

Illinois Institute of Technology**Stuart School of Business**

Course Syllabus

Statistical Analysis in Financial Markets, MSF502

Spring 2024

A syllabus provides an overview of a course and attempts to outline an accurate summary of its requirements, outcomes, and schedule. Circumstances may arise that require modification of the syllabus at any point during the semester. I will announce any changes to the syllabus as early as possible so that you can adjust your expectations and schedule accordingly. Please know that you are responsible for remembering and adhering to the changes once they are announced.

Instructor Information

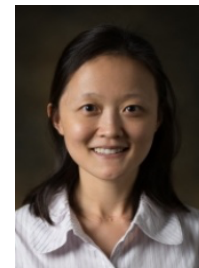
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TA Information: To be updated on Bb



I welcome you to contact me outside of class.

My office hours are: Tue & Fri 11:00-1:00pm at DTC, and by appointment

Instructor Bio

My research focuses on investments, with emphasis on socially responsible investing, factor investing, mutual funds, hedge funds, econometrics, and risk management. I use a lot of statistics in my research. Statistics is important in finance as in many other industries. To emphasize the applications of statistics in financial market, during lectures I would regularly

- 1) explain statistical results presented in financial news and articles,
- 2) demonstrate the usage of financial data in statistical analysis,
- 3) emphasize statistical techniques that have broad financial applications

I like my students to understand as much science of the subject as possible without sacrificing learning its applications in finance.

Course Information

Course #: MSF502-01

Course name: Statistical Analysis in Financial Markets

Course day and time: Tuesday 1:00-3:30pm

Course description: Statistics is very important and useful for the analysis of financial markets, especially in today's financial world of large data. This course has three sections. The first section reviews the basics of statistics, including Tabular and Graphical tools, Descriptive Statistics, Exploratory Data, and Probability Distributions. The second section turns to the theory and methods of Statistical Inference. It explains Sampling Theory, Estimation, and Hypothesis Testing. The third section puts emphasis on Variance Analysis and Regression Analysis, a widely used statistical technique in finance. To emphasize the applications of statistics in financial market, during lectures I would regularly

- 1) explain statistical results presented in financial news and articles,
- 2) demonstrate the usage of financial data in statistical analysis,
- 3) emphasize statistical techniques that have broad financial applications

Students are expected to understand as much science of the subject as possible without sacrificing learning its applications in finance.

Pre-requisites: The class is mostly self-contained. But basic algebra is a must-known skill.

Summarized Course Goal: Become skillful in recognizing data, making appropriate tables and graphs to best present statistical information of data. Appreciate the usefulness and limitations of inferential methods widely used in finance.

Course Method: Lecture, Real Data Modeling Demo, Homework, Project, Presentation, Test

Course Learning Objectives

Some of the skills I hope you will learn throughout the course include...

- Understand the basic concepts of both descriptive and inferential statistics.
- Demonstrate the ability to analyze data using statistical methods.
- Demonstrate the ability to build and test explanatory models.
- Understand some common biases in interpreting statistical results.
- Be skilled at interpreting statistical results presented in financial news and articles.
- Be skilled at organizing and presenting statistical information in a format that will facilitate informed financial decisions.

Required Course Materials

Text:

Jaggia, Kelly, Business Statistics: Communicating with Numbers

- There are two copies of old edition textbooks, one 2013 edition and one 2016 edition, in the Mies Campus library. There are two reserve locations at the library, and these two books are both in one of the reserve locations. Being in reserve means they can only be borrowed for 2 hours.
- I prefer to use the latest edition (4e) for assignments. I usually can have access to eBook, then I will open it during class for you to take pictures of assignment questions. This helps save you cost of buying the new edition.

Materials: Lecture Slides, Selected Articles, Sample Programming Scripts. All course materials are shared on Bb.

Software: Microsoft Excel

Programming Skills: I use and explain both Excel and R in class, excel modeling is required

Recommended Course Materials

Supplemental texts/readings: Supplemental texts/readings: Additional statistical books shall not be needed. I would encourage more readings in investments or more broad finance, WSJ, and programming techniques. I usually select current financial articles for students to read, and they will be updated on Bb in real time.

