

Computer Science-Economics

The joint Computer Science-Economics concentration exposes students to the theoretical and practical connections between computer science and economics. It prepares students for professional careers that incorporate aspects of economics and computer technology and for academic careers conducting research in areas that emphasize the overlap between the two fields. Concentrators may choose to pursue either the A.B. or the Sc.B. degree. While the A.B. degree allows students to explore the two disciplines by taking advanced courses in both departments, its smaller number of required courses is compatible with a liberal education. The Sc.B. degree achieves greater depth in both computer science and economics by requiring more courses, and it offers students the opportunity to creatively integrate both disciplines through a design requirement. In addition to courses in economics, computer science, and applied mathematics, all concentrators must fulfill the Computer Science department's writing requirement by passing a course that involves significant expository writing.

Standard Program for the Sc.B. degree.

Prerequisites (3 courses):

MATH 0100	Introductory Calculus, Part II	
MATH 0520	Linear Algebra	
or MATH 0540	Honors Linear Algebra	
or CSCI 0530	Coding the Matrix: An Introduction to Linear Algebra for Computer Science	
ECON 0110	Principles of Economics	

Required Courses: 17 courses: 8 Computer Science, 8 Economics, and a Capstone

CSCI 1450	Probability and Computing	1
or APMA 1650	Statistical Inference I	
or APMA 1655	Statistical Inference I	

Select one of the following Series: 2

Series A

CSCI 0150 & CSCI 0160	Introduction to Object-Oriented Programming and Computer Science and Introduction to Algorithms and Data Structures	
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Series B

CSCI 0170 & CSCI 0180	Computer Science: An Integrated Introduction and Computer Science: An Integrated Introduction	
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Series C

CSCI 0190	Accelerated Introduction to Computer Science (and an additional CS course not otherwise used to satisfy a concentration requirement; this course may be CSCI 0180, an intermediate-level CS course, or a 1000-level course.)	
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Two of the following intermediate courses, one of which must be math-oriented and one systems-oriented. 2

CSCI 0220	Introduction to Discrete Structures and Probability (math)	
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CSCI 0320	Introduction to Software Engineering (systems)	
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CSCI 0330	Introduction to Computer Systems (systems)	
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CSCI 1010	Theory of Computation	
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A pair of CS courses with a coherent theme. ¹ 2

An additional CS course that is either at the 1000-level or is an intermediate course not already used to satisfy concentration requirements. CSCI 1450 may not be used to satisfy this requirement. 1

ECON 1130	Intermediate Microeconomics (Mathematical) ²	1
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ECON 1210	Intermediate Macroeconomics	1
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ECON 1630	Econometrics I	1
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Three courses from the "mathematical economics" group (CSCI 1951K can be counted as one of them, if it has not been used to satisfy the computer science requirements of the concentration and if the student has taken either ECON 1470 or ECON 1870): 3

ECON 1170	Welfare Economics and Social Choice Theory	
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ECON 1220	Monetary and Fiscal Policy	
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ECON 1225	Advanced Macroeconomics: Monetary, Fiscal, and Stabilization Policies	
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ECON 1460	Industrial Organization	
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ECON 1465	Market Design: Theory and Applications	
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ECON 1470	Bargaining Theory and Applications	
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ECON 1490	Designing Internet Marketplaces	
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ECON 1640	Econometrics II	
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ECON 1650	Financial Econometrics	
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ECON 1660	Big Data	
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ECON 1670	Advanced Topics in Econometrics	
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ECON 1740	Mathematical Finance	
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ECON 1750	Investments II	
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ECON 1759	Data, Statistics, Finance	
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ECON 1810	Economics and Psychology	
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ECON 1820	Behavioral Economics	
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ECON 1850	Theory of Economic Growth	
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ECON 1860	The Theory of General Equilibrium	
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ECON 1870	Game Theory and Applications to Economics	
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and any graduate Economics course

Two additional 1000-level Economics courses (excluding 1620, 1960, 1970) ³ 2

Capstone Course in either Computer Science or Economics ⁴ 1

Total Credits 17

¹ A list of pre-approved pairs may be found at the approved-pairs web page (<http://www.cs.brown.edu/ugrad/concentrations/approvedpairs.html>). You are not restricted to pairs on this list, but any pair not on the list must be approved by the Computer Science director of undergraduate studies.

² Or ECON 1110, with permission.

³ Note that ECON 1620, ECON 1960, and ECON 1970 (independent study) cannot be used for concentration credit. However, 1620 and 1960 can be used for university credit and up to two 1970s may be used for university credit.

