CSC-BS - Computer Science

Overview

Institution Code
BAR01

Official Name of Program
Computer Science

Plan Code
CSC-BS

Department(s) Sponsoring Program
Mathematics

Career
Undergraduate

Degree Designation
BS - Bachelor of Science

Requirements

Simple Requisites

Degree Requirements - Bachelor of Science
Type
Completion Requirement

Fulfill ALL of the following requirements:

Earn at least 120 credits

AND

Earn at least 30 credits
In Residence at Baruch College

AND

Earn at least 90 credits
Liberal Arts and Sciences Content Courses

AND

Earn a minimum GPA of 2.0

Additional Comments:

General Education Requirements - Required Core
Type
Completion Requirement

Fulfill ALL of the following requirements:

Required Core English Composition

Complete ALL of the following Courses:

- ENG 2100 - Writing I
  OR ENG 2100T - Writing I
  OR ENG 2100H - Honors Writing I
- ENG 2150 - Writing II
  OR ENG 2150T - Writing II

OR ENG 2150H - Honors - Writing II

A course in this area must meet all of the following learning outcomes. A student will:

- Read and listen critically and analytically, including identifying an argument's major assumptions and assertions and evaluating its supporting evidence.
- Write clearly and coherently in varied, academic formats (such as formal essays, research papers, and reports) using standard English and appropriate technology to critique and improve one's own and others' texts.
- Demonstrate research skills using appropriate technology, including gathering, evaluating, and synthesizing primary and secondary sources.
- Support a thesis with well-reasoned arguments, and communicate persuasively across a variety of contexts, purposes, audiences, and media.
- Formulate original ideas and relate them to the ideas of others by employing the conventions of ethical attribution and citation.

AND

Required Core Mathematical and Quantitative Reasoning

Complete at least 1 of the following courses:

- MTH 2140 - Mathematics and Quantitative Reasoning
- MTH 2160 - Ideas in Mathematics and Their Applications
- MTH 2003 - Precalculus and Elements of Calculus 1A
- MTH 2009 - Precalculus
  OR MTH 2009T - Precalculus
- MTH 2205 - Precalculus and Elements of Calculus 1B
- MTH 2207 - Elements of Calculus I and Matrix Algebra
- MTH 2610 - Calculus I
- MTH 2001 - Pre-Calculus
- PSY 2100 - Statistics for Social Science
- BIO 2100 - Biostatistics
  OR ENV 2100 - Biostatistics
- STA 2000 - Business Statistics I
- MTH 2001 - Pre-Calculus
- MTH 2600 - Calculus I with Trigonometry Refresher

A course in this area must meet all of the following learning outcomes. A student will:

- Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
- Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
- Represent quantitative problems expressed in natural language in a suitable mathematical format.
- Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
- Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
- Apply mathematical methods to problems in other fields of study.

The following courses are no longer offered at Baruch, but do appear on students' transfer evaluations. Any of these courses may be used to satisfy the Mathematical and Quantitative Reasoning requirement of the Pathways curriculum without appeal: MTH 2000; MTH 2300; MTH 2300; MTH 2301; MTH 2100; MTH 2150; MTH 2006; MTH 2206; and MTH 2630. MTH 3010 Calculus II is considered a STEM Variant course, and may also be used to satisfy this requirement without appeal.

** Zicklin students should not take MTH 2140 or MTH 2160, which do not meet the mathematics requirement for the BBA degree. Zicklin students must complete a course in precalculus (and must satisfy the prerequisites for whichever precalculus course they take). Therefore, these students usually take MTH 2003 or MTH 2009. Students who enter Baruch with a calculus placement (MTH 2207 or MTH 2610) may take STA 2000 to satisfy their Pathways requirement.

MTH 2140 and MTH 2160 are not appropriate for students within the Weissman School of Arts and Sciences whose major requires a statistics course or additional math courses (such majors include: Actuarial Science, Biological Sciences, Computer Science, Economics, Financial Mathematics, Natural Sciences ad hoc, and Statistics).

AND

Complete at least 1 courses in the following course sets:

- Required Core Life and Physical Sciences

A course in this area must meet all of the following learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a life or physical science.

