

Modified guidelines to start Spring 2025

READ THE GUIDELINES CAREFULLY SENTENCE BY SENTENCE

ALL EMAIL COMMUNICATIONS RELATED TO EE590 SHOULD BE SENT TO msfine@usc.edu

Please do not use any other email.

DIRECTIONS FOR EE590 and TEMPLATES

EVERY MSFINE STUDENT MUST COMPLETE AN INDEPENDENT PROJECT IN ORDER TO GRADUATE

The procedure for signing up for EE590 (one unit) is as follows.

1. Submit your Directed Research Request on MyViterbi and select Prof. Ioannou as the supervising instructor in order to be granted d-clearance to register EE 590.
2. Register for 1 unit EE590 any time within the USC registration deadlines.
3. Send a proposal in the format described below to Prof. Ioannou at msfine@usc.edu to approve the topic by the end of the 1st week of classes for the semester. Prof. Ioannou will review within a week and then the student is ready to start the research if approved. If proposal is denied, the student must fix the proposal for further review/approval or drop EE 590.
4. The final report is due at the **last day of classes for the semester**, before the final exam period begins. If major changes are needed or if the student is not able to complete the final report, he/she will be given no credit and will have to take it again by registering in subsequent semesters and pay tuition. **IN (Incomplete)** is assigned when work is not completed because of **documented illness or another emergency occurring after the 12th week of the semester** (or 12th week equivalent for any course scheduled for less than 15 weeks).

Purpose of Study: To follow guidelines, practice writing technical reports, doing an independent research study in financial engineering.

Grading

- Following the guidelines: 10%
- Proposal and final report write up : 25%
- Topic, solution and results: 65%

PROPOSAL SUBMISSION

Proposals will be acceptable starting two weeks before the due date

The proposal file name should have the following:

EE590_Proposal_Last Name_First Name.doc

Subsequent revisions will be indicated as

EE590_Proposal_Last Name_First Name_Revision 1or 2 etc.doc

The proposal should have a cover page with the following information

Name:

Student ID:

Semester/Year:

Title of Project:

Number of Units:

The cover page should be followed by a page or two with a maximum number of words of 800 describing what you plan to do.

FINAL REPORT

The Final Report file name should have the following

EE590_Report_Last Name_First Name.doc

Subsequent revisions will be indicated as

EE590_Report_Last Name_First Name_Revision 1or 2 etc.doc

Make sure you use the same names as they appear on myviterbi so I can identify you.

NO LATE PROPOSALS OR FINAL REPORTS WILL BE ACCEPTED

USE MICROSOFT WORD

Use font size 11 , space 1.15, Times New Romans, Border space Normal 1inch from sides and top and bottom. The use of extra space to fill pages or use of large empty spaces is not allowed. If you copy graphs, figures or tables from any source you need to indicate so and provide a reference. Cut and paste of text from papers or reports and presenting as yours is plagiarism and is not allowed. All reports will be checked for overlaps using a plagiarism software tool.

PROPOSAL

IMPORTANT: Make sure you write correct English and use the word speller to correct all spelling errors. Proposals with spelling or grammar mistakes will be returned.

Template starts after the line.

EE590 Project Proposal

Term:

Date:

Title of Project:

Name:

Student ID:

Describe in ONE page what you plan to do. Do not describe theory or motivation from books. Stay focused on what you plan to do, how you collect data, how you plan to process them and what is the goal of the research. DO NOT EXCEED ONE PAGE DESCRIPTION

**Mandatory Zoom Orientation Meeting to be announced each term.
Every student is required to attend.**

FINAL REPORT TEMPLATE

At least 8 pages long excluding references , cover page and appendix. Do not copy diagrams from references or leave empty spaces between sections in order to fill up pages. Use check list at the end to check that you did things right, initial and include with report.

Use MS Word

Template starts after the line.

Cover Page (one separate page)

Course: EE590 Project Report

Number of Units:

Name:

Student ID:

Email:

Term:

Project Title:

Date:

Executive Summary

(1 page min)

- Describe what problem you considered
- How you solved it
- What are the results and conclusions

The summary tells the reader what the problem is how you solve it and what results you obtain and how significant they are. It is for the reader who does not want to read the rest of the report. No figures or diagrams should be included in this part.

1. Introduction

(1 page min)

- Describe in more detail what problem you addressed
- Why is it important
- What method you used
- What are the results? Describe them in a couple of sentences. This is not the place to list them
- What is the conclusion
- Figures and tables should be labeled. Under the figure you write as an example ' Figure ?: Return vs Time' . Table captions go above the table. Plots are labeled as figures and captions go under the plot.

2. Problem Statement

(1 page min)

- Describe clearly the problem you considered.