Software: R (I use R in presenting additional real-data examples, R programming is not required however recommended to use, I will share my Sample Programming Scripts on Bb to help you learn it)

Course, Grading, & Instructor Policies

Exam Dates: Final Week-Final Exam

Withdrawal and other important dates/deadlines: Please reference Illinois Tech's [Academic Calendar](#) for the current semester's official academic deadlines and informational dates.

Make-up: Make-up exam can be given for student who is ill on the exam day with an official letter from the doctor. Make-up is determined on a case-by-case basis.

Late work: I usually look at all late submissions of HW or group projects after I grade the final exam. I consider granting partial credits if they can help move one's letter grade up from C to B.

Special assignments: NA

Class attendance: Very important. If you will miss a class, please try to let me know ahead of time. If you will be absent, but would like to attend a live class online, let me know, I can open Bb collaborate for you to connect during our class time.

Classroom conduct: Cheating in exams is treated as failure and will be given a grade "D".

Discipline: Misconduct will be asked to step out of the classroom.

Grading System/Policy

Percentages for assignments:

Class Participation/Homework	10%
Group Projects	15%
Quizzes	30%
Final Exam	35%
Final Project	10%

Class Participation: Class participation include homework, group project presentation, in-class exercises/discussions, and Bb discussions. Selected homework questions will be explained in class. Just try your best on the questions, do not worry about making mistakes. Only Pass/Fail will be graded for each homework. Each in-class exercise and satisfying homework submission gets 1 point of participation grade. For Bb discussions, everyone is required to post at least one original thread, and a minimum of 2 responses to others, more is always preferred.

Group Project: There are three group projects, project presentations are arranged if time allows. Details will be given on Bb.

Test: Always bring your laptop to class. We use it for in-class exercise, quizzes, and exam. We will be green and minimize printing.

Grade scale (how do the points earned correlate to a letter grade): Tentative cutoff is 60 and 85. Cutoff may change depending on performance and difficulty of the assessments. I will give it my best efforts to be appropriate and fair in grading.

Incompletes: A student is eligible for a grade of incomplete when an emergency beyond his/her control prevents completion of the course.

TENTATIVE Course Outline

Assignments Glossary

GP: Group Project

HW: Homework

Q: Quiz

P: Final Individual Project

Week	Date	Learning Objective	Chapter	Assignments
1	01/09	Introduction, Statistics and Data	1	
2	01/16	Syllabi, Introduction to R, Introduction	1	GP1 Posted
3	01/23	Tabular and Graphical Methods	2	HW1
4	01/30	Numerical Descriptive Measures	3	HW2
5	02/06	Probability	4	
6	02/13	Distributions	5-6	HW3
7	02/20	Recitation, Quiz, Project Presentation	1-6	GP1 Due, Q1
8	02/27	Sampling and Sampling Distribution	7	GP2 Posted, HW4
9	03/05	Estimation	8	
10	03/12	No Class. IIT Spring Break		
11	03/19	Hypothesis Testing	9	HW5
12	03/26	Recitation, Quiz, Project Presentation	7-9	GP2 Due, Q2
13	04/02	Analysis of Variance	13	GP3 Posted, HW6
14	04/09	Regression Analysis	14-15	HW7

15	04/16	Regression Analysis	14-15	
16	04/23	Recitation, Quiz, Project Presentation	13-15	GP3 Due, Q3, P Posted
17	04/30	Final Week, Final Exam	1-9,13-15	P Due

Students are expected to spend about 2.5 hours every week preparing for class by going over the lecture slides (and/or book chapters), suggested readings, and video content. The class will meet for 2.5 hours every week. Class review, assignments, and Bb discussions are expected to take about 4 hours every week over the course of the entire semester. Quiz review may be expected to take 3 hours, and final review may be expected to take 6 hours.

Illinois Institute of Technology and Stuart School of Business Policies

The Stuart School of Business aims to ensure that all students have access to consistent course, Stuart, and Illinois Tech information and policies. The previous section of this syllabus was authored by the faculty teaching a specific course and related questions should be directed to that instructor. The following is a standardized selection of required information and policies included in all syllabi at Stuart. Related questions can be directed to Dr. Curt Allee, Assistant Dean of Academic Administration and Student Success, at 312.906.6597 or callee@stuart.iit.edu.