- Apply the scientific method to explore natural phenomena, including hypothesis development, observation, experimentation, measurement, data analysis, and data presentation.
- Use the tools of a scientific discipline to carry out collaborative laboratory investigations.
- Gather, analyze, and interpret data and present it in an effective written laboratory or fieldwork report.
- Identify and apply research ethics and unbiased assessment in gathering and reporting scientific data.

NOTE: The following courses are no longer offered at Baruch, but do appear on students' transfer evaluations. Any of these courses may be used to satisfy the **Life and Physical Sciences** or the **Scientific World** requirement of the Pathways curriculum without appeal: BIO 1003; BIO 1005; CHM 1000; ENV 1020; ENV 1021; and PHY 1003. One course may not be used to satisfy both requirements.

STEM VARIANT COURSES

The following courses may be used to satisfy either the *Life and Physical Sciences* or the *Scientific World* requirement (one course may not satisfy both requirements). Students who wish to pursue a major or minor in the Natural Sciences should satisfy the Pathways science requirements with STEM Variant courses.

BIO 2010 Principles of Biology I

CHM 2003 General Chemistry I

PHY 2003 General Physics I

PHY 3010 Quantitative Physics I

Additional Comments:
The Department of Natural Sciences offers "stand-alone" sections of their Pathways courses (BIO 1011L, BIO 1012, etc.), specifically designed for students who are only required to complete one half of the paired courses – lecture or lab, not both. For example, a student who transfers a ***Scientific World*** course, may satisfy the ***Life and Physical Sciences*** requirement with a stand-alone section of a Natural Sciences course in that category. These stand-alone sections are *not* open to students who enter Baruch as freshmen or to transfer students who have satisfied neither the ***Life & Physical Sciences*** nor the ***Scientific World*** requirement at the time they entered Baruch. Please consult the Department of Natural Sciences to request registration permission for any of their stand-alone sections (17 Lexington Ave, room 506; 646-660-6200)

General Education Requirements - College Option
Type
Completion Requirement

Fulfill ALL of the following requirements:

Complete at least 1 of the following courses:
- CMP 2800 - Great Works of Literature I
  OR ENG 2800 - Great Works of Literature I
- CMP 2850 - Great Works of Literature II
  OR ENG 2850 - Great Works of Literature II

AND

Earn at least 3 credits
4000-level CIC "capstone" course for one of the liberal arts minors
This course must be completed at Baruch.

AND

Earn at least 6 credits
Two 3000-level liberal arts course toward the same liberal arts minor

- *The liberal arts minor cannot be within the same area of study as the major. This is also true for students who are required to complete part of the minor for the College Option.*
- *There is no GPA stipulation attached to the College Option courses, but in order to graduate with the liberal arts minor, a student must have a grade point average of at least 2.00 in the three courses that make up his or her liberal arts minor.*

Additional Comments:
The College Option consists of as many as four courses (6, 9, or 12 credits), depending on how much coursework the student has completed at another institution.

General Education Requirements - Flexible Core
Type
Completion Requirement

Fulfill ALL of the following requirements:

Complete at least 1 courses in the following course sets:

- Flexible Core World Cultures and Global Issues

A course in this area must meet *at least three* of the following *additional* learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring world cultures or global issues, including, but not limited to, anthropology, communications, cultural studies, economics, ethnic studies, foreign languages (building upon previous language acquisition), geography, history, political science, sociology, and world literature.
- Analyze culture, globalization, or global cultural diversity, and describe an event or process from more than one point of view.
- Analyze the historical development of one or more non-U.S. societies.
- Analyze the significance of one or more major movements that have shaped the world's societies.
- Analyze and discuss the role that race, ethnicity, class, gender, language, sexual orientation, belief, or other forms of social differentiation play in world cultures or societies.
- Speak, read, and write a language other than English, and use that language to respond to cultures other than one's own.

AND

Complete at least 1 courses in the following course sets:

- Flexible Core U.S. Experience in Its Diversity

A course in this area must meet *at least three* of the following *additional* learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the U.S. experience in its diversity, including, but not limited to, anthropology, communications, cultural studies, economics, history, political science, psychology, public affairs, sociology, and U.S. literature.
- Analyze and explain one or more major themes of U.S. history from more than one informed perspective.
- Evaluate how indigenous populations, slavery, or immigration have shaped the development of the United States.
- Explain and evaluate the role of the United States in international relations.
- Identify and differentiate among the legislative, judicial, and executive branches of government and analyze their influence on the development of U.S. democracy.
- Analyze and discuss common institutions or patterns of life in contemporary U.S. society and how they influence, or are influenced by, race, ethnicity, class, gender, sexual orientation, belief, or other forms of social differentiation.