- What did you try to achieve by addressing the problem

3. Approach

(5 to 8 pages)

- Describe the theoretical method you use and why you chose it. Use equations to explain the theory with references. Focus on the equations you use. Do not simply copy theory from books without explaining how you used it.
- DO NOT SIMPLY WRITE FORMULAS COPIED FROM BOOKS. SHOW HOW YOU USED THEM TO CALCULATE TERMS
- Describe what data you needed and where you found them
- Give a reference where you got them from
- Describe your results and their significance
- Use tables and graphs to explain your results
- Describe whether your objectives and goals have been achieved

4. Validation

(1 to 2 pages)

- If you develop models and theory for predicting prices or risk or any financial term include a validation or back testing section. Models are often used to predict future values show how these predicted values compare with the actual market values. Explain differences, similarities etc. This is the most important part of your project. To validate or test do not use the same data used during training of the models.

5. Conclusions

(2 to 3 paragraphs)

- Describe your conclusions
- What is the significance of your results
- No results or figures should be presented in this section

6. References

(as many pages as needed)

- List all references and websites that you used and you referenced in the report. DO NOT INCLUDE ANY REFERENCE THAT IS NOT MENTIONED IN THE TEXT. Use same format as in proposal i.e number as [1], [2]....

7. Check list (separate page) with initials and signature

Appendix (as many pages as needed): Software used, list of Data etc

- Attached software code used, ready to run i.e matlab code, excel etc

NOTES: Plots are labeled as Figures and Figure number and caption goes under the plot.
Tables are labeled as tables and Table number and caption is placed above the table.

Check List for Final Report: Check that you addressed each item and THEN initial it.

1. **Confirm that you read the guidelines sentence by sentence. Failure to do so will lead to rejection of the report, getting no credit and retaking EE590 the following semester. Yes you will still have to pay again**

2. **Structure of document:** font, spaces, minimum number of required pages. Font should be 11. Space should be single or 1.15. Margins should be 1 in all around _____
3. All **abbreviations** are defined when first appeared _____
4. All **figures and tables** are labeled with numbers and captions. Figure captions go under the plots and table captions above tables. Make sure you indicate units. _____
5. Figures, tables, diagrams, pictures taken from the web or papers should include the source otherwise it is plagiarism. They cannot be used to fill space _____
6. No text should be copied and paste from anywhere as it is plagiarism. If you quote someone you should put it under “...” and identify the source as a reference but it should not be more than a couple of lines. _____
7. All listed references should be mentioned in text. Use format [1], [2]

8. **Grammar and English** should be carefully checked . No report with typos and grammatical errors will be accepted. Check the tenses. Some students tend to use parts of the proposal that uses the words ‘I will’ , ‘I plan’ etc. The final report should state what you did not plan to do. _____
9. **All variables in equations should be defined and explained**

PLIAGIARISM: *Any identified form of plagiarism will be reported to the University and in addition to receiving no credit for EE590 the graduation of the student may be affected. All past reports are kept and a software program is used to identify overlaps with past reports and literature. If you use figures or tables or diagrams from a website or papers you need to indicate that and include the reference. Projects completed for other courses cannot be used for EE590. All reports will be tested using a plagiarism software.*

I confirm that my proposal/report abides with the above guidelines and no material was copied from any source that is not indicated in the report and referenced accordingly.

Name _____

Signature _____

DIRECTIONS FOR TOPIC

You are encouraged to come up with your own topic. If you cannot below are some ideas:

Example A. Start with a \$1 million hypothetical portfolio. Choose any of the following:

1. Invest fully in bonds. Invest all money in bonds by looking into risk, returns and diversification plus immunization for low sensitivity to interest rates. Test whether the portfolio generates the expected returns
2. Invest in a number of stocks, 30 or above that you analyze using optimization to maximize return or minimize risk or both. Test whether the portfolio generates the expected returns
3. Invest in mutual funds that you analyze for diversification, risk, return, manager performance and other criteria and use optimization to select a mix that maximizes return or minimizes risk or a combination. Consider at least 20 of them. Test whether the portfolio generates the expected returns

Use real data to develop models and make asset price predictions. Test whether your model generates the expected returns.

- 4 Use part of real data from past to set up your portfolio. Use remainder of past data to check whether what you expected to get is confirmed. For example, if you set up a portfolio with an expected return of 15% did you get it?

