

My Life as a Quant Student: Reflections on Studying Financial Engineering at Columbia University

(Disclaimer: google Emanuel Derman)

After finishing my bachelor's studies at IES and MFF UK I decided to attend Master of Science in Financial Engineering program at Columbia University. As it was quite a journey, I'd like to share my experience and hopefully inspire someone to pursue their goals in the future.

About the program

The Financial Engineering program at Columbia is a cornerstone program of the Industrial Engineering and Operations Research department at the Fu Foundation School of Engineering and Applied Science. It is a 36 credits program (which basically means 12 subjects) and it runs from September to either May, August or the following December, depending on how fast you want to finish. Most students choose to finish in December as it gives them enough time to have summer internship.

There are six mandatory courses in the first two semesters and students can take another six electives according to their interests and/or concentration. As part of the program you can choose to concentrate in either Finance and Economics, Asset Management, Derivatives, Computation and Programming and Trading Systems.

Financial Engineering itself is a multidisciplinary field involving financial theory, the methods of engineering, the tools of mathematics and the practice of programming. If you want to inspect more about the program, you can find all the information here:

<http://ieor.columbia.edu/ms-financial-engineering>

If you are interested in quant programs in general, I would suggest to take a look at this forum:

www.quantnet.com

You can find there plenty of resources about quant programs, applications, schools, jobs, etc.

Getting there: Application process

As part of almost all applications to top US universities, you will need to submit the following:

1) Personal statement, 2) Letters of recommendation, 3) GRE test results, 4) TOEFL results, 5) Resume.

As there are plenty of resources regarding all of these in general, I will try to focus on the less apparent details.

1) Personal statement

Before writing a personal statement, you should really think about why you want to study this particular degree at that particular university, what led you there, what have you done up to now in this field, what are your goals after finishing the program, etc. Simply put, you should really know what you want to do and why you want to do it.

Do a thorough research about the university you want to attend – see their curriculum, what are the job prospects after finishing the degree, how good their professors are, how much it will cost you etc. This will give you a better idea about what you want to sign up for and it will help you tailor your personal statement to the specific program and university – which is of course very important. It might also be a good idea to reach out to some professors and ask them further questions regarding the program, as it demonstrates your interest.

In the statement, try to focus not only what the program can give to you, but on what can you bring to the program as well.

2) Letters of recommendation

It is always better to get a letter of recommendation from someone who knows you very well (e.g. thesis supervisor or your boss if you have a work experience) than having a general

recommendation letter from someone who doesn't know you much – the committee sees right through it anyway and it might actually hurt you.

Most universities specify at their websites what they want to hear about you in the recommendation letter, so try to ask your recommender to focus on these points.

3) + 4) GRE + TOEFL

Both GRE and TOEFL are standardized tests which means that it is relatively easy to prepare for them. Most quantitatively focused programs are only concerned about the quantitative part of the GRE test, so don't worry too much about the other two parts. In most cases, however, having a good GRE score (> 168 in the quant part) is not an advantage but a must.

If you are looking for a prep material, definitely visit the center of Fulbright Commission in Prague. They are also a great resource regarding applications to US universities in general.

5) Resume

When applying to US, it is generally a good idea to use the US resume format, which can be found at most universities' websites. Make sure you list specific things you have done in the past, not a generic description. E.g. 'Self-developed client scoring algorithm for a major financial services provider in CR and implemented the algorithm in R' is incomparably more informative than 'Worked on a project in the financial industry'.

Unless you have a Ph.D. or extensive work experience, the resume should be no longer than one-page.

If you have any specific questions or would like to have your resume or personal statement reviewed, do reach out to me, I'll be happy to help! (see contact below)

Studying at Columbia

The coursework at Columbia, and in general at US universities, is mainly focused on real world applications. This means you will see very few purely theoretical results and many many practical applications of the topics covered.

The main difference in the coursework compared to, say, IES and MFF, is that it is heavily based on homework assignments. On average you can expect to have three assignments due every week and each one of them can take you anywhere from 5 to 15 hours of time to finish. If you add to that the time you spend on attending lectures, studying, social events, interviews, employer's presentations etc., you can get an idea of how busy your schedule can be.

Another big difference at US schools is the grading system and exams in general. In most courses, you are graded based on homework assignments, midterm and final exam (no oral examinations). The weights among these is usually 10-20% for assignments, 30-40% midterm, 40-50% final exam. The grading itself is based on a curve, which means you will be assigned a grade based on how good you performed compared to your classmates. So if you score 60/100 overall, which means borderline C on the absolute scale, but manage to beat most of your classmates, you will still end up with A. On the other hand, if you score 90/100 and still more than half of your classmates will be above 90, you will most probably get a B grade.

The dates of all midterms and finals are given and usually all of your midterms/finals are in one week. Given that you are graded on a curve, have all your exams in one week and no chance of retaking the exam, there is no room for making mistakes :)

Getting a job

Now we are getting to the most interesting and important part, that is getting a job/summer internship – the ultimate goal of Master's level education in the US. Most full time jobs are converted from summer internships, so everyone wants to get a solid summer internship in the first place.

All the top universities will provide you with plenty of resources when it comes to getting a job. These might be e.g. employer's presentations, industry presentations, hosting networking events, career fairs, practice interviews, mentoring programs, alumni network, resume and personal statement reviews, resume book, Columbia's job posting website, career officer and many more. Even with all this support, getting a job in the financial industry in NYC is not easy. Most major investment banks and hedge funds here hire only from few target schools (Columbia, NYU, Princeton, Yale, Harvard, Carnegie Mellon, etc.) and if you are attending a non-target school, your chances of breaking in are almost non-existent. All of these schools have multiple similarly oriented programs (e.g. Columbia also offers programs in Mathematical Finance, Operations Research, Statistics and similar), so for any single job offering, there could be anywhere from tens to hundreds of people applying with you – and that's only from your school.

In the end, most interviews are secured through networking, resume book or university job posting website. According to statistics, if you apply for 10 jobs, you will hear back from only one of them on average.

If you manage to differentiate yourself among the other applicants, the company will schedule a first round screening interview, which is usually on campus or conducted via phone. Some companies require you to write a test as part of the screening process.

The second/third round is usually on-site super day. This means you'll have three to six (or even more) interviews in one day with members of the team in which you'd be working. Sometimes you might have additional rounds of interviews depending on the outcome of the previous rounds.

Given the multidisciplinary nature of financial engineering, there is a vast amount of questions you might be asked in the interviews. These might be either technical questions from mathematics, programming, financial theory, optimization, statistics and so, or more behavioral questions regarding your past experience, company fit, personality, or what's going on in the markets these days. Overall, it's a very thorough process in which the employer really wants to get to know you, see if you are genuinely interested in the field and if your fit with the team is good.

Final remarks

If you really want to study at some top US university, my final advice simply is - give it a shot! Bachelor's degree from IES (and MFF in my case) will give you more than sufficient background to tackle the coursework in any advanced degree at US universities. And you never know what are your chances of getting in unless you try.

Should you have any questions, don't hesitate to send me an email at marek.sabata@columbia.edu, I'll be more than happy to help! I know from my personal experience how hard it can be to get firsthand information about programs in US. Moreover, I can see now that I would tailor my application differently if someone told me what to focus on and what really matters for the admissions committees at US universities.

Good luck!