***Note: HIS 1004 History of American Civilization I** is no longer offered at Baruch, but it does appear on students' transfer evaluations. This course may be used to satisfy the U.S. Experience in its Diversity requirement of the Pathways curriculum without appeal.*

AND

Complete at least 1 courses in the following course sets:

- Flexible Core Creative Expression

A course in this area must meet *at least three* of the following *additional* learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring creative expression, including, but not limited to, arts, communications, creative writing, media arts, music, and theater.
- Analyze how arts from diverse cultures of the past serve as a foundation for those of the present, and describe the significance of works of art in the societies that created them.
- Articulate how meaning is created in the arts or communications and how experience is interpreted and conveyed.
- Demonstrate knowledge of the skills involved in the creative process.
- Use appropriate technologies to conduct research and to communicate.

AND

Complete at least 1 courses in the following course sets:

- Flexible Core Individual and Society

A course in this area must meet *at least three* of the following *additional* learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the relationship between the individual and society, including, but not limited to, anthropology, communications, cultural studies, history, journalism, philosophy, political science, psychology, public affairs, religion, and sociology.
- Examine how an individual's place in society affects experiences, values, or choices.
- Articulate and assess ethical views and their underlying premises.
- Articulate ethical uses of data and other information resources to respond to problems and questions.
- Identify and engage with local, national, or global trends or ideologies, and analyze their impact on individual or collective decision-making.

AND

Complete at least 1 courses in the following course sets:

- Flexible Core Scientific World

A course in this area must meet at least three of the following *additional* learning outcomes. A student will:

- Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies.
- Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions.
- Articulate and evaluate the empirical evidence supporting a scientific or formal theory.
- Articulate and evaluate the impact of technologies and scientific discoveries on the contemporary world, such as issues of personal privacy, security, or ethical responsibilities.
- Understand the scientific principles underlying matters of policy or public concern in which science plays a role.

Note: The following courses are no longer offered at Baruch, but do appear on students' transfer evaluations. Any of these courses may be used to satisfy the *Scientific World* or the *Life and Physical Sciences* requirement of the Pathways curriculum without appeal: BIO 1003; BIO 1005; CHM 1000; ENV 1020; ENV 1021; and PHY 1003. One course may not be used to satisfy both requirements.

STEM VARIANT COURSES

The following courses may be used to satisfy either the **Life and Physical Sciences** or the **Scientific World** requirement (one course may not satisfy both requirements). Students who wish to pursue a major or minor in the Natural Sciences should satisfy the Pathways science requirements with STEM Variant courses.

0903051 - Missing course Principles of Biology I

0905521 - Missing course General Chemistry I

0937161 - Missing course General Physics I

0937241 - Missing course Quantitative Physics I

AND

Complete at least 1 courses in the following course sets:

- Flexible Core - Any Area

Additional Comments:

The Flexible Core is made up of six courses, which must be taken in five different categories (numbered 4-8): ***4) World Cultures and Global Issues; 5) U.S. Experience in its Diversity; 6) Creative Expression; 7) The Individual and Society;*** and ***8) Scientific World***.

In fulfilling the six-course requirement, students may not take more than two courses from any one department, discipline, or interdisciplinary field.

Please note that some departments offer courses in more than one category…

- ANT and SOC courses are offered by the Department of Sociology and Anthropology;
- ART, MSC, and THE courses are offered by the Department of Fine and Performing Arts;
- BLS and LTS *(formerly HSP)* courses are offered by the Department of Black and Latino Studies;
- BIO, ENV, CHM, and PHY courses are offered by the Department of Natural Science; and
- Within the Pathways Flexible Core, POL and PAF (formerly PUB) are considered to be a single field.