Illinois Institute of Technology Land Acknowledgement

Although our university's contemporary history began in 1940 with the merger of Armour Institute and Lewis Institute, Illinois Tech has recently embarked on a journey of reflecting further on our shared past. This exploration is one rooted in the desire to acknowledge the origins of our physical space and to show gratitude to the original stewards of the land on which we are situated.

According to the Mitchell Museum of the American Indian, the name "Chicago" is commonly accepted as a variant of a word that comes from the Algonquin language: "shikaakwa," meaning "striped skunk" or "onion." According to early explorers, the lakes and streams around Chicago were full of wild onions, leeks, and ramps (also called wild leeks). The land acknowledgement process, therefore, becomes a piece in a larger framework of deeper understanding of Chicago's

true history and something we felt encouraged to explore as a university.

The Field Museum shares that several original tribes of Indigenous peoples lived and thrived on the land that would come to be called Chicago. Bodéwadmik (Potawatomi), Hoocąk (Winnebago/Ho'Chunk), Jiwere (Otoe), Nutachi (Missouria), and Baxoje (Iowas); Kiash Matchitiwuk (Menominee); Meshkwahkîha (Meskwaki); Asâkîwaki (Sauk); Myaamiaki (Miami), Waayaahstanwaki (Wea), and Peeyankihšîaki (Piankashaw), Kiikaapoi (Kickapoo), Inoka (Illini Confederacy), Anishinaabeg (Ojibwe), and Odawak (Odawa) all shared land near the abundant resource that is Lake Michigan. Illinois Tech recognizes that the land we now reside on, including our Mies, Rice and Moffett campuses, is the traditional homeland of many Indigenous nations, and remains home to diverse Indigenous peoples today. We would like to thank the original stewards of the land that Illinois Tech now calls home: Myaamiaki (Miami), Kiikaapoi (Kickapoo), Očhéthi Šakówin, Bodéwadmik (Potawatomi), Peoria, Hoocąk (Winnebago/Ho'Chunk), and Kaskaskia.

Illinois Tech invites you to join us in this journey of exploring our collective past to learn from it and better inform our futures. We call on our community to also recognize and respect Indigenous peoples as the traditional stewards of the land we inhabit and to understand our place within, and impact on, the history of Indigenous nations of Chicago.

Diversity, Equity, and Inclusion

Illinois Institute of Technology promotes diversity, equity, and inclusion (DEI) inside and outside of the classroom. The instructors will educate themselves about the DEI of their fields and utilize the DEI resources at Illinois Tech to make a good-faith effort to include DEI topics in the course. The instructor will make sure that class materials and lectures are free from unfair and unsupported prejudice against diversity, inclusion and equity. Both the instructor and students will use inclusive language in both online and in-person settings. The instructor will work with students to enhance

the DEI culture in the classroom. We note that DEI conversations can at times create uncomfortable situations, but together we can handle those and emerge stronger.

- For DEI resources for faculty, contact Hilary Hudson Hosek, AVP, Head of Human Resources at (312) 567-3318 hr@iit.edu
- For DEI resources for students, contact Katherine Stetz, Vice Provost, Student Affairs and Dean of Students at (312) 567-3081 dos@iit.edu
- Students, Faculty and Staff can also use the incident form to report: iit.edu/incidentreport

Names and Pronouns

Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name and other information provided on their application for admission to Illinois Tech.

I will gladly honor your request to address you by a name other than the one on my roster and using the pronoun you specify. Please advise me of this early in the semester so that I may make appropriate changes to my records, forgive any early transgressions, and promptly correct me.

Disabilities

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources. The Center for Disability Resources (CDR) is located in 3424 S. State St., room 1C3-2 (on the first floor), telephone [312 567.5744](tel:312567.5744) or disabilities@iit.edu.

Sexual Harassment and Misconduct Information

Our school encourages anyone experiencing sexual harassment/misconduct to speak with someone about what happened, so they can get the support they need and the school can respond appropriately. Many areas of the University are required to report incidents of sexual harassment/misconduct and thus cannot guarantee confidentiality. If you wish to speak confidentially about an incident you believe falls under sexual harassment/ misconduct, please contact the school's Confidential Advisor service at (773) 907-1062.

