**Stanford University ♦ School of Engineering**

# Computer Science

## Computational Biology Track

## 2023-2024 Program Sheet

***Final version of program sheet is due to the department one month prior to the last quarter of senior year.***

***Follow all requirements as stated for the year of the program sheet used.***

Name: _____ SUID #: _____

Phone: _____ Email: _____

Today's Date: _____ Month/Yr B.S. expected: _____

### Mathematics and Science Requirement

| Dept | Course | Title | Transfer/AP Approval by SoE | | | Unit | Grade |
|---|---|---|---|---|---|---|---|
| | | | ✓ if Transfer | SoE Initials | Date | | |
| *Mathematics (20 units minimum)* | | | | | | | |
| MATH | 19 | Calculus (see note 1) | | | | | |
| MATH | 20 | | | | | | |
| MATH | 21 | | | | | | |
| CS | 103 | Mathematical Foundations of Computing | | | | | |
| CS | 109 | Introduction to Probability for Computer Scientists | | | | | |
| | | | | | *Mathematics Unit Total (20 units minimum)* | | |

*Biology (12 units minimum; take BIO or HUMBIO sequence)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BIO | Any 3 of 82, 83, 85, 86 | Genetics/Biochem & Mol Biol/Evolution/Cell Biology | | | | | |
| *OR* HUMBIO | 2A, 3A, 4A | Genetics, Evolution & Ecology/Cell & Dev/Human Org | | | | | |
| | | | | | *Science Unit Total (12 units minimum)* | | |
| | | | | | *(32 units min. Math/Sci combined)* | | |

### Technology in Society Requirement *(1 course req'd; see note 7 for WIM options)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | A TiS course must be on the SoE-approved list the year you take it. | | | | | |

### Engineering Fundamentals *(8 units minimum)*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CS | 106B | Programming Methodology | | | | | |
| | | Elective (see note 2) | | | | | |
| | | | | | *Engineering Fundamentals Total (8 units minimum)* | | |

### NOTES

* **All courses listed on this form can be included under only one category. There is no double-counting.**

* **All courses listed on this form must be taken for a letter grade (unless taken Spring 2019-20, and Aut-Sum 2020-21)**

* This printed form must be signed by the departmental representative. Changes must be petitioned (see UGHB, Petitions page) and initialed in ink.

* Minimum Grade Point Average (GPA) for all courses in Engineering Fundamentals and Computer Science Depth (combined) is 2.0.

* Students without prior programming experience should first take CS106A. The major otherwise requires at most 95 units, so even with CS106A, the BSCS major adheres to the university's 100-unit cap on all undergraduate majors.

* Transfer and AP credits in Math, Science, Fundamentals, & TIS must be approved by the SoE Dean's Office: https://ughb.stanford.edu/transfers-ap-exceptions in UGHB fo approval process. Transfer credits in Computer Science Core, Depth and Senior Project must be approved by the Computer Science office.

* Courses must be taken for the number of units on the Program Sheet. CS 103, 106B, 107, 109, 111 and 161 must be taken for 5 units.

( 1 ) MATH 19/20/21 or equivalent (10 units AP BC, or transfer, with placement into MATH 51/CME 100) is acceptable. If 6-8 units AP or IB credit are used, must take Math 21 (21 may not be skipped using Math Diagnostic Placement results). AP must be approved by SoE; see **https://ughb.stanford.edu/transfers-ap-exceptions** in UGHB.

( 2 ) One course required; may not be any CS 106. See ENGR Fundamentals Courses list at ughb.stanford.edu

# CS Computational Biology Track Program Sheet (continued)

## CS Computational Biology Track Core, Depth, and Senior Project *(43 units minimum)*

*Be advised: no course may be listed twice on the sheet; no double-counting.*

| Dept | Course | Title | Transfer/Deviation Approval by Dept | | | Unit | Grade |
|---|---|---|---|---|---|---|---|
| | | | ✓ if Transfer | Dept Initials | Date | | |
| **Core (15 units minimum)** | | | | | | | |
| CS | 107 or 107E | Computer Organization and Systems | | | | | |
| CS | 111 | Operating Systems Principles | | | | | |
| CS | 161 | Design and Analysis of Algorithms | | | | | |
| **Depth (25 Units minimum)** | | | | | | | |
| CS | 173A | Foundations of Computational Human Genomics | | | | | |
| CS | 221 | Artificial Intelligence: Principles and Techniques | | | | | |
| CS | 145 or 246 | Databases, Mining Massive Datasets | | | | | |
| CS | 142, 147L, or 448B | Web Applications, Data Visualization | | | | | |
| | | Restricted Elective (see note 3) Comp Bio | | | | | |
| CS | | Restricted Elective (see note 4) AI | | | | | |
| | | Restricted Elective (see note 5) Quant Tools | | | | | |
| | | Restricted Elective (see note 6) Application Areas | | | | | |
| **Seior Project (3 Units Minimum)** | | | | | *Total depth units (25 minimum)* | | |
| CS | | At least 3 units of 191, 191W, 194, 194H, 194W, 210B, or 294 *(see note 7)* | | | | | |
| | | | | | *Computer Science Core and Depth Total (43 units minimum)* | | |

### Program Approvals

*Departmental*

Printed Name: _____ Date: _____

Signature: _____

*School of Engineering (No action required-office use only)*

Printed Name: _____ Date: _____

Signature: _____

**NOTES (continued from page 1)**

( 3 ) One course selected from CS 279, 371; BIOMEDIN 210, 214, 215, 217, 219, 220, 222, 260, 273B; IMMUNOL 207

( 4 ) Pick one course from:
Area I) AI Methods: 224R, 224W, 228, 229, 229S, 234, 238; Area II) Natural Language Processing: CS 124, 224N, 224V; Area III) Vision: CS131, 231N

( 5 ) One course selected from: CS 147, 148, 154, 166, 168, 185, 230, 248A, 353; BIO 183, 187; BIOC 241; BIOMEDIN 248; EE 263, 364A; MS&E 152, 252; STATS 141, 202, 203, 205, 206, 211, 315A, 315B; ChemEng 150; AppPhys 294; or a class from: CS 142, 147L, 448B, note 3, or a distinct area from note 4

( 6 ) One course selected from: BioE 220; ChemEng 150, 174; GENE 211; ME 281; AppPhys 294; Bio 81, 82, 83, 84, 85, 86, 112, 214, 230; Chem 31A, 31B, 31M, 33, 