***All Flexible Core courses must meet the following three learning outcomes*. A student will:**

- Gather, interpret, and assess information from a variety of sources and points of view.
- Evaluate evidence and arguments critically or analytically.
- Produce well-reasoned written or oral arguments using evidence to support conclusions.

The learning goals or outcomes of each area within the Flexible Core are included above, followed by lists of applicable courses.

Baruch no longer restricts students to one course from any given discipline, department, or interdisciplinary field

Major Requirement: CS with a Concentration in Environmental Science
Type
Completion Requirement

Complete ALL of the following Courses:

- ENV 1003 - Fundamentals of Ecology
- ENV 1004 - Fundamentals of Ecological Research
- ENV 3016 - Environmental Modeling
- ENV 4900 - Topics in Environmental Science

- The environmental science faculty mentor is Dr. Stephen Gosnell.
- This concentration requires two CS electives. Students with this concentration are encouraged to take the Machine learning elective (MTH 4330).

Additional Comments:

Major Requirement: CS with Concentration in Applied Linguistics
Type
Completion Requirement

Complete ALL of the following Courses:

- ENG 3700 - Introduction to Linguistics: The Study of Language
  OR ENG 3750 - The Structure and History of English
- ENG 3960 - Topics in Language

- This concentration focuses on Computer Assisted Language Learning (CALL). The linguistics faculty mentor is Dr. Brooke Schreiber.
- This concentration requires two CS electives

Additional Comments:

Major Requirements - Overall
Type
Completion Requirement

Fulfill ALL of the following requirements:

Earn at least 43 credits
Pathways requirements, consisting of 13 credits of Required Core (including a STEM alternative MTH 2610), 18 credits of Flexible Core, and 12 credits of the College Option

AND

Earn at least 9 credits
Pre-Weissman core courses (including foreign languages)

AND

Earn at least 26 credits
Required Mathematics courses

AND

Earn at least 15 credits
Major/Concentration elective courses

AND

Earn at least 27 credits
Elective courses

Additional Comments:

Major Requirements - Program Requirements
Type
Completion Requirement

Fulfill ANY of the following requirements:

Option 1

- MTH2610 Calculus I- Calculus I **OR** Calculus AP Exam(AB) with a score of 4 or 5 (transfers to Baruch as MTH 2610)
- 0931651 - Missing course- Calculus II

OR

Optional 2

Complete ALL of the following Courses:

- MTH 2205 - Precalculus and Elements of Calculus 1B
  OR MTH 2206 - Applied Calculus
  OR MTH 2207 - Elements of Calculus I and Matrix Algebra
- MTH 3006 - Elements of Calculus II

OR

Option 3

Calculus AP Exam (BC) with a score of 4 or 5 (transfers to Baruch as MTH 3010)

OR

Option 4

Complete ALL of the following Courses:

- MTH 2630 - Analytic Geometry and Calculus I

- CS+ majors need the equivalent of two semesters of calculus which could be satisfied by one of the following 4 options.

Additional Comments:
Students must meet the following requirement to gain admission to the program:

- In Options 1,2, and 4, the combined calculus GPA must be at least 3.5 out of 4.0.
- MTH3300 (or CIS 2300) and MTH3150 with a minimum grade of B in each course.

Students who fail to obtain sufficiently high grades to enter the program could use the CS courses they took to obtain a CS minor. This minor already exists at Baruch.It consists of MTH3300(or CIS 2300), MTH3150, and one capstonecourse. Thus, after taking the prerequisites for the CS+ program, a student would needonlya capstone course to compete the CSminor.

Major Requirements - Required Courses
Type
Completion Requirement

Complete ALL of the following Courses:

- MTH 3150 - Discrete Math: An Invitation to Computer Science
- MTH 3300 - Algorithms, Computers, and Programming I
  OR CIS 2300 - Programming and Computational Thinking
- MTH 4300 - Algorithms, Computers and Programming II

- MTH 4320 - Data Structures and Algorithms
- MTH 4350 - Computer Architecture
- MTH 4355 - Operating Systems
- MTH 4360 - Complexity and Computational Models

Additional Comments:

Major Requirements- Pre- Weissman Core
Type
Completion Requirement

Fulfill ALL of the following requirements:

Complete ALL of the following Courses:
- COM 1010 - Speech Communication
  OR COM 1010H - Honors Speech Communications

AND

Foreign Language

Earn at least 6 credits
Students may not use proficiency and/or exemption exams to satisfy this requirement.

