

# MS in Financial Engineering Capstone Experience

## Procedures and Requirements

This document details the procedures that must be followed and the requirements that must be met in order to gain credit for this capstone experience.

### Types of Capstone Experiences

There are four types of capstone experiences available to MS FE students: **theses**, **projects**, **topics courses**, and **internships**. Students must choose one single option for the fulfillment of their capstone experience and are not allowed to mix several options. Next, they may not begin their capstone experience until they have successfully completed two semesters and obtained a minimum of 18 credits. Furthermore, the NYU Tandon School of Engineering requires that all graduate students must maintain a grade point average (GPA) of at least 3.00, as reflected on their academic transcript, in order to intern. A capstone experience is a 3 credit experience.<sup>1</sup>

### Theses

A Master's Thesis is a work of original research into the theory or practice of Financial Engineering. This work must be guided by a faculty mentor from the start. Approval to begin a Master's Thesis is granted after the student and the faculty mentor submit an acceptable thesis proposal to the capstone advisor. Such a proposal lays out the questions to be addressed, the work to be done, the time frame for completion of the work, and a literature review sufficiently extensive to convince the advisor that the work is new and interesting and that the student has the background knowledge to begin the effort. The written thesis must follow the guidelines on format and duplication of the Master's thesis, which can be found at:

<https://engineering.nyu.edu/academics/support-services/graduate-services#chapter-id-20191>.

The written paper must be submitted to the Department of Finance and Risk Engineering electronically so that it can be checked for plagiarism. The signatures of both the capstone advisor and department head on a bound copy of the paper are required for the thesis to be considered complete. The thesis must be successfully defended in a public oral presentation to obtain the capstone advisors signature, unless the advisor waives this requirement.

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<sup>1</sup> A credit is defined by the State of New York as having 15 weeks of classroom experience (or the equivalent) of one academic hour each (50 minutes). Each classroom hour must be supplemented by two to three hours of work outside the classroom; this includes reading, homework, studying, and writing papers. Therefore, the following formula outlines the minimum amount of time required to be spent on a 3-credit capstone experience: 150 minutes/credit/week \* 15 weeks \* 3 credits = 6750 minutes = 112.5 hours. We strongly desire that this minimum be exceeded by a comfortable margin.

## Projects

A Capstone Project is the creation of an analysis, tool, product, or other object of potential value to the financial community. Such a project must be guided by a mentor from the start; this person can come from either NYU Tandon School of Engineering's faculty or from industry. The student and the mentor must jointly submit an acceptable project proposal to the capstone advisor to gain permission to begin a project. Such a proposal outlines the work to be done, the resources required, the potential value of the finished product, the project's milestones, a demonstration that the student is intellectually prepared to begin the project, and a statement that the mentor will allocate the time necessary to guide the student to completion. The project must be rigorous enough to warrant the granting of three academic credits; a report detailing the outcome of the project must be filed before the work can be considered to be complete. The student should write his or her report conforming to the University's Guidelines on format of the project report, that can be found at:

<https://engineering.nyu.edu/academics/support-services/graduate-services#chapter-id-20191>.

The advisor reserves the right to require any student to orally defend their project in a public oral presentation.

## Topics

Students may satisfy the capstone requirement by completing with passing grades 3 credits (2 courses of 1.5 credits each or one 3.00 credit course) of courses marked in the FRE section of the NYU Tandon School of Engineering catalog as "special topics" or "topics", and by writing a report that contains two original essays, one for each course taken. Students may choose the essays' subject. For instance, possible subjects are

- Recent advances in these fields
- Issues and challenges for practitioners of financial engineering in these fields
- Practical implementation of the techniques presented in the courses
- Future directions of development in these fields
- A new project consisting of implementing some of the techniques presented in the course (note that you cannot reuse a project that has already been graded by the course's instructor).

