1. Provide examples from your past professional or academic experience that highlight skills you have developed that will be directly applied in your above-selected functional area. (350-word max)

Developing initiatives in the field of machine learning is one of my research interests. By participating in various machine learning projects, I have developed self-learning ability which has prepared me for this opportunity of Financial Engineering. A key project I've worked on using Python is investigating the relationship between heterogeneity described by convolutional neural network (CNN) image features and the ‘between-group heterogeneity’ of the dataset measured by population descriptors. It showcases my research capabilities and places my analytical thinking as well as problem-solving skills to the test. Any kind of variability within a dataset is likely to be termed as heterogeneity, which represents the degree to diverge from a state of perfect conformity of a system. After splitting the training dataset into 4 groups by selecting the PATHMNIST dataset which contains four classes (adipose tissue, background, debris, CRC epithelium), we were required to assess and describe between-group heterogeneity. I proposed to apply Cochran’s Q as a metric measure the deviation of each group’s mean from the grand when we all seemed to hit a wall. Then we used the average pixel intensity of each image as the population descriptor and implemented K-means clustering analysis to record the predicted accuracy of each cluster. Based on the predicted results, I reported the coefficients of variation (CV) accordingly to measure the heterogeneity described by CNN image features and increased the sample size and repeated the above steps. Finally, it turned out that Cochran’s Q was a plausible metric in quantifying the between-group and it had a positive correlation with CV. Throughout this project I implemented my theoretical knowledge while strengthening my analytical thinking. My ability to forecast situations by relying on careful observation was challenged. Additionally, the statistical techniques I have been studying at my undergraduate have armed me with strong data collection research and coding skills have prepared me to further pursue in the field of financial engineering.

1. How did you develop an interest in the field of quantitative finance? What skill(s) are you currently lacking and how will the MSCF program uniquely prepare you with the knowledge you need for career success? (350 words max)

“Financial Principals for Actuarial Science” is one of many summer courses that stimulated my passion for Financial Mathematics. The process of acquiring relevant knowledge and skills has unlocked my full potential, and my achievements have proved my talent. The competencies obtained in this course have encouraged me to study Finance. For instance, my portfolio management and execution ability, my skills of financial risk analysis and critical thinking were enhanced in an assignment which involved managing risks for ten different companies by trading realistic financial derivatives on a virtual platform called RPM. After consulting the annual financial reports of the companies, I determined to make hedge arrangements for the ones making profit from the operations such as Starbucks, and speculate the metal price of some mining companies with the key goal of earning more profits by using a common trick of buying low and selling high. Then I created portfolios that contain options, spreads, combinations, and futures by investigating the historical stock price of the underlying including commodities, exchange rates, Gold ETF, and other items. With allotted $200 million dollars in the RPM account, I executed the designed strategies using the NASDAQ ticker symbol. However, the unexpected reduction of portfolio value forced me to re-evaluate my investment strategies, which also made me realize that I had to keep up with current news instead of simply relying on the historical stock price, as well as diversify my investments to reduce risk. Finally I gained a profit of $42 million dollars in this project and won the first place in the class with a grade of 93.

Although with years of coding experience in Python, R, SAS, and VBA at both university and my work, I still don't have much expertise with C++ programming. Financial Computing and Programming Prep courses of MSCF program will make up for my lacking skills in coding. Working in hedge fund as a quantitative analyst is my career dream, the obligatory summer internship will train me to be well-prepared with a much better sense of the work in Investment Bank. And the career counselors will collaborate closely with me to support my internship search.

Optional essay (Maximum 2 pages double spaced, 12 point font)

In order to gain more exposure to professional and practical knowledge and improve my competitiveness, I strive for every precious internship opportunity. The fact that I succeeded in interning at Munich Reinsurance Company of Canada, Intact Financial Corporation and The Wawanesa Mutual Insurance Company demonstrated my excellent academic background and strong motivation, also equipping me with both relative hard skills and soft skills, which will be greatly beneficial to my future career planning and promotion. During the internship at Munich Re, I worked in the Reserving and IFRS 17 team, which tasked us with model prediction using Chain Ladder and Bornhuetter-Ferguson methods, as well as examing and contrasting differences in cash flow patterns between quarters (with the help of Excel pivot tables and Visual Basic for Applications (VBA). Since we are required to handle complex and large data sets, the extraction process was extremely slow, especially while using VBA programs. To resolve this problem, I suggested using R rather than Excel to sum the loss to a particular granularity, which reduced run time of the data pulling process to 10 seconds and reconciled the output. This was followed by exporting data from R to Power BI to better visualize patterns and trends. Finally, all analysis procedures were automated in R and Power BI, saving 80% of the work. Through this experience, I learned how to use different applications to increase the effectiveness of analysis and data visualization. In conclusion, these experience helped me be familiar with financial analysis tools and investment vehicles for asset classes, as well as improve my communication and teamwork skills.

Based on my own interests and experiences, combined with the current social development situation, I’m aspiring to work as a quantitative analyst for a reputative hedge fund. To achieve my career dream, I need to acquire comprehensive training in advanced financial theory and methodology, top research platform and rich resources to refine myself in practical applications. Since your program is dedicated to training individuals to a better proficient version of themselves by helping them to gain career-focused knowledge and experience at the cutting-edge fields, I am looking forward to joining in your program. I’m quite confident that the rigorous training and inspiration provided by you will enable me to reach my full potential in financial engineering and help me be an outstanding composite talent in the future.