University of Missouri–St. Louis

College of Business Administration

FIN 3599/5599 – Independent Study in Finance – AI Applications in Finance

Spring 2021 Syllabus

Course Instructor: Tim Dombrowski
Office: 232 Anheuser-Busch Hall
Office Hours: Thursdays from 4:30PM – 5:30PM, or by appointment
Email: tdombrowski@umsl.edu
Meeting Schedule: Thursdays from 5:30PM – 6:45PM

Course Description: This course introduces students to topics in artificial intelligence (AI) and its applications in finance fields. The course discusses the history of AI and machine learning (ML) and its general methodology of development of data models. The course presents AI and ML applications and real life examples in financial services industries, such as portfolio management, algorithmic trading, and credit scoring.

Prerequisites: FIN 3572, or FIN 6572, or consent of instructor.


Course Objectives: This course aims to introduce students to artificial intelligence (AI). The content of the course will be broken down into three major components: a textbook-guided focus on the history and theoretical foundations of AI, a case study component where students will learn about existing applications of AI in the finance industry, and a group project where students will work in teams to attempt to solve a financial problem using the techniques discussed in class. Upon completion of the course, student will be expected to be able to distinguish between AI, machine learning, and deep learning, as well demonstrate an understanding of applying these concepts from both a technical and business function perspective.

Exams: There will be two exams throughout the semester worth 100 points each (a midterm and final exam). Exam details will be announced at a later time.
Case Studies: Throughout the course, students will be assigned case studies and small projects for discussion in the in-person class meetings. These will consist of either researching existing applications of artificial intelligence in the finance industry and/or utilizing some machine learning techniques. Students will be expected to prepare discussion points prior to class meetings to facilitate discussions in class. After each case study discussion, students will be expected to submit a report summarizing their findings from before and during the in-class discussions. These case study reports will each be worth 50 points with four throughout the semester, for a total of 200 points.

Project: Students will be expected to complete a semester-long project aiming to either solve some problem in finance or examine the relationship between two or more financial variables. Students will be expected to apply at least one of the techniques discussed in the class to help solve this problem. The final project will be worth 100 points.

Grading: The grading for the course will follow the standard +/- grading scale below. Across the two exams, case studies, and the group project, there are 500 total points. The final grade will be a weighted average as such:

- Exams: \( 2 \times 100 \text{ points} = \frac{2}{5} \text{ of final grade} 
- Case Studies: \( 4 \times 50 \text{ points} = \frac{2}{5} \text{ of final grade} 
- Project: 100 \text{ points} = \frac{1}{5} \text{ of final grade} 

<table>
<thead>
<tr>
<th>Final %</th>
<th>Grade (Points)</th>
<th>Final %</th>
<th>Grade (Points)</th>
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<tbody>
<tr>
<td>( \geq 93.0 )</td>
<td>A (4.0)</td>
<td>73.0 – 76.9</td>
<td>C (2.0)</td>
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<tr>
<td>90.0 – 92.9</td>
<td>A− (3.7)</td>
<td>70.0 – 72.9</td>
<td>C− (1.7)</td>
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<tr>
<td>87.0 – 89.9</td>
<td>B+ (3.3)</td>
<td>67.0 – 69.9</td>
<td>D+ (1.3)</td>
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<tr>
<td>83.0 – 86.9</td>
<td>B (3.0)</td>
<td>63.0 – 66.9</td>
<td>D (1.0)</td>
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<tr>
<td>80.0 – 82.9</td>
<td>B− (2.7)</td>
<td>60.0 – 62.9</td>
<td>D− (0.7)</td>
</tr>
<tr>
<td>77.0 – 79.9</td>
<td>C+ (2.3)</td>
<td>&lt; 60</td>
<td>F (0.0)</td>
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Grading Scale:
Time Requirements: If this course were offered on entirely on campus, you’d be in class 2.5 hours/week plus travel time. The blended version is no different in terms of expectations for your involvement. This is an active course that requires 3 hours of your time each week in addition to the time it takes you to read the required materials, watch the videos, and complete the assignments. That means that you need to plan to spend a minimum of 6 hours every week (up to 9-10 hours a week) on activities related to this course.

Technology Requirements: As a student in an blended course, you are expected to have reliable internet access almost every day. If you have computing problems, it is your responsibility to address these or to use campus computing labs. Problems with your computer or other technology issues are not an excuse for delays in meeting expectations and missed deadlines for the course. If you have a problem, get help in solving it immediately. At a minimum, you will need the following software/hardware to participate in this course:

1. Computer with an updated operating system (e.g. Windows, Mac, Linux)
2. Updated Internet browsers (Apple Safari, Internet Explorer, Google Chrome, Mozilla Firefox)
3. Ability to navigate Canvas (Learning Management System)
4. Minimum Processor Speed of 1 GHz or higher recommended.
5. DSL or Cable Internet connection or a connection speed no less than 6 Mbps.
6. Media player such as VLC Media Player.
7. Adobe Flash player (free)
8. Adobe Reader or alternative PDF reader (free)
9. A webcam and/or microphone is highly recommended.

