

Decision Science, B.S.

The Major in Decision Science

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<https://www.cmu.edu/dietrich/sds/undergraduate/decision-science/index.html> (<https://www.cmu.edu/dietrich/sds/undergraduate/decision-science/>)

Overview

Decision scientists are experts in improving decisions. They study what good decisions look like, why people make predictable errors, and how better decisions can be achieved through improved judgment, better decision environments, and scientific evidence. Their work spans personal health, financial security, technological innovation, business strategy, education, risk analysis, and public policy, but every application shares a common goal: improving the quality of human decision making.

Carnegie Mellon is one of the world's leading centers for Decision Science and offers the only undergraduate major in the field. Students learn to think like decision scientists. Guided by faculty whose research continues to advance the field, they learn how to recognize high-quality decisions, evaluate evidence, and translate scientific discoveries into better decisions for individuals, organizations, and society.

The major combines rigorous scientific training with quantitative methods, behavioral research, and decision analysis. Students design experiments, evaluate evidence, build decision models, and develop practical solutions to complex human and organizational problems. Research opportunities allow students to contribute to ongoing discoveries, and an optional capstone project provides the opportunity to tackle a real-world decision problem, integrating the scientific, analytical, and practical skills they have developed throughout the major.

As organizations increasingly rely on data, analytics, and artificial intelligence to guide important decisions, the ability to understand human judgment becomes even more valuable. Better decisions require more than better data. They require people who know how to ask the right questions, interpret evidence, design effective decision environments, and transform information into better decisions. Graduates are well prepared for careers in consulting, behavioral science, product strategy, user research, healthcare, public policy, organizational leadership, and many other fields, as well as as graduate and professional study in decision science, business, law, medicine, psychology, and related disciplines.

Prerequisites

All Decision Science majors must complete mathematics, statistics, and analytic methods prerequisites (see below), by the end of the sophomore year.

Mathematics Prerequisite	Units
21-111 Differential Calculus & 21-112 and Integral Calculus or 21-120 Differential and Integral Calculus	10-20

Statistics Prerequisite	Units
36-200 Reasoning with Data	9

Students must take one course from the following set (or an approved alternative). Students may not count a course used to fulfill the Mathematics Prerequisite as also filling the Analytic Methods Prerequisite.

Students may not count a course used to fulfill the Analytic Methods Prerequisite as also filling a Decision Science elective.

Analytic Methods Prerequisite	Units
21-122 Integration and Approximation or 21-256 Multivariate Analysis or or 36-401 Modern Regression or 36-410 Introduction to Probability Modeling or 80-210 Logic and Proofs or 80-211 Logic and Mathematical Inquiry or 80-315 Logics for Knowledge and Belief or 88-252 Causal Inference: from Data to Decisions or 88-300 Programming and Data Analysis for Social Scientists	10

Curriculum

The core curriculum in Decision Science consists of five courses providing the theoretical perspectives of Decision Science, two courses in research methods, and one capstone.

Core Courses

Theoretical Perspectives	Units
73-102 Principles of Microeconomics or 73-104 Principles of Microeconomics Accelerated	9
85-100 Introduction to Psychology	9
88-120 Reason, Passion and Cognition *	9
88-223 Decision Analysis	12
88-302 Behavioral Decision Making	9
	48

* 88-120 should be taken in the freshman or sophomore year.

Statistical Research Methods (select one course)*	Units
36-202 Methods for Statistics & Data Science or 36-309 Experimental Design for Behavioral & Social Sciences or 85-309 Statistical Concepts and Methods for Behavioral and Social Science	9

*** Be sure to consult with your Decision Science advisor to discuss which course will best fit your plans and goals.**

SDS Research Methods	Units
88-251 Empirical Research Methods	9
	9

Electives

45 units

Complete at least 45 units of courses from the following list. Note that additional courses (most typically 88xxx courses) are occasionally added.

For the most up to date list of approved electives (and additional information about the courses), see the SDS website (<https://www.cmu.edu/dietrich/sds/undergraduate/>). Some courses have additional prerequisites.

Although the Decision Science major doesn't explicitly require students to take a capstone course, students who want to have real-world, professional experience should register for 88-454 Decision Science Capstone (this will count as one of the electives).

At least three of these courses (27 units) must be Department of Social and Decision Sciences courses (88-xxx) from the approved list.