If you want more information about filing a report, or have questions about the school's sexual harassment policies and procedures you may contact:

- Virginia Foster the Title IX Coordinator at (312) 567-5725 foster@iit.edu
- Katherine Stetz the Dean of Students at (312) 567-3081 dos@iit.edu
- To file an online complaint go to [iit.edu/incidentreport](https://web.iit.edu/incidentreport)

For a list of resources go to the University's Title IX office website:

<https://web.iit.edu/hea/resources>

Campus Resources

You can make appointments with any of the following free services, where Illinois Tech faculty, staff, and students are waiting to assist. You are encouraged to seek assistance from these offices, and I may recommend that you take advantage of specific help that the university provides.

Office of Technology Services

If you have a technology issue on or off campus, the Office of Technology Service (OTS) Support Desk is available to help. Support provided by OTS includes Wi-Fi connectivity, Blackboard issues, MyIIT portal access, etc. Learn more at ots.iit.edu/.

Library Research Help Office

You have a dedicated subject specialist librarian who can assist with research requests, finding and citing sources, information, and tools. You can email directly or schedule a research appointment for individualized assistance. Contact information for Subject Specialists information can be found here library.iit.edu/subject-specialties.

Stuart Career Management Center

The Stuart School has a dedicated Career Management Center (CMC) that offers a variety of services designed to help you launch or grow your career. To make an appointment, explore your career options, or learn more about CMC services, please email careers@stuart.iit.edu.

Office of Academic Affairs and Advising

At Stuart, you have a dedicated academic advisor providing holistic support, partnering to set academic, professional, and personal goals, and connecting you to Illinois Tech resources. Visit: www.iit.edu/stuart/student-resources/academic-success/office-academic-affairs-and-advising

The Academic Resource Center (ARC)

The Academic Resource Center offers free peer tutoring, exam reviews, workshops, and computing and printing services for Illinois Tech students. If you would like more information about different services, visit the ARC website at www.iit.edu/arc.

Academic Coaching

You can seek the assistance of highly qualified academic coaches. These coaches can assist with general learning strategies and study skills to improve subject understanding, retention, and

quickly solving problems. For more information about academic coaching or to make an appointment, please visit www.iit.edu/elm/team.

The Writing Center

One-on-one consultation, both by appointment and on a limited walk-in basis. Consultants are specifically trained in working with writers for whom English is a second language. If you would like to find out more at www.iit.edu/humanities/student-resources/writing-center.

Additional Resources

There are many other resources available to support you during your time at Illinois Tech and Stuart School of Business, including Student Health and Wellness, Office of Global Services, Bookstore, and more here www.iit.edu/student-experience/services-and-resources.

Copyright/Plagiarism/Academic Integrity

Rules on Plagiarism and Academic Integrity

Plagiarism and other violations of academic integrity are strictly prohibited and subject to penalty as defined by the University. Information about the Illinois Tech Code of Academic Honesty can be found at:

iit.edu/student-affairs/student-handbook/fine-print/code-academic-honesty

iit.edu/academic-affairs/academic-honesty-guidelines

The Code of Academic Honesty is one of several standards outlined in the Illinois Tech student handbook (web.iit.edu/student-affairs/handbook). Other parts of the handbook contain other rules that apply to all students. Students will be expected to conform to the rules and procedures set forth in the handbook.

What is Plagiarism?

Often there is some confusion as to what constitutes plagiarism. Plagiarism is the act of passing off someone else's work as your own. To assist in providing an understanding of the types of writing that constitute plagiarism, three types of are each discussed below. Also discussed below is the problem of "string citations." String citations are not plagiarism, but many professors will reject string citations because they are not the student's original work.

Word for Word copying: The use of any phrase or excerpt from another source requires the use of quotation marks around the copied material, or if the material is more than a few lines, the copied material should be placed in its own indented paragraph. A citation in proper form is always required to identify the source.

