

Faculty Projects

For MBA 2021, MBA/HKS 2021/2022 and MFin Feb 2021

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Deadline: May 17, 2020 at 11:59pm ET

COVID 19 Alliance - Simon Johnson

Up to 20 student needed

Description The COVID-19 Policy Alliance (www.covidalliance.com) rapidly generates actionable data intelligence and operational recommendations that can help government entities and organizations make better policy decisions regarding the healthcare system and the economy. Up to 20, working in teams of 2-4 people each, identifying and developing projects that can benefit from further MIT engagement. All kinds of skills welcome, as people will be combined into teams with complementary backgrounds.

COVID 19 Alliance - Retsef Levi

Up to 5 students needed

Description The COVID-19 Policy Alliance (www.covidlliance.com) rapidly generates actionable data intelligence and operational recommendations that can help government entities and organizations make better policy decisions regarding the healthcare system and the economy. Technically strong; 3-5 students would be good depending on skillsets. Analytics & coding skills will be important.

COVID 19 Alliance - Kate Kellogg

Up to 10 students needed

Description The COVID-19 Policy Alliance (www.covidalliance.com) rapidly generates actionable data intelligence and operational recommendations that can help government entities and organizations make better policy decisions regarding the healthcare system and the economy. 10 students needed to work on boundary spanning team; will look for people who can work across technical and organizational boundaries; good people skills.

Dr. Philip Budden, Fiona Murray

Up to 3 students needed

Description We are looking for 2-3 MBAs (combining FT/PT effort) for two or three of these following projects: comparative analysis of innovation units for 'national security' in the post-brexite UK; understanding culture in new defense innovation units – lessons for innovation; policies and programs to support innovation-driven entrepreneurship in the post-COVID US recovery (smes/ides).

Antoinette Schoar

1 student needed

Description I am working on a research project related to trading and arbitrage in cryptocurrency markets. We have done earlier work to document the structure of price dispersion in cryptocurrency markets across the world, and what factors drive arbitrage opportunities and price impact in these markets. I am now looking to collect data from crypto currency exchanges on the trading behavior of individual market participants. The aim is to develop and test granular models of how traders update about cryptocurrency prices, how price bubbles form (and crash), and who are the winners and losers in crypto currency markets. To access this kind of data we would like to collaborate with some of the largest crypto exchanges to find viable partnerships. I would be happy to take on a master's student who has some familiarity with cryptocurrency markets and ideally might have already contacts in the industry. The goal for the summer is to build partnerships with a number of prominent exchanges to explore opportunities for joint data analysis. The student would be in charge of reaching out to exchanges and

managing the relationship as well as working with myself and one of my research assistant on building the data asset and analyzing it.

Golub Center for Finance and Policy - Edward Golding & Debbie Lucas

Up to 6 students needed

Description We at the Golub Center for Finance and Policy (GCFP) routinely hire students for summer projects and are looking for good candidates this year too. We have four projects that we are planning to undertake or are ongoing projects. In total, we estimate that we could successfully engage 4 to 6 students. The four projects are as follows: 1) Estimating and tracking the financial health of local government pension programs (2 students needed who would work under the leadership of Debbie Lucas and various GCFP staff); 2) Modeling the cash-flows of the mortgage Credit-Risk Transfer (CRT) bonds that have been issued by Freddie Mac and Fannie Mae (2 students needed who would work under the leadership of Debbie Lucas and Edward Golding); 3) Analyzing the economic effect of COVID-19 on mortgage servicers, originators, and investors (1 student needed who would work under the leadership of Edward Golding); and 4) Analyzing the cost of bailouts. While this current crisis requires massive government response, it is important to track the costs and to understand the effectiveness of the intervention into markets (1 student needed who would work under the leadership of Debbie Lucas).

Erin Kelly

1 student needed

Description Research-to-Practice student focused on Work & Wellbeing. Professor Erin Kelly is involved in several research projects on management practices and organizational policies that support workers' wellbeing while also advancing firm goals. She would like to work with a master's student who can help prepare briefings, trainings, and toolkits to share research findings with employers and inspire them to take action. Specifically, the student would (1) collaborate with researchers at MIT and Harvard to develop an online toolkit introducing workplace redesign strategies that have been shown to improve workers' wellbeing, and (2) collaborate with an MIT research team and an e-commerce firm to develop and pilot the manager training components of a scheduling intervention that the team will be testing in the firm's fulfillment centers. The ideal candidate would have: very strong verbal and written communication skills (in English); a demonstrated interest (evidenced through coursework, student activities, or previous work experience) in disseminating business practices that improve the quality of work and enhance long-term business value; experience with multi-stakeholder design processes and/or experience with operations management in a production or warehouse setting.

