

# Program schedule

	Workshops	Subjects		
MAY 2019	MIT Workshop on Artificial intelligence	Probability	Data analysis	Entrepreneurship
	PON Global / Program on Negotiation at Harvard Law School	Negotiation	Leadership	Communication
Continuous support				
JANUARY 2020	MISTI GSL-PRO	Statistics	The future of work	Machine learning
Continuous support				
SEPTEMBER 2020	MIT Final workshop/ MITx MicroMasters Final			

## The workshops

The program begins with an on-site MIT workshop in Montevideo, in which the subjects of data science, entrepreneurship and artificial intelligence are introduced. Three other workshops will follow.

### Artificial Intelligence Workshop, led by MIT J-WEL HigherEd. facilitators

In this workshop students will attend the launch of the Program in Data Science, including presentation of Program goals, structure and role of the different institutions supporting it. The sessions will focus on the relevance of data science, machine learning and entrepreneurship in the region and the world. There will be extensive explanation and exploration of the online platform supporting the Program, which will be used to access extra material, to interact with MIT facilitators, and to build a data science community amongst participants. Students will be guided through the beginning of the first course in the MITx MicroMasters in Data Science and Statistics - Introduction to Probability – The Science of Uncertainty. Students will have the opportunity to introduce themselves and form connections that will extend and strengthen throughout the Program in Data Science.

### PON Global – Montevideo, from the Program On Negotiation at Harvard Law School

An innovative, blended learning program hosted in cities around the world, PON Global is offered by the Program on Negotiation (PON) at Harvard Law School (HLS), which has provi-

ded world-class negotiation training to more than 35,000 global professionals since its founding in 1983. PON Global's intensive three-day format is designed to provide you with cutting-edge negotiation skills, teach you to overcome emotional and rational biases, and help you to learn a range of cooperative and competitive negotiation strategies.

## **MISTI Global Startup Labs-PRO**

During this workshop's four intense weeks, this essential component of our Program on Data - Science focuses on applying machine learning and data analysis to the resolution of national and international challenges. This on-site workshop challenges the skills every MITx MicroMasters in Statistics and Data Science student has acquired. The MIT instructors will lead the participants through the experience of discovering the commercial potential of data science and machine learning projects. The technical curriculum is complemented by meetings with special guests and networking events so that the students can shape and propel their ideas.

## **Closing workshop by MIT**

For a week in September 2020, a team of MIT facilitators will create a space that will foster the exchange of results of the projects that were developed throughout the Program. Also, as a complement, students will pitch their ideas to investors and use their projects to apply for ANII's human resource and capital seed financing fund.

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# The subjects

## **Introduction to Probability - The Science of Uncertainty**

The world is full of uncertainty: accidents, storms, unruly financial markets, noisy communications. The world is also full of data. Probabilistic modeling and the related field of statistical inference are the keys to analyzing data and making scientifically sound predictions.

Probabilistic models use the language of mathematics. But instead of relying on the traditional "theorem - proof" format, we develop the material in an intuitive -- but still rigorous and mathematically precise -- manner. Furthermore, while the applications are multiple and evident, we emphasize the basic concepts and methodologies that are universally applicable.

The course covers all of the basic probability concepts, including:

- multiple discrete or continuous random variables, expectations, and conditional distributions
- laws of large numbers
- the main tools of Bayesian inference methods
- an introduction to random processes (Poisson processes and Markov chains)

The contents of this course are essentially the same as those of the corresponding MIT class (Probabilistic Systems Analysis and Applied Probability) -- a course that has been offered and continuously refined over more than 50 years. It is a challenging class, but it will enable you to

apply the tools of probability theory to real-world applications or your research.

## Data Analysis for Social Sciences

This statistics and data analysis course will introduce you to the essential notions of probability and statistics. We will cover techniques in modern data analysis: estimation, regression and econometrics, prediction, experimental design, randomized control trials (and A/B testing), machine learning, and data visualization. We will illustrate these concepts with applications drawn from real world examples and frontier research. Finally, we will provide instruction for how to use the statistical package R and opportunities for students to perform self-directed empirical analyses.

This course is designed for anyone who wants to learn how to work with data and communicate data-driven findings effectively.

