DOCTOR OF PHILOSOPHY IN SOCIAL AND ENGINEERING SYSTEMS

Institute for Data, Systems, and Society (*https://catalog.mit.edu/ schools/engineering/data-systems-society/#graduatetext*)

Program Requirements

Orientation

IDS.900	Doctoral Seminar in Social and Engineering Systems	3

Core

Select 12 units from three of the areas below:

Probability

6.7700[J]	Fundamentals of Probability	

Statistics

18.6501	Fundamentals of Statistics	
18.655	Mathematical Statistics	
IDS.160[J]	Mathematical Statistics: a Non-Asymptotic Approach	
IDS.131[J]	Statistics, Computation and Applications	

Social Science [1]

17.850	Political Science Scope and Methods	
21A.809	Designing Empirical Research in the Social Sciences	
21A.819	Ethnographic Research Methods	

Microeconomics / Causal Inference

14.121 & 14.122	Microeconomic Theory I and Microeconomic Theory II	
14.320	Econometric Data Science	
14.386	New Econometric Methods	
14.388	Inference on Causal and Structural Parameters Using ML and AI	
17.802	Quantitative Research Methods II: Causal Inference	

Information Systems and Decision Science Focus [2, 3]	**54**

Five in the areas of probabilistic modeling, statistics, optimization, or systems/control theory, including:

- One subject from the list of Statistical Processing of Data Subjects below
- One subject of substantial mathematical content [4]
- Two subjects belonging to a sequence that provides increasing depth on a particular topic

Social Science Focus [2, 5]	**42**

Four subjects that create a coherent and rigorous program of study in the social sciences, providing necessary background for research, including three subjects comprising a coherent collection that builds depth in a particular social science focus area

Problem Domain Focus [2, 6, 7]	**9**

Two subjects in the application domain of the student's research

Teaching

IDS.960	Teaching in Data, Systems, and Society	20

Research

IDS.970	Pre-Thesis Research in Data, Systems, and Society [8]	138
IDS.THG	Graduate Thesis [8]	60

Total Units	**326**

[1] Can also be satisfied by Harvard University subject SOCIO 2205 Sociological Research Design.

[2] Students should choose 9-12 unit subjects to meet this requirement, with no more than half of the subjects chosen being 9-unit subjects. Two partial term subjects that form a two-subject sequence may be counted as one subject if their unit total is equal to or greater than 9 units. If Core subjects are used to satisfy this requirement, the remaining subjects in the focus should be at a more advanced level.

[3] Core subjects in Probability and Statistics should be counted toward this requirement.

[4] 6.7700[J] Fundamentals of Probability or another subject approved by the advisor and the graduate program committee.

[5] Core subjects in Social Science and Microeconomics/Causal Inference should be counted toward this requirement.

[6] One subject may be satisfied by a one-term, 12-unit internship (IDS.955 Practical Experience in Data, Systems, and Society) or independent study (IDS.950 Independent Study in Data, Systems, and Society). IDS.955 is considered an ideal way to satisfy one Problem Domain requirement.

[7] One subject may also be counted toward the Social Science Focus.

[8] This represents the number of units the average student registers for this subject over the course of the program.

Statistical Processing of Data Subjects

6.7810	Algorithms for Inference	12
6.7900	Machine Learning	12
9.520[J]	Statistical Learning Theory and Applications	12
14.382 & 14.383	Econometrics and High-Dimensional Econometrics	6
15.077[J]	Statistical Machine Learning and Data Science	12
16.391	Statistics for Engineers and Scientists	12

17.802	Quantitative Research Methods II: Causal Inference	12
17.804	Quantitative Research Methods III: Generalized Linear Models and Extensions	12
17.806	Quantitative Research Methods IV: Advanced Topics	12
18.6501	Fundamentals of Statistics	12
18.655	Mathematical Statistics	12
IDS.131[J]	Statistics, Computation and Applications	12
IDS.160[J]	Mathematical Statistics: a Non-Asymptotic Approach	12