Plagiarizing by Paraphrase: When a writer uses a source, substitutes words and sentences, or even changes the order but keeps the meaning of the original, a citation is required. In the example given below, the original is on the left. The paraphrase in the right box constitutes plagiarism.

Original: It is not generally recognized that at the same time when women are making their way into every corner of our work-world, only one percent of the professional engineers in the nation are female.

A generation ago, this statistic would have raised no eyebrows, but today, it is hard to believe.

Paraphrase: Few people realize now that women are finding jobs in all fields, that a tiny percentage of the country's engineers are female.

Years ago this would have surprised no one, but now it seems incredible.

The writer could avoid plagiarism here by acknowledging the source and providing a proper citation.

Mosaic Plagiarism: Here the writer lifts phrases and terms from the source and embeds them in his own prose. An example follows in which the lifted phrases are underlined:

The pressure is on to get more women into engineering. The engineering schools and major corporations have opened wide their gates and are recruiting women zealously. Practically all women engineering graduates can find attractive jobs. Nevertheless, at the moment, only one percent of the professional engineers in the country are female.

Mosaic plagiarism is sometimes caused by careless note taking. However, it looks dishonest and is judged as such. The use of quotation marks around the original wording and citation avoid the problem of plagiarism. Often a better approach is to use paraphrase or to quote directly (with appropriate citations).

Plagiarism can be avoided by providing citations for the sources of any material, including *ideas, phrases, or sentences* that you have used in your paper. A number of different systems are available for providing citations. The key to all of them is that the writer must clearly identify for the reader the sources of all material (including ideas) that have come from somewhere else.

String Quotation Problem: Sometimes a student will write a paper consisting of a string of quotations. It is usually much better for a student to provide his or her own analysis and write the paper in his/her own words. Many professors will reject a paper consisting primarily of material quoted from other sources because they do not view such a paper as the student's own work. Prior to writing your paper, be sure to understand your professor's view with respect to string quotations.

Artificial Intelligence Writing Tools

Recent leapfrog advances in artificial intelligence (AI) are now available as open access tools to provide sophisticated, essay-style answers in a very human-like manner. Unless otherwise specified, the use of Automated Writing Tools, such as chatGPT and similar AI tools, is strictly prohibited in this course. Any work submitted that is found to have been generated by a language model will be considered plagiarism and will result in a grade of zero for that assignment. It is your responsibility to properly cite any sources used in your work, including text generated by language models.

It is important to note that if AI tools are permitted to be used for an assignment, they should be used with caution and proper citation. AI is not a replacement for your own thinking and research.

Exams and Proctoring

Faculty have the discretion to establish the exam and proctoring policies for their courses. By enrolling in this course, you are agreeing to adhere to these exam and proctoring procedures unless you have an accommodation arranged via the Center for Disability Resources (iit.edu/cdr) that requires otherwise.

Below are explanations of common exam and proctoring procedures, all of which are an attempt to provide every student with a similar experience and an equal opportunity for success:

- Classroom exams are administered in-person, on-campus, and overseen by a faculty proctor. The faculty proctor may be the individual teaching the course or a peer from the faculty body. In addition to the faculty proctor, other individuals may be present to assist with exam administration.
- Online exams are administered with or without a proctor via a web-based platform of the faculty member's choosing. When present, the proctor may be the faculty member, their

peer designee, a third-party platform or service representative, an artificial intelligence program, or some combination thereof.

Students are expected to follow the faculty or proctor's instructions and adhere to the platform or service provider's requirements. Requirements may include paying a fee to the proctoring service/platform, providing identification, removing unauthorized devices or materials from their work area, or maintaining a live audio and video feed. Students may be recorded while completing the exam and, in the event of a suspected incident of academic dishonesty, excerpts from recordings may be shared with others at the university.

One or more of these requirements may generate privacy concerns for some students which are understandable. While Illinois Tech does not take any responsibility for third-party data security, vendors are required to adhere to the Family Education Rights and Privacy Act, a federal law, which governs the storage, use, and disclosure of personal information.

Refusing a reasonable request by the proctor or instructor may be deemed as a suspected violation of the Illinois Tech Code of Academic Honesty or Code of Student Conduct.

