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.


Prerequisites (3 courses):
- MATH 0100 Introductory Calculus, Part II
- MATH 0520 Linear Algebra
- CSCI 1450 Probability and Computing
- or APMA 1650 Statistical Inference I
- or APMA 1655 Statistical Inference I

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

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

Select one of the following Series:

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

Series B
- CSCI 0170 Computer Science: An Integrated Introduction
- CSCI 0180 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 CS course, or a 1000-level course.)

Two of the following intermediate courses, one of which must be math-oriented and one systems-oriented.
- 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

A pair of CS courses with a coherent theme. 1

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.

- ECON 1130 Intermediate Microeconomics (Mathematical) 2
- ECON 1210 Intermediate Macroeconomics 1
- ECON 1630 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):

- 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

and any graduate Economics course

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

Capstone Course in either Computer Science or Economics 4

Total Credits

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
- MATH 0520 Linear Algebra
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:

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:
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.

ECON 1110 Intermediate Microeconomics (Mathematical) 1
ECON 1210 Intermediate Macroeconomics 1
ECON 1630 Econometrics I 1

Three courses from the "mathematical-economics" group: 2

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
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 1660, 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.
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Helvetica was used instead of Arial.
The editor may contact Leepfrog for a draft with the correct fonts in place.