Resources/Support: Additional student support resources include:

- Academic Support
- Student Resources
- Technical Support
**Academic Integrity:**

- You are responsible for being attentive to and observant of University policies about academic honesty as stated in the University’s Campus Policies and Code of Student Conduct found in the UMSL Bulletin.

- Academic dishonesty is a serious offense that may lead to probation, suspension, or dismissal from the University. One form of academic dishonesty is plagiarism – the use of an author’s ideas, statements, or approaches without crediting the source. Academic dishonesty also includes such acts as cheating by using any unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the faculty member (e.g., copying someone else’s answers on tests and quizzes). Unauthorized possession or distribution of academic materials is another type of academic misconduct. It includes the unauthorized use, selling or purchasing of examinations or other academic work, using or stealing another student’s work, unauthorized entry or use of material in a computer file, and using information from or possessing exams that an instructor did not authorize for release to students. Falsification is any untruth, either verbal or written, in one’s academic work. Facilitation is knowingly assisting another to commit an act of academic misconduct. **Plagiarism, cheating, and falsification are not acceptable.**

- All instances of academic dishonesty will be reported to the Office of Academic Affairs who will determine whether you will appear before the Student Conduct Committee for possible administrative sanctions such as dismissal from the university. The instructor will make an academic judgment about the student’s grade on that work in this course. The campus process regarding academic dishonesty is described in the Policies section of the Academic Affairs website.

**Mandatory Reporting:**

Under Title IX, all UMSL faculty, staff, and administrators (with limited exception) are obligated to report any incidents of sexual harassment, sexual misconduct, sexual assault, or gender discrimination to the Student Affairs office and/or other University officials. This ensures that all parties are protected from further abuses and that victim(s) are supported by trained counselors and professionals. Note: There are several offices at UMSL (e.g., Counseling Services, Health Services, Community Psychological Service, Center for Trauma Recovery, and Student Social Services) whose staff are exempt from Title IX mandated reporting, when the information is learned in the course of a confidential communication.
Online Netiquette

- **Be self-reflective** before you post an emotional response and reread what you have written to be sure it is positive. Think of your comments as printed in the newspaper. Your online comments will be seen, heard and remembered by others in the class.

- **Use effective communication.**
  - Avoid the use of all caps or multiple punctuation elements (!!, ??? etc).
  - Be polite, understate rather than overstate your point, and use positive language.
  - If you are using acronyms, jargon or uncommon terms, be sure to explain them so everyone can understand and participate in the discussion.

- **Ask for clarification** to a point if you feel emotional from a classmate’s post. It is likely that you misunderstood his/her point. This strategy will also help you step away from the intensity of the moment to allow for more reflection.

- **Sign your name.** It is easier to build a classroom community when you know to whom you are responding.

- **Foster community.** Share your great ideas and contribute to ongoing discussions. Consider each comment you make as one that is adding to, or detracting from, a positive learning environment for you and your classmates.

- **Be constructive.** You can challenge ideas and the course content, but avoid becoming negative online. When you disagree politely, you stimulate and encourage great discussion. You also maintain positive relationships with others with whom you may disagree on a certain point.

- **Keep the conversation on topic** by responding to questions, adding thoughtful comments about the topics at hand. Online dialogue is like conversation. If there is a certain dialogue going on, please add to it, but if you have something new to say, please post it in another thread.

- **Define your terms.** When using acronyms or terms that are particular to your field (or new to our course), please define them for others.
<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
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| Week 1 | 1/18–24 | • Review Syllabus  
|  |  | • Chapter 1  
|  |  | • Intro to RStudio |
| Week 2 | 1/25–31 | • Chapter 2  
|  |  | • Python in RStudio |
| Week 3 | 2/1–7 | • Chapter 3  
|  |  | • Intro to Cmind |
| Week 4 | 2/8–14 | • Chapter 4 |
| Week 5 | 2/15–21 | • Cmind Case Study Discussion |
| Week 6 | 2/22–28 | • Chapter 7  
|  |  | • Intro to TensorFlow |
| Week 7 | 3/1–7 | • Chapter 12–13 |
| Week 8 | 3/8–15 | • TensorFlow Stock Price Prediction Discussion |
| Week 9 | 3/15–21 | • Chapter 19  
|  |  | • Intro to PyTorch |
| Week 10 | 3/22–28 | • Midterm Exam |
| Week 11 | 3/29–4/4 | • Spring Break! |
| Week 12 | 4/5–11 | • PyTorch Discussion |
| Week 13 | 4/12–18 | • Chapter 20–21 |
| Week 14 | 4/19–25 | • Decentralized Autonomous Organizations Discussion |
| Week 15 | 4/26–5/2 | • Chapters 27–28 |
| Week 16 (5/3–9)  
*Classes End 5/8 @5:00PM | • Project Presentations |
|-------------------------|------------------------|
| Week 17 (5/10–16)  
*Semester Ends 5/15 EOD | • Final Exam            |