Code of Student Etiquette

Students are expected to respect the following Code of Student Etiquette at all times:

- Electronics. Use of laptops, tablets, cell phones and related devices in class for non-educational purposes is prohibited. It is distracting to your classmates to sit beside or behind you while you email, text, or browse social media.
- Punctuality and Behavior. Class will start on time. Arriving late, leaving and then returning during class is disruptive and, at times, unavoidable. For those that may need to arrive late

or excuse themselves more frequently, please use discretion and, if feasible, choose a seat nearer to the exit. Classes longer than 1.5 hours typically have a short break in the middle.

- Seating. Your assigned seat for the semester will be a seat of your choosing. I use assigned seats to help me learn names and keep track of class discussion, and also to know where to direct any visitors to sit.
- Beverages and Snacks. Unless prohibited by classroom policies (e.g. computer labs, etc.), you are welcome to bring and consume beverages and non-disruptive snacks during class. Every attempt should be made to avoid spilling, dripping, etc. Should any clean up be required, it is your responsibility.
- Attendance. There may or may not be points associated with your class attendance. Regardless, attendance is expected and represents an essential component of the learning experience at Stuart School of Business. If you must be absent because of an emergency or illness, please make every effort to communicate this to me beforehand, if possible, or speak with me about it after the next class.

If you have religious or cultural observances that coincide with this class, please let me know in writing (by e-mail for example) as soon as is practicable. I strongly encourage you to honor your cultural and religious holidays! However, if I do not hear from you, I will assume that you plan to attend class and any related points will be allocated accordingly.

- Preparation and Participation. Preparation and participation are expected and vital to the learning experience. Class participation is evaluated based on the *quality of participation*, not its “quantity.” You should be prepared to provide insights, observations, inferences, or conclusions that not only express your viewpoint, but also defend your analysis.

Your comments are to be relevant to the topic at hand, and should advance the discussion. An opinion or viewpoint can be valuable with justification. Valuable comments respond to, elaborate on, lend support to, contradict, or correct a comment by one of your classmates. Counter-productive comments include opinions without a justifying argument, pure repetition of previous points, class interruptions that do not advance the discussion, and rambling, vacuous or disparaging comments.

- Academic Integrity. All students are expected to act in good faith with utmost civility and personal integrity; to respect other students' dignity, rights and property; and to help create and maintain an environment in which all students can succeed through the fruits of their own efforts.

Academic integrity includes a commitment to not engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another persons' work as one's own, using sources without citation, having another student take your exam, tampering with the work of another student, and facilitating other students' acts of academic dishonesty. Sanctions for breaches in academic integrity range from a fail grade in an assignment or test to a fail grade in the course, as well as severe disciplinary sanctions up to and including suspension or expulsion.

Online Code of Conduct

When interacting with fellow students in online discussions and in other web-enabled activities, students are further expected to respect the following Online Code of Conduct at all times:

Specifically, for live class sessions

- Ensure possession of a working video-conference camera and microphone for use during class. Many faculty will expect cameras to be kept on during class.

- Do not dominate any discussion. Instead, allow others the opportunity to join in the discussion, and feel free to use the chat function to express your thoughts.

In chat and discussion board posts:

- Be cautious when using Internet language and emojis - some may have different meanings around the world. Do not capitalize all letters or rely heavily on acronyms.
- Avoid using vernacular and/or slang language. Again, some slang common to you may have different meanings around the world and this could possibly lead to misinterpretation.
- Proofread your posts and edit as needed before you submit them.

In general:

- Do not use offensive language. Present your ideas appropriately and apologize promptly for any misunderstandings.
 - Never make fun of someone's ability to speak, read, or write in English. Instead, offer to assist any of your peers who are having trouble.
 - Share tips with other students. Everyone is learning and strategies that work for you may help someone else, too.
 - Keep an open-mind and be willing to express your opinion. Respect minority opinions. At the same time, ask questions and challenge the ideas of others to help them develop. They will do the same for you.
 - Using humor is acceptable just remember to be mindful of sarcasm as it is easily misinterpreted.
 - Do not hesitate to ask for feedback. Asking for, receiving, and integrating feedback from others is an important part of what it means to be professional.
-