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. If you are interested in declaring a concentration in Computer Science-Economics, please refer to this page for more information regarding the process. For more information about the CS Pathways, see this page.

Standard Program for the Sc.B. degree.

Prerequisites (3 courses):

MATH 0100	Single Variable Calculus, Part II	
MATH 0520	Linear Algebra	
or MATH 0540	Linear Algebra With Theory	
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	Advanced Introduction to Probability for Computing and Data Science [1]	1
or APMA 1650	Introduction to Probability and Statistics with Calculus	
or APMA 1655	Introduction to Probability and Statistics with Theory	
Select one of the following Series:		2
Series A		
CSCI 0150 & CSCI 0200	Introduction to Object-Oriented Programming and Computer Science and Program Design with Data Structures and Algorithms	
Series B		
CSCI 0170 & CSCI 0200	Computer Science: An Integrated Introduction and Program Design with Data Structures and Algorithms	
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 0200, a Foundations CS course, or a 1000-level course.)	
Series D		
CSCI 0111 & CSCI 0200	Computing Foundations: Data and Program Design with Data Structures and Algorithms	
Two courses, touching two different Foundations areas		2
a. Algorithms/Theory Foundations		
CSCI 0500	Data Structures, Algorithms, and Intractability: An Introduction	
b. AI/Machine Learning/Data Science Foundations, No concentration credit for 1410, 1411		
CSCI 0410	Foundations of AI	
c. Systems Foundations, Concentration credit not for both 300, 330		
CSCI 0300	Fundamentals of Computer Systems	
or CSCI 0320	Introduction to Software Engineering	
or CSCI 0330	Introduction to Computer Systems	
Three 1000-level CSCI courses, which must be technical courses as defined in concentration handbook.. One of these can be an additional 100-level Foundations course.		3
ECON 1130	Intermediate Microeconomics (Mathematical) [2]	1
ECON 1210	Intermediate Macroeconomics	1
ECON 1630	Mathematical Econometrics I	1
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	
ECON 1225	Advanced Macroeconomics: Monetary, Fiscal, and Stabilization Policies	
ECON 1255	Unemployment: Models and Policies	
ECON 1470	Bargaining Theory and Applications	
ECON 1490	Designing Internet Marketplaces	
ECON 1545	Topics in Macroeconomics, Development and International Economics	
ECON 1560	Economic Growth	
ECON 1640	Mathematical Econometrics II	
ECON 1660	Big Data	
ECON 1670	Advanced Topics in Econometrics	
ECON 1680	Machine Learning, Text Analysis, and Economics	
ECON 1750	Investments II	
ECON 1770	Crisis Economics	
ECON 1805	Experimental and Behavioral Economics	
ECON 1820	Theory of Behavioral Economics	
ECON 1860	The Theory of General Equilibrium	
ECON 1870	Game Theory and Applications to Economics	
Two additional 1000-level Economics courses excluding 1620, 1960, 1970 [3]		2
One capstone course in either CS or Economics: a one-semester course, normally taken in the student's last semester 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. A senior thesis, which involved two semesters of work, may count as a capstone.		1
Total Credits		**17**

[1] Concentration credit will be given for only one of APMA 1650, APMA 1655, and CSCI 1450.

[2] Or ECON 1110 with permission. For students matriculating at Brown in Fall 2021 or later, note that if ECON 1110 is used, then one additional course from the mathematical-economics group will be required

[3] Students may apply, at most, one Economics course whose number is in the range of 1000 to 1099 toward the concentration. 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. If the primary thesis advisor belongs to Economics (Computer Science), then students must have a reader in the Computer Science (respectively, Economics) department.

Professional Track

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

Students must complete full-time professional experiences doing work that is related to their concentration programs, totaling 2-6 months, whereby each internship must be at least one month in duration in cases where students choose to do more than one internship experience. Such work is normally done at a company, but may also be at a university under the supervision of a faculty member. Internships that take place between the end of the fall and the start of the spring semesters cannot be used to fulfill this requirement.

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.
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Standard Program for the A.B. degree:

Prerequisites (3 courses):

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MATH 0520	Linear Algebra	
or MATH 0540	Linear Algebra With Theory	
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

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or APMA 1650	Introduction to Probability and Statistics with Calculus	
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Select one of the following series:		2
Series A		

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Series D		
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Two courses, touching two different Foundations areas:		2
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CSCI 0410	Foundations of AI	
c. Systems Foundations. Concentration credit for only one of 300/330		
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ECON 1770	Crisis Economics	
ECON 1805	Experimental and Behavioral Economics	
ECON 1820	Theory of Behavioral Economics	
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. For students matriculating at Brown in Fall 2021 or later, note that if ECON 1110 is used, then one additional course from the mathematical-economics group will be required

[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.

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- Would you recommend your summer experience to other Brown students? Explain.