⁴ One capstone course (<http://cs.brown.edu/degrees/undergrad/concentrations/capstone>) in either Computer Science or Economics: a one-semester course, taken in the student's last undergraduate year, in which the student (or group of students) use a significant portion of their undergraduate education, broadly interpreted, in studying some current topic (preferably at the intersection of computer science and economics) in depth, to produce a culminating artifact such as a paper or software project.

Standard Program for the A.B. degree:

Prerequisites (3 courses):

MATH 0100	Introductory Calculus, Part II	
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MATH 0520	Linear Algebra	
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or MATH 0540	Honors Linear Algebra	
or CSCI 0530	Coding the Matrix: An Introduction to Linear Algebra for Computer Science	
ECON 0110	Principles of Economics	
Required Courses: 13 courses: 7 Computer Science and 6 Economics		
CSCI 1450	Probability and Computing	1
or APMA 1650	Statistical Inference I	
or APMA 1655	Statistical Inference I	
Select one of the following series:		2
Series A		
CSCI 0150 & CSCI 0160	Introduction to Object-Oriented Programming and Computer Science and Introduction to Algorithms and Data Structures	
Series B		
CSCI 0170 & CSCI 0180	Computer Science: An Integrated Introduction and Computer Science: An Integrated Introduction	
Series C		
CSCI 0190	Accelerated Introduction to Computer Science (and an additional CS course not otherwise used to satisfy a concentration requirement; this course may be CSCI 0180, an intermediate-level course, or a 1000-level course)	
Two of the following intermediate courses, one of which must be math-oriented and one systems-oriented:		2
CSCI 0220	Introduction to Discrete Structures and Probability (math)	
CSCI 0320	Introduction to Software Engineering (systems)	
CSCI 0330	Introduction to Computer Systems (systems)	
CSCI 1010	Theory of Computation	
Two additional CS courses; at least one must be at the 1000-level. The other must either be at the 1000-level or be an intermediate course not already used to satisfy concentration requirements.		2
ECON 1130	Intermediate Microeconomics (Mathematical) ¹	1
ECON 1210	Intermediate Macroeconomics	1
ECON 1630	Econometrics I	1
Three courses from the "mathematical-economics" group: ²		3
ECON 1170	Welfare Economics and Social Choice Theory	
ECON 1220	Monetary and Fiscal Policy	
ECON 1225	Advanced Macroeconomics: Monetary, Fiscal, and Stabilization Policies	
ECON 1460	Industrial Organization	
ECON 1465	Market Design: Theory and Applications	
ECON 1470	Bargaining Theory and Applications	
ECON 1490	Designing Internet Marketplaces	
ECON 1640	Econometrics II	
ECON 1650	Financial Econometrics	
ECON 1660	Big Data	
ECON 1670	Advanced Topics in Econometrics	
ECON 1740	Mathematical Finance	
ECON 1750	Investments II	
ECON 1759	Data, Statistics, Finance	
ECON 1810	Economics and Psychology	
ECON 1820	Behavioral Economics	

ECON 1850	Theory of Economic Growth	
ECON 1860	The Theory of General Equilibrium	
ECON 1870	Game Theory and Applications to Economics	
or any graduate Economics course ³		
Total Credits		13

¹ Or ECON 1110, with permission.

² CSCI 1951K can be counted as one of them, if it has not been used to satisfy the computer science requirements of the concentration and if the student has taken either ECON 1470 or ECON 1870.

³ Note that ECON 1620, ECON 1960, and ECON 1970 (independent study) cannot be used for concentration credit. However, 1620 and 1960 can be used for university credit and up to two 1970s may be used for university credit.

Honors

Students who meet stated requirements are eligible to write an honors thesis in their senior year. Students should consult the listed honors requirements of whichever of the two departments their primary thesis advisor belongs to, at the respective departments' websites.

Professional Track

The requirements for the professional track include all those of the standard track, as well as the following:

Students must complete two two-to-four-month full-time professional experiences, doing work that is related to their concentration programs. Such work is normally done within an industrial organization, but may also be at a university under the supervision of a faculty member.

On completion of each professional experience, the student must write and upload to ASK a reflective essay about the experience addressing the following prompts, to be approved by the student's concentration advisor:

- Which courses were put to use in your summer's work? Which topics, in particular, were important?
- In retrospect, which courses should you have taken before embarking on your summer experience? What are the topics from these courses that would have helped you over the summer if you had been more familiar with them?
- Are there topics you should have been familiar with in preparation for your summer experience, but are not taught at Brown? What are these topics?
- What did you learn from the experience that probably could not have been picked up from course work?
- Is the sort of work you did over the summer something you would like to continue doing once you graduate? Explain.
- Would you recommend your summer experience to other Brown students? Explain.

Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetica was used instead of Arial.

The editor may contact Leepfrog for a draft with the correct fonts in place.