The students must provide a thorough analysis of the chosen subjects and may draw their arguments and examples from the material taught in class. Furthermore, the essays must correctly and fully attribute all source material. The faculty believes that a successful paper will be at least 20 pages in length, single-spaced in a 12-point font. Please note that the course numbers attached to these courses do not matter; they must be titled as "topics". Each student must also complete an outline of their report by the middle of the semester and hand it to their capstone advisor.

## Internships (must complete two)<sup>2</sup>

Students may complete two<sup>3</sup> (1.5 credit each) internships over a period of two semesters to complete the 3 credit capstone requirement. An internship in financial engineering is defined by our department as the employment of an MS FE student in a challenging, educational, and relevant position in the financial industry. FRE internships should provide the opportunity for intellectual growth and a career building experience. Internships are managed by industrial employers, and must be approved in advance by the capstone advisor. For approval, students will need to provide a document (on company letterhead) that includes job description, hours per week, start and end dates, name of manager, company and group name, pay rate and location. This should be signed by the hiring manager or Human Resources. Internships dates must fall within the dates of the academic term and the number of hours worked should be at least 240 in total. Internships taking place over the summer may be done on a full-time or part-time basis and should have a minimum length of 8 weeks. Fall or spring term internships are normally part-time (up to 20 hrs/wk) and must take place over a period of at least 12 weeks. Students interning in their final semester of study and taking only 3 credits in addition to the internship are eligible to work full-time (40 hr/wk) schedule. Requests to work full-time will need to be vetted by the office of Graduate Academics to confirm that students are academically eligible to work full time.

A report must be presented to the advisor at the completion of the internship. The faculty believes that a successful paper will be at least 20 pages in length (single spaced, 12 font)<sup>4</sup>. It is due on the final day of classes. The report should address the following points:

- main objective / goals of the internship
- the tasks that were required of the student and the topics learned during the internship, both theoretical and practical
- technology and platforms used
- the relation between the student's past and future coursework in the MSFE program and the internship
- obstacles / challenges encountered and how they were overcome

Each student must also complete an outline of their report by the middle of the semester and hand it to their capstone advisor.

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<sup>2</sup> If you wish to complete a different capstone option but would also like to intern, you may choose to use elective credits for your internships instead of using it towards your capstone.

<sup>3</sup> If a student interns one time with the intention of doing a 2nd internship in a later semester, but is unable to obtain a second internship or decides they no longer want to do a 2nd internship, the 1.5 credits used for the first internship will be used towards free elective credits and the student will need to choose a different capstone experience (project, thesis, or two 1.5 credit special topics)

<sup>4</sup> It is possible that some of the things learned by a student in an internship will be company confidential; indeed, in a well -designed internship this is more likely. Accommodations will be made for confidential material. There are many ways to manage this issue, including but not limited to careful editing of written work by the employer.

## Registration and Grading

Each of the capstone experiences requires that the student register for three credits. Master's thesis students must register for FRE-GY 9973, internship students for FRE-GY 7021, project students for FRE-GY 7043, and Topics students for the chosen Topics courses. Note that students may only register once for FRE-GY 7043 and FRE-GY 9973, and a maximum of two times for FRE-GY 7021. In addition, students must register for FRE-GY 5990 in their last semester before graduation in order to obtain validation of their capstone experience from the capstone advisor.

No student shall be registered for any of these courses without the consent of the advisor or the advisor's designee. In addition, internship students who are foreign students on an F1 visa must apply for a CPT and have it approved both by the capstone advisor and OGS.

For both thesis and project students mentored by faculty members, the final grade for the experience will be assigned by the faculty mentor. For project students mentored by industry leaders and students completing internships, the final grade may be suggested by the industry mentor or employer but will be decided upon by the capstone advisor. In all cases, the capstone experience is not complete and no grade is to be entered until the capstone advisor certifies that all requirements have been met and all procedures followed. Grading for the capstone internship course (FRE-GY 7021) and for the capstone assessment course (FRE-GY 5990) are either P (pass) or F (fail).

All capstone project proposals go to the capstone advisor for her approval before she issues a permission code for the course.

## Contact

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