Emilio Castilla

Up to 2 students needed

Description One student (two, even) needed to help with some people analytics projects (some of them in the works, but others soon to be started/send proposals to potential organizations to participate in people analytic projects). The ideal candidates would be interested in helping organizations adopt a data-driven approach to improving people-related decisions for the purpose of advancing individual, team, and organizational success. Ideally, they will have good experience with project management in a consulting/research setting, and should be well organized, capable of working independently, and willing to take initiative. They would have strong communication (verbal and written) and analytical skills.

Good Companies Good Jobs Initiative - Erin Kelly, Emilio Castilla, Barbara Dryer

1 student needed

Description The Good Companies Good Jobs Initiative (GCGJ) seeks to engage a talented MBA student for a project during the summer of 2020. The Initiative is about making work work for everyone. Our overarching goal is to support and connect MIT research and expertise to those poised to craft an inclusive future of work, one that addresses the needs of frontline, low-wage workers as well as other stakeholders. The focus on this project will include: 1) Working with our leadership team in planning for the next phase of the GCGJ in tandem with planning for the future of the Institute for Work and Employment Research (IWER); and 2) Developing approaches for deeper part of the strategic planning effort, the student would help to identify creative possibilities for engagement with employers, employee

advocates, and policymakers. The student would also help to explore external funding options and models for the Initiative, engagement with MIT Sloan MBAs through a new speaker/webinar series or podcast series, case and research competitions, among other possibilities. The student would develop strategies for deeper engagement of MBA students with GCGJ from all Sloan programs. Possible strategies could include developing a webinar series open to MBAs and others on relevant topics and/or researching and writing short cases on strategic management practices to protect workers' jobs and wellbeing during the coronavirus crisis.

Alexandre Jacquillat

1 student needed

Description Predicting flight delays with analytics for a European airline. Flight delays are significant drivers of airlines' operating, economic and environmental performance. Important levers for delay management are available the day ahead—by assigning aircraft to flights in a way that will be robust to future disruptions. To be effective, however, these interventions require good forecasts of delays. To address this question, this project partners with a major European airline to predict flight delays from historical data—using analytics methods. In initial work, we have gone through data pre-processing and initial modeling. We will then build upon that work to improve the quality of our predictions. Requirement: 15.071 Analytics Edge.

MIT Center for Collective Intelligence - Thomas Malone & Kathleen Kennedy

Up to 5 students needed

Description BeatTheVirus CoLab will help individuals and groups work together to solve practical problems created by the Covid-19 pandemic. By leveraging an open online collaboration platform, we hope to mobilize various kinds of experts, innovators, communities, businesses, and many others to develop actionable solutions to real problems. Opportunities include helping to structure problems for the experts and online community to solve, attracting participants and moderating activity on the online platform, and helping to analyze the results (Note: "BeatTheVirus CoLab" is a working title and may be changed).

MIT's Collective Intelligence Design Lab (CIDL) helps groups design innovative new kinds of organizations and other collectively intelligent systems (superminds) to solve important problems. One of its key activities is developing a systematic methodology (called "supermind design") together with associated online tools for doing this kind of design. Among other topics, we expect to apply this methodology during the summer to identify possible approaches to dealing with problems created by the Covid-19 pandemic. Opportunities include applying this methodology with companies and other organizations, developing a library of case studies that can stimulate surprising analogies in other contexts, and analyzing the results of this work.

Stephen C. Graves & Sean Willems

1 student needed

Description Sean Willems and I have developed an MITx offering based on 15.762 and 15.763, which are (half-term) supply chain electives. We have now run each of these MITx classes a couple of times over the past two years. 15.762x is focused on inventory analytics for supply chain planning, and 15.763x is on capacity analytics for supply chain planning. We could use a student to work over the summer to improve and refine these online classes. We expect that the main task is to create a library of problems that we could use as illustrative exercises, as homework problems, and as exam questions. We have done some of this, but the two classes would be greatly enhanced by having a much larger and richer set of problems that could be used. In addition, there may be opportunity to create additional pedagogical content, such as lecture notes, cases and tutorials. This opportunity would be appropriate for a student with a strong technical background and has already taken the on-campus version of these classes, namely 15.762 and 15.763, offered this spring. The student would need to review and master the online classes, as they are currently implemented; and then work with the instructors to identify and tackle the most pressing needs.

Steven J Spear

Up to 2 students needed

Description Data Mining Clinical Notes to Support Clinical Decision Making Finding heterogeneity among Type 2 Diabetes patients to better tailor diagnosis and treatment / Summer Research Assistantship: Research can be basis for field study/independent credit or thesis (if necessary for degree). Expectation is that student has meaningful experience in data sciences from coursework and/or practical experience.

