Agenda

- Computer Science
- Bioinformatics
- Program Overview
- Resources
- Q/A
Computer Science

Covers:
- System building
- System architecture
- Theory and Concepts
- Design
- Software engineering
- Performance
What Is Bioinformatics?

- New and rapidly growing interdisciplinary field at the intersection of computer science and biology
- Computer science provides tools to generate, maintain, analyze and utilize bioinformation
- Computer science is biology’s microscope for the 21st century
Computer Science Faculty
(Including Bioinformatics)

- Faculty have PhDs from some of the world’s most prestigious universities.

- Some faculty have come to NJIT after successful careers at such companies as Bell Labs, AT&T, and IBM, among others.
Faculty Expertise

Students can interact with faculty in areas such as:

- Databases
- Data Mining
- Bioinformatics
- Algorithms
- Software Engineering
- Parallel Computing
- Telecommunications and Networking
- Graphics and Image Processing
- Artificial Intelligence
- Performance Analysis
- Mobile Computing
- Security
Personnel

- 30 Research/teaching faculty in Computer Science
- 20 Teaching faculty
- Full-time professional staff for student advisement
Bachelor of Science in Computer Science (BSCS)

- Provides students with strong background in both the conceptual and practical aspects of Computer Science

- Curricula have been developed according to the recommendations of ACM/IEEE

- Courses are constantly being monitored and modified for relevance.

- New courses are introduced as warranted by new developments

- Fully accredited by ABET/CAC
# Computer Science Curriculum

<table>
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<tr>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
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<tbody>
<tr>
<td>Computing</td>
<td>The Machine</td>
<td>Disciplinary</td>
<td>Integration</td>
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<td>Foundations</td>
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<td>Depth</td>
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<td>Logic &amp; automata</td>
<td>Algorithms</td>
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<td>Societal Issues</td>
<td>Software Engineering</td>
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<td>DB Design</td>
<td>Capstone</td>
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<td>Problem-solving,</td>
<td>Language Theory</td>
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<td>Programming</td>
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<td>&amp; Data Structures</td>
<td>Computer Organization</td>
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<td>Operating Systems</td>
<td>DB Design</td>
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- Freshman: Computing Foundations
- Sophomore: The Machine
- Junior: Disciplinary Depth
- Senior: Integration
CS Curriculum Overview

- 12 required CS courses
- 4 CS elective courses
- 5 math courses
- 3 science courses
- 11 elective courses
- 8 General University Requirements
Bioinformatics Degree .. A Stepping Stone

- “Industry’s demand for scientists with skills in bioinformatics far exceeds the supply” – Science
- “Bioinformatics specialists can expect to receive salaries that exceed those ... in comparable computer careers” – Madison Magazine
The Bioinformatics Curriculum

- A broad and balanced selection of courses drawn from biology and computer science
- Hands-on experience with cutting-edge software packages and insight into their design
Environment

An environment that gives students the background and skills necessary for entry into today's workplace. This is achieved through:

- Senior team project working with industry
- Faculty that works steadily in the forefront of many research areas
- Interaction with industry and experts
- An administration focused on teaching, research, and student services
## Average Computing Salaries

<table>
<thead>
<tr>
<th>Occupation Title</th>
<th>Annual Salary</th>
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<tbody>
<tr>
<td>Computer Scientists, Research</td>
<td>$135,000</td>
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<tr>
<td>Computer Programmers</td>
<td>$69,040</td>
</tr>
<tr>
<td>Computer Software Engineers</td>
<td>$58,100</td>
</tr>
<tr>
<td>Computer Support Specialists</td>
<td>$47,330</td>
</tr>
<tr>
<td>Computer Systems Analysts</td>
<td>$51,000</td>
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<tr>
<td>Database Administrators</td>
<td>$88,000</td>
</tr>
<tr>
<td>Network and Computer Systems Administrators</td>
<td>$60,000</td>
</tr>
<tr>
<td>Network Systems and Data Communications Analysts</td>
<td>$52,000</td>
</tr>
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Some NJ IT Facilities

- Four year honors experience (Albert Dorman Honors College)
- Wireless areas (classrooms, library)
- A large number of public computers
More than BS

- BS/MS: have 6 credits count for BS and MS; free tuition in 1st semester (if eligible), 5 year program
- Double majors: have 2 majors completed in 4 years
- Variety of Minors: select from 25 minors (6 courses each)
Questions or Comments??
A Sampler of Bioinformatics Problems

- Reading the human genome (3 billion units of information)
- Predicting the shape and interaction of biomolecules
- Managing and analyzing snapshot data of cell function from microarrays
- Enabling large-scale drug discovery methods
- Constructing the Tree of Life – the map of relations of common descent of all living things
Computer Science
Required Courses

- Introduction to Computer Science I and II
- Computer Organization and Architecture
- Programming Language Concepts
- Intensive Programming Practicum
- Principles of Operating Systems
- Fundamentals of Computer Science I and II
- Computer and Society
- Advanced Data Structures and Algorithms
- Database Design and Management
- Guided Design and Software Engineering
- Senior Project (Capstone)
Computer Science
Elective Course Sample

- Multimedia Information Systems
- Introduction to Unix/Linux Operating System
- Systems Simulation
- Computer Vision
- Data Communications and Networks
- Data Mining
- Open Systems Networking
- Web Development
- Object Oriented System Design
- Image Processing
- Security
Computer Science Mathematics Courses

- Calculus I
- Calculus II
- Calculus III
- Probability and Statistics
- Mathematics Elective (e.g. Linear Algebra)
Computer Science Program Electives

- 4 Computer Science Courses
- 4 General Electives (Usually used for pre-requisites)
- 3 Interdisciplinary Studies (Engineering, Science, Mathematics)
General University Requirements

- English Composition
- History
- Philosophy
- Literature
- Economics
- Management