Other Example topics

1. Develop models and train them using real data. Back test or validate your model using predicted and actual data. For example, you can use data from years 2010 to 2020 to train your model. Then the model can be used to predict values for the years 2021, 2022 for which you have the real data. Compute measures of the error (such as mean square error) between the predicted and actual data. Use plots and tables to present the results and comment on them. If the prediction error is large find out why. Is it because your approach is wrong in which case you need to correct, or something happened in the market that was not captured in the data you used to train the model.
2. Use real data to verify Put Call parity and Black Sholes equations and compute implied volatilities for several stocks 20 or more.
3. Monte Carlo simulations to solve a variety of different problems covered in EE518

The best topic of course is something that you have a strong interest and is defined by you.

Examples of Portfolio Funds

Portfolio A

FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation	FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation
FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth	FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth
HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth	HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth
MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond	MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond
MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value	MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value
MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus Bond	MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus
PIREX	PRINCIPAL REAL ESTATE SECURITIES FUND INSTITUTIONAL CLASS	Real Estate	PIREX	PRINCIPAL REAL ESTATE SECURITIES FUND INSTITUTIONAL CLASS	Real Estate
REGX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth	REGX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth
FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation	FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation
FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth	FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth
HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth	HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth

MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond	MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond
MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value	MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value
MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus Bond	MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus Bond
PIREX	PRINCIPAL REAL ESTATE SECURITIES FUND INSTITUTIONAL CLASS	Real Estate	PIREX	PRINCIPAL REAL ESTATE SECURITIES FUND INSTITUTIONAL CLASS	Real Estate
REGX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth	REGX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth
FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation	FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation
FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth	FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth
HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth	HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth
MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond	MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond
MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value	MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value

Portfolio B

FBAKX	FIDELITY BALANCED FUND CLASS K	Moderate Allocation
FCNKX	FIDELITY CONTRAFUND CLASS K	Large Growth
HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth
MHYSX	MAINSTAY MACKAY HIGH YIELD CORPORATE BOND FUND CLASS R6	High Yield Bond
MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value
MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus Bond
PIREX	PRINCIPAL REAL ESTATE SECURITIES FUND INSTITUTIONAL CLASS	Real Estate
REGRX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth
VTWNX	VANGUARD TARGET RETIREMENT 2020 FUND	Target-Date 2020
HRAUX	CARILLON EAGLE MID CAP GROWTH FUND CLASS R6	Mid-Cap Growth
MVCKX	MFS MID CAP VALUE FUND CLASS R6	Mid-Cap Value
MWTSX	METROPOLITAN WEST TOTAL RETURN BOND FUND PLAN CLASS	Intermediate Core-Plus Bond
REGRX	AMERICAN FUNDS EUROPACIFIC GROWTH FUND CLASS R-6	Foreign Large Growth
VBTIX	VANGUARD TOTAL BOND MARKET INDEX FUND INSTITUTIONAL SHARES	Intermediate Core Bond
VTWNX	VANGUARD TARGET RETIREMENT 2020 FUND	Target-Date 2020

Portfolio C

FDRXX	FIDELITY GOVERNMENT CASH RESERVES	Money Market-Taxable
FAGIX	FIDELITY CAPITAL & INCOME FUND	High Yield Bond
FBALX	FIDELITY BALANCED FUND	Moderate Allocation
FBIOX	FIDELITY SELECT BIOTECHNOLOGY PORTFOLIO	Health
FCNTX	FIDELITY CONTRAFUND	Large Growth
FDGRX	FIDELITY GROWTH COMPANY FUND	Large Growth
FDVLX	FIDELITY VALUE FUND	Mid-Cap Value
FFIDX	FIDELITY FUND	Large Growth
FGMNX	FIDELITY GNMA FUND	Intermediate Government
FIGRX	FIDELITY INTERNATIONAL DISCOVERY FUND	Foreign Large Growth
FLPSX	FIDELITY LOW-PRICED STOCK FUND	Mid-Cap Value
FLVCX	FIDELITY LEVERAGED COMPANY STOCK FUND	Large Blend
FMCSX	FIDELITY MID-CAP STOCK FUND	Mid-Cap Blend
FRIFX	FIDELITY REAL ESTATE INCOME FUND	Real Estate
FSUTX	FIDELITY SELECT UTILITIES PORTFOLIO	Utilities
FTBFX	FIDELITY TOTAL BOND FUND	Intermediate Core-Plus Bond
TSLA	Tesla Stock	

Portfolio D

ACELRX PHARMACEUTICALS INC COM	ACRX
AIRBNB INC COM CL A	ABNB
AMAZON COM INC COM	AMZN
APPLE INC COM	AAPL
BANK OF AMERICA CORPORATION COM	BAC
CISCO SYSTEMS INC COM	CSCO
CITIGROUP INC COM	C
FORD MOTOR CO COM	F
GENERAL MOTORS CO COM	GM
MGM RESORTS INTERNATIONAL COM	MGM
NOKIA OYJ ADR SPONSORED	NOK