## Entrepreneurship 101

This MIT course begins by acknowledging the immense difficulty that technology entrepreneurs face when it comes to answering a seemingly simple question: Who is your client? The classes will focus on MIT entrepreneurship case studies from a diverse range of areas such as mobile app development, 3D printing, electronics, international development or watchmaking. Their ensuing analysis will allow the students to learn and identify prospective clients, interview clients to get to know their needs, choose the correct clients for a particular business and think about the client when it comes to designing the product.

## Fundamentals of Statistics

Statistics is the science of turning data into insights and ultimately decisions. Behind recent advances in machine learning, data science and artificial intelligence are fundamental statistical principles. The purpose of this class is to develop and understand these core ideas on firm mathematical grounds starting from the construction of estimators and tests, as well as an analysis of their asymptotic performance.

After developing basic tools to handle parametric models, we will explore how to answer more advanced questions, such as the following:

- How suitable is a given model for a particular dataset?
- How to select variables in linear regression?
- How to model nonlinear phenomena?
- How to visualize high-dimensional data?

Taking this class will allow you to expand your statistical knowledge to not only include a list of methods, but also the mathematical principles that link them together, equipping you with the tools you need to develop new ones.

## Machine learning using Python: from linear models to deep learning

Machine learning methods are commonly used across engineering and sciences, from computer systems to physics. Moreover, commercial sites such as search engines, recommender systems (e.g., Netflix, Amazon), advertisers, and financial institutions employ machine learning algorithms for content recommendation, predicting customer behavior, compliance, or risk.

As a discipline, machine learning tries to design and understand computer programs that learn from experience for the purpose of prediction or control.

In this course, students will learn about principles and algorithms for turning training data into effective automated predictions. We will cover:

- Representation, over-fitting, regularization, generalization, VC dimension;
- Clustering, classification, recommender problems, probabilistic modeling, reinforcement learning;
- On-line algorithms, support vector machines, and neural networks/deep learning.

Students will implement and experiment with the algorithms in several Python projects designed for different practical applications.

## Shaping Work of the Future

The goal of this course is to explore the current state of the work, the impact globalization and new technologies such as AI and robotics are having, and develop plans of action for improving the job and career opportunities for today and tomorrow's workforce. If we take the right actions, we can shape the future of work in ways that meet the needs of workers, families, and their economies and societies. To do so, we first have to understand how work is changing, how firms can compete and prosper and support good jobs and careers, and how to update the policies, institutions, and practices governing the world of work.

We have to understand and better address the deep divisions and inequalities in societies that threaten the future of our economies and democracies. We will address these by using the materials from the the features of the new social contract as we go through the course and then vote on how well the overall social contract generated by the class meets your expectations for the future.

We'll start by tracing the history of work and employment that has made our economies work well in the past. And we'll uncover what's gone wrong, in order to figure out new solutions that fit today's workforce, economy, and society. We'll look at the impact advances in technology are having across industries, and the ways in which these technologies are transforming the nature of human work and skills needed. We will explore ways in which we as a society can and should shape and catalyze these new technologies to complement and augment human work, rather than replace it. We'll also take you on a personal journey, where you will learn what employers expect in today's world of work—the skills, flexibility, and knowledge that are crucial for success in the contemporary workplace. We'll examine what has to happen in order for employers, workers, governments, and educators to come together to forge new policies, rules, and understandings for governing the world of work in the 21st century.

Many colleagues and groups around the world share our deep concern for these issues and are studying how to address them in their specific settings. We invite each of you to join us and to share your insights and ideas about how we can make work, work better for all in the years ahead. In this spirit we will draw on our own expert group here—our MIT Task Force on Work of the Future. Together we can make a difference for the next generation workforce, our economies, and our societies.

## **Negotiation Objectives**

PON Global faculty members have negotiated peace treaties, brokered multi-billion-dollar deals, and drafted high-stakes agreements around the globe. Widely recognized as the world leader in the field of negotiation research, PON is a consortium program of Harvard University, Massachusetts Institute of Technology (MIT), and Tufts University, and serves as an interdisciplinary research center dedicated to developing the theory and practice of negotiation and dispute resolution in a range of public and private settings. PON's mission includes nurturing the next generation of negotiation teachers and scholars, helping students become more effective negotiators, and providing a forum for the discussion of ideas.