Project Background: Causality not well understood, so treatments are convergent trials and errors. Best case, a clinician approaches a patient, draws on her own experiences to quickly recognize presentation and causes of symptoms, thereby knowing what the appropriate treatment might be. Second best, the clinician doesn't have immediate recognition, but she can draw on the collective experience of colleagues (whether by face to face consultation, literature review, or diving deep into mineable data to come up with "personalized medicine." Worst is that the clinician lacks her own understanding of cause and effect and the community cannot well support her with its own understanding. Then, patients are subject to treatment which has a strong 'trial and error' aspect, the experience defined as 'good' if convergence to an effective treatment is quicker and less painful than it otherwise might have been.

Examples: Such is the experience with Type 2 Diabetes (and other widespread conditions like migraines, depression, hypertension, etc.). Of the millions who suffer diabetes, 10 to 15% are Type 1—known failures in insulin generating cells cause insulin deficiency for which there are a number of offsetting treatments. Everyone else—85 to 90%—are tabled "Type 2" which simply means they suffer from poor blood sugar controls due to apparent difficulties with insulin response. Why and where is that breakdown? Good question. That's not clear, so T2D is a classification based largely on superficial presentation. Is T2D really one disease affecting so many people in so many ways, or are there sub populations—heterogenous relative to each other, homogenous within the various sub populations—indicative of there being many diseases (each with their own cause, diagnose, and distinctive treatment)?

Project Focus and Desired Outcomes: The focus of this project will likely take the NLP techniques identified by an early student researcher to extract data from clinical notes, and then subject that data to the cluster analysis techniques developed and tested by other student projects. Goal is to help develop practical tools and techniques that can be applied over large record sets to arrive at better determination quicker for diagnosis and treatment planning.

Leigh Hafrey

1 student needed

Description The project concerns a new public education and advocacy initiative called The Equity Project which we launched on March 8, International Women's Day. You can see a brief description of The Equity Project on our website here: <https://www.womenssportsfoundation.org/the-equity-project/>.

Georgia Perakis

1 student needed

Description Participate in a project which provides expertise in Machine Learning and Optimization in order to develop and test both predictive and prescriptive methods for COVID-19. We plan to focus on three aspects.

Data Wrangling. The first step has been to merge different publicly available datasets that will allow us to test our models.

Predictive. As a second step, we want to understand how the virus spreads in different locations in the world but also more specifically in the US using machine learning and AI. The goal is to understand what is the probability that different locations could get infected by the virus but also the severity of the

infection, the probability of hospitalization of the population in that location and the need for ICU admission and the use of ventilators.

Prescriptive. As a third step, we will focus on our main goal: to study the effects of different interventions (these may include among others what is now referred to as different degrees of “social distancing”).

We will develop optimization models and methods to tackle the problem of prescribing different mitigation strategies (social distancing, stay-in orders, complete lockdown), in order to recommend optimal government interventions that minimize deaths due to COVID-19 without severely impacting the economy for different locations and with the goal to reduce if not eliminate the problem.

Roberto Rigobon & MIT Sloan LATAM Office

Up to 9 students needed

Description We are looking for 2-3 teams of MBAs (teams can consist of 2-3 students) to work on projects in South America:

- Assisting private companies and governments by conducting analytical projects
- Opportunities to assist organizations and firms in different sectors in the post-COVID world

The following skills would be most useful in each of the 3 cases:

- Prior consulting/report-writing experience
- Knowledge of Spanish or Portuguese is very recommended. At least a member of the team.
- Analytical Skills
- Interest in Latin America

Healthcare Finance and Innovative Financing - Andrew W. Lo, Charles E. and Susan T. Harris Professor of Finance and Director, Laboratory for Financial Engineering (LFE)

Up to 6 students needed

Description

Researching and preparing industry reviews, profiles, and case studies in the areas of healthcare finance and innovative financing. Responsibilities would include library/background research (e.g., literature reviews) and, possibly, interviews with high-level executives and other key stakeholders. Project focus could include examining the landscape for developing vaccines and anti-infective treatments for COVID-19 and other infectious diseases; preparing historical case studies that focus on examples of how financial markets have shaped the nature of innovation and R&D, e.g., the use of asset-backed securities to finance solar deployment; and developing business plans/concrete proposals for new applications of financial engineering tools to address important economic and societal challenges such as Alzheimer’s disease and other neurodegenerative diseases and clean energy innovation. Depending on the students’ backgrounds, there could also be an opportunity to contribute to the design and implementation of simulations and empirical analyses to test the feasibility of proposed financial structures and models. Pre-requisites: Strong empirical research and writing skills, and familiarity with corporate finance and economics literature.