

University of Missouri–St. Louis

College of Business Administration

FIN 3574: AI Applications in Finance / FIN 6574: AI/ML in Finance Spring 2022 Online Syllabus

Course Instructor: Tim Dombrowski
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Office Hours: Wednesdays from 5:00–6:30PM, or by appointment
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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.

Required Materials: “Artificial Intelligence: A Modern Approach” by Russel and Norvig, (4rd Edition) by Pearson.

UMSL AutoAccess: This course is part of our AutoAccess program designed to reduce the cost of course materials for students. You will be able to access the digital content for this course through Canvas on the first day of class.

Your student account will be charged for the cost of the digital course material. We have helped save students over \$39 million by providing digital content over the last 6 years.

The lowest cost content has been sourced. If you choose to opt out of the content please do so by February 1, 2022, to receive a refund. You will be sent an AutoAccess Welcome Email that will provide charge amounts, the opt-out process and any additional information needed for your AutoAccess course(s) beginning January 5, 2022.

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Course Objectives:

This course aims to introduce students to various applications of artificial intelligence in finance and examine the implementation of various machine learning techniques in financial contexts. The coursework will be derived in part from the AI textbook, but also from existing AI applications and open resources. Students will be expected to develop a basic theoretical and technical understanding of AI in the context of finance, but also complete a project focusing on an existing AI platform in the financial industry. 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.

Weekly Assignments:

Throughout the semester, there will be 12 weekly assignments. Students will be given a weekly set of tasks on each of the weekly agendas, which will be on the Canvas homepage in their respective weeks. Many weeks, the tasks will include a discussion for a particular textbook chapter or finance AI application. These discussion assignments can be completed either on the Canvas discussion boards or live in the weekly office hour discussions. If you are unable to attend the live session, it is recommended that you at least make one Canvas post prior to the weekly office hour so that we can incorporate your perspective into our discussion. Each of these assignments will be graded out of 5 points for a total of 60 points.

Project:

Students will be expected to complete a semester-long project that summarizes an AI application in the financial industry. There must be at least some degree of technical detail in the report; however, one can certainly focus more qualitative aspects of the particular project if desired. Ideally, students will develop enough experience in RStudio to create an R Notebook demonstrating some proficiency with loading in and analyzing data related to the selected AI application. The final project will be worth 40 points.

Grading:

The grading for the course will follow the standard +/- grading scale below. Across the weekly assignments and the project, there 100 total points divided as such:

- Weekly Assignments: 12×5 points = $3/5$ of final grade
- Project: 40 points = $2/5$ of final grade

Grading Scale:

| Final % | Grade (Points) | Final % | Grade (Points) |
|-----------|----------------|---------|----------------|
| ≥ 93 | A (4.0) | 73 – 76 | C (2.0) |
| 90 – 92 | A– (3.7) | 70 – 72 | C– (1.7) |
| 87 – 89 | B+ (3.3) | 67 – 69 | D+ (1.3) |
| 83 – 86 | B (3.0) | 63 – 66 | D (1.0) |
| 80 – 82 | B– (2.7) | 60 – 62 | D– (0.7) |
| 77 – 79 | C+ (2.3) | < 60 | F (0.0) |

Note: Intermediate grades are not rounded; however, final grades will be rounded to the nearest percentage point before assigning a letter grade.

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. If you would like to explore how the online Canvas activities work, please consult the [Online Course Overview](#) course in Canvas where you can practice posting to a discussion board, take a practice quiz and more. If you are worried about your preparedness, consider taking the [Online Readiness Survey](#) to help decide if an online course is right for you.

Technology Requirements: As a student in an online course, you are expected to have reliable internet access almost every day. Please reach out to your academic advisor or student success network if you need hardware or access to the Internet. If you have computing problems, it is your responsibility to address these through the ITS Helpdesk (helpdesk@umsl.edu) 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 (I recommend Brave, but Chrome, Firefox, or Safari should be fine)
3. Ability to navigate Canvas (Learning Management System)
4. Minimum Processor Speed of 1 GHz or higher recommended.
5. Reliable and stable internet connection.
6. Adobe Reader or alternative PDF reader (free)
7. A webcam and/or microphone is **highly recommended**.

Resources/Support:

Additional resources that students should review include:

- [Academic Advising](#)
- [Academic Integrity/Plagiarism](#)
- [Academic Support](#)
- [Mandatory Reporting](#)
- [Online Netiquette/Behavior](#)
- [Student Resources](#)
- [Technical Support](#)
- [UMSL Academic Calendar](#)
- [UMSL AutoAccess FAQ](#)

Tentative Course Schedule

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| Week 1 (1/17–23) | <ul style="list-style-type: none"> • Review Syllabus • Intro to RStudio, R, and Python |
| Week 2 (1/24–30) | <ul style="list-style-type: none"> • Review of Data Analytics and Machine Learning • Chapter 1: Intro to AI |
| Week 3 (1/31–2/6) | <ul style="list-style-type: none"> • Chapter 2: Intelligent Agents |
| Week 4 (2/7–13) | <ul style="list-style-type: none"> • APIs, Data Sources and Formats |
| Week 5 (2/14–20) *Project Proposal Due 2/20 | <ul style="list-style-type: none"> • R and Python Bridging in R Markdown |
| Week 6 (2/21–27) | <ul style="list-style-type: none"> • Chapter 7: Logical Agents |
| Week 7 (2/28–3/6) | <ul style="list-style-type: none"> • Chapter 8: First-Order Logic |
| Week 8 (3/7–13) | <ul style="list-style-type: none"> • Intro to Crypto and Blockchain Data |
| Week 9 (3/14–20) | <ul style="list-style-type: none"> • AI Portfolio Management (Numerai/NMR) |
| Week 10 (3/21–27) *Project Update Due 3/27 | <ul style="list-style-type: none"> • Review / Project Work Week |
| Week 11 (3/28–4/3) | <ul style="list-style-type: none"> • Spring Break! |
| Week 12 (4/4–10) | <ul style="list-style-type: none"> • Chapter 23: Natural Language Processing (NLP) |
| Week 13 (4/11–17) | <ul style="list-style-type: none"> • Decentralized Autonomous Organizations (DAOs) |
| Week 14 (4/18–24) | <ul style="list-style-type: none"> • AI Portfolio Management (SingularityDAO/SDAO/AGIX) |
| Week 15 (4/25–5/1) *Project Report Due 5/1 | <ul style="list-style-type: none"> • AI Ethics / Legal Issues |
| Week 16 (5/2–8) *Classes End 5/8 @5:00PM | <ul style="list-style-type: none"> • Project Presentations |
| Week 17 (5/9–15) *Semester Ends 5/15 EOD | <ul style="list-style-type: none"> • Project Presentations |