1st Foreign Language course (based on placement) and 2nd Foreign Language course (the same language as the 1st Foreign Language course)

Students who transfer language credits for languages not taught at Baruch College may use these credits for the foreign language requirement at Baruch College.

Placement Information:
Students should review the guidelines below, and see a faculty advisor in the Department of Modern Languages and Comparative Literature to confirm proper placement if they intend to continue a language to which they have prior exposure. Students have the option of taking a placement exam to ensure that they are placed at the correct level.

Please consult the **Department of Modern Languages and Comparative Literature** for assistance.

Additional Comments:

Major Requirements - Elective Courses
Type
Completion Requirement

Fulfill ANY of the following requirements:

Complete ANY of the following Courses:
- MTH 4330 - Introduction to Machine Learning
- CIS 3500 - Computer Networking
- CIS 3400 - Database Management Systems
- CIS 3630 - Principles of Web Design
- MTH 4140 - Graph Theory
- CIS 4560 - Ethical Hacking
- MTH 4325 - Programming Languages
- MTH 4150 - Combinatorics
- MTH 4250 - Introduction to Cryptography
- MTH 4135 - Computational Methods in Probability
- MTH 4335 - Introduction to Natural Language Processing

The program also includes advanced CS elective courses. CS+ majors are required to take 1-2 CS electives, depending on their concentration. A CS+ major with no concentration is required to take four CS electives.

Additional Comments:

Major Requirements- General Track

Type
Completion Requirement

Computer Science - General Track

Concentration Requirements: 12-16 credits

Students must complete four courses from the computer science electives list.

Additional Comments:

Major Requirement: CS with Concentration in Biology
Type
Completion Requirement

Complete ALL of the following Courses:

- BIO 2100 - Biostatistics
  OR ENV 2100 - Biostatistics

- This concentration focuses on bioinformatics. The biology faculty mentors are Dr. Zachary Calamari and Dr. Rebecca Spokony.
- Students are also required to take Bioinformatics (4 credits), this is a new course which is currently being created by Zachary Calamari.
- This concentration requires two CS electives.

Complete ALL of the following :

Additional Comments:

Major Requirement: CS with Concentration in Physics
Type
Completion Requirement

Complete ALL of the following Courses:

- PHY 3004 - Physics on the Computer with Python
- PHY 4004 - Statistical Physics with Applications to Mathematical Finance

- This concentration is focused on computational physics. The physics faculty mentors are Dr. Adrian Dumitru and Dr. Stefan Bathe.
- This concentration requires two CS electives.
- Note: PHY 3004 has no significant overlap with the CS Python course MTH 3300 (or CIS 2300)

Additional Comments:

Major Requirement: CS with Concentration in Financial Mathematics
Type
Completion Requirement

Complete ALL of the following Courses:

- MTH 4120 - Introduction to Probability
- MTH 4500 - Introductory Financial Mathematics
- MTH 4115 - Numerical Methods for Differential Equations in Finance

- This concentration is focused on computational finance. The mathematical finance faculty mentor is Dr. Douglas Howard.
- This concentration requires one CS elective. Students with this concentration are encouraged to take the Machine learning elective (MTH 4330).
- MTH 4115 has linear algebra as a pre or co-requisite. However, MTH 3150 would be an alternative prerequisite.

Additional Comments:

Major Requirement: CS with a Concentration in Psychology
Type
Completion Requirement

Complete ALL of the following Courses:

- PSY 1001L - Lect Gen Psychology
- PSY 3001 - Research Methods in Psychology
- PSY 3081 - Cognitive Psychology
  OR PSY 3082 - Mind, Brain, and Behavior
  OR PSY 3056 - Social Psychology
  OR PSY 3067 - The Psychology of Motivation and Learning

- This concentration includes computational work in one of Baruch's psychology laboratories. For that reason, it requires more courses than other concentrations. The psychology mentors are Dr. Tatiana Emmanouil and Dr. Jennifer Mangels.
- Independent study at one of the relevant psychology labs is also required for this concentration.
- This concentration requires one CS elective.

Additional Comments: