcase your weekly outcomes and enhance your portfolio, you are encouraged to create your own repository on GitHub and upload your projects. This practice not only provides extra credit but also demonstrates your ability to manage and share your work with a broader audience. By maintaining a GitHub repository, you will gain experience with version control, collaborative coding practices, and professional project presentation. This will also allow you to receive feedback from peers and potential employers, further enhancing your learning experience and career readiness.

References

GeeksforGeeks

https://www.geeksforgeeks.org/

GitHub

https://github.com/

ISU Required Syllabus Statement

Free Expression

Iowa State University supports and upholds the First Amendment protection of freedom of speech and the principle of academic freedomLinks to an external site. in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

In effect Summer 2024: No employee, student, applicant, or campus visitor is compelled to disclose their pronouns. Anyone may voluntarily disclose their own pronouns.

Academic Dishonesty

The class will follow Iowa State University's policy on academic misconduct (5.1 in the Student Code of Conduct). Students are responsible for adhering to university policy and the expectations in the course syllabus and on coursework and exams, and for following directions given by faculty, instructors, and Testing Center regulations related to coursework, assessments, and exams. Anyone suspected of academic misconduct will be reported to the Office of Student Conduct in the Dean of Students Office. Information about academic integrity and the value of completing academic work honestly can be found in the Iowa State University Academic Integrity TutorialLinks to an external site..

AI (Artificial Intelligence) Policy

In this course, students are encouraged to leverage AI as a supplementary tool to enhance their learning experience and problem-solving capabilities. While the use of AI is welcomed, it is important to employ it judiciously and not solely rely on its output as the exclusive means of completing assignments.

Students should be aware of potential pitfalls associated with AI usage, such as "hallucinations" or "confabulations," wherein generative-AI tools may generate

information that sounds realistic but lacks accuracy. Additionally, caution is advised regarding the potential lack of citations, where required, or the presence of inaccurate content not aligning with provided citations. Some AI tools may produce content referencing "others," "critics," and "research" without proper attribution.

Furthermore, students should exercise discernment as AI may identify references or topics that deviate significantly from the course content or expectations for a particular assignment. The responsible and mindful integration of AI tools is encouraged to ensure academic integrity and the alignment of outputs with the intended learning outcomes of the course (CELT, Iowa State University).

Accessibility Statement

Iowa State University is committed to advancing equity, access, and inclusion for students with disabilities. Promoting these values entails providing reasonable accommodations where barriers exist to students' full participation in higher education. Students in need of accommodations or who experience accessibility-related barriers to learning should work with Student Accessibility Services (SAS) to identify resources and support available to them. Staff at SAS collaborate with students and campus partners to coordinate accommodations and to further the academic excellence of students with disabilities. Information about SAS is available online at www.sas.dso.iastate.edu, by email at accessibility@iastate.edu, or by phone at 515-294-7220.

Discrimination and Harassment

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu

Mental Health and Wellbeing Resources

As a Cyclone, you can access 24/7 resources and people dedicated to helping you achieve your goals and be your best in and out of the classroom. Whether you need academic support or just someone to talk to, we're here for you at Cyclone Support (cyclonesupport.iastate.edu).

Prep Week

This class follows the Iowa State University Prep Week policy as noted in section 10.6.4 of the Faculty Handbook.

Religious Accommodation

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request a reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office at 515-294-1020 or the Office of Equal Opportunity at 515-294-7612.

Student Code of Conduct

Students in this course are responsible for being familiar with the Iowa State University student rules and policies in the Student Code of Conduct in the Policy Library.

Disclaimer: In extenuating circumstances, the schedule, policies, or procedures are subject to change. All efforts will be made not to alter assignment due dates or scheduled exams. Any modifications will be communicated in writing, verbally in class, and/or published in the Canvas course.