Elective Courses	Units
88-150 Managing Decisions	9
88-221 Markets, Democracy, and Public Policy	9
88-230 Human Intelligence and Human Stupidity	9
88-231 Thinking in Person vs. Thinking Online	9
88-234 Negotiation: International Focus	9
88-235 Negotiation: Strategies and Behavioral Insights	9
88-237 The Happy Cyborg	9
88-252 Causal Inference: from Data to Decisions *	9
88-261 Health Policy and Decision Making	9

88-262	Rationality and Irrationality in Medicine	9
88-275	Bubbles: Data Science for Human Minds	9
88-285	Deconstructing and Dismantling Discrimination	9
88-290	Confessions, Lies, and Gossip	9
88-300	Programming and Data Analysis for Social Scientists	9
88-312	Decision Models and Games	9
88-342	The Neuroscience of Decision Making	9
88-344	Systems Analysis: Environmental Policy	9
88-360	Behavioral Economics	9
88-365	Behavioral Economics and Public Policy	9
88-366	Behavioral Economics of Poverty and Development	9
88-367	Designing Economics Experiments in the Wild	9
88-372	Social and Emotional Brain	9
88-379	Data-Driven Decision Analysis	9
88-451	Policy Analysis Senior Project	12
88-452	Policy Analysis Senior Project	12
88-454	Decision Science Capstone	9
70-311	Organizational Behavior	9
70-332	Business, Society and Ethics	9
70-381	Marketing I	9
70-443	Digital Marketing and Social Media Strategy	9
70-460	Mathematical Models for Consulting	9
73-265	Economics and Data Science	9
80-221	Philosophy of Social Science	9
80-324	Philosophy of Economics	9
84-369	Decision Science for International Relations	9
85-409	Crosscultural	9
85-454	Health Psychology	9

early as the third week of the spring semester in the first year. Students who are planning to attend the Washington Semester Program, to study abroad, to apply for the Heinz Accelerated Masters Program, or to pursue an additional major/minor may have a very different curriculum map and should consult early – and often – with the Decision Science Academic Advisor.

Students are encouraged to consider the Washington Semester Program as part of their education. Suitable courses will be considered as fulfilling requirements of electives in the major. Please send the course syllabus, along with a note explaining how the course addresses fundamental aspects of decision science in one of the six elective categories to your DS advisor.

Additional Major in Decision Science

Students who elect Decision Science as an additional major must fulfill all of the requirements of the Decision Science major.

Students pursuing Behavioral Economics with an additional major in Decision Science may only count 36-202, 73-102, 88-120, 88-251 and 88-302 toward the completion of both majors.

Students pursuing Policy and Management with an additional major in Decision Science and may only count 36-202, 73-102, 88-223, and 88-251 toward the completion of both majors.

Additional majors cannot count menu electives toward simultaneously fulfilling more than one major or minor. Students who are interested in an additional major in Decision Science should see the Academic Advisor of the Decision Science program.

Decision Science, B.S. Sample Curriculum

First-Year		Second-Year	
Fall	Spring	Fall	Spring
88-120 Reason, Passion and Cognition *	36-202 Methods for Statistics & Data Science	85-100 Introduction to Psychology	88-223 Decision Analysis
36-200 Reasoning with Data	Pick One (Grand Challenge Seminar, FYW, Disciplinary Perspectives: Humanities)	88-251 Empirical Research Methods	88-302 Behavioral Decision Making
21-120 Differential and Integral Calculus (or 21-111, depending on placement)	Pick One (Grand Challenge Seminar, FYW, Disciplinary Perspectives: Humanities)	88-252 Causal Inference: from Data to Decisions or other Analytic Methods course	88-300 Programming and Data Analysis for Social Scientists or other Analytic Methods course
Pick One (Grand Challenge Seminar, FYW, Disciplinary Perspectives: Humanities)	Gen Ed or Elective	Gen Ed or Elective	Decision Science Elective
73-102 Principles of Microeconomics	Gen Ed or Elective	Gen Ed or Elective	Gen Ed or Elective
			Gen Ed or Elective

Third-Year		Fourth-Year	
Fall	Spring	Fall	Spring
Decision Science Elective	Decision Science Elective	Senior Honors Thesis or Elective	Senior Honors Thesis or Elective
Gen Ed or Elective	Gen Ed or Elective	Capstone or Decision Science Elective	Decision Science Elective
Elective	Elective	Elective	Elective
Elective	Elective	Elective	Elective
Elective		Elective	Elective

* 88-120 should be taken as the first course in the Decision Science sequence. It is intended for students in their first or second year; it is offered in Fall and Spring semesters. It may be taken as late as the junior year.

This is presented as a recommended plan for completing major requirements. The major can be completed in as few as two years (not that it must be), but students may not have time for other opportunities such as additional majors or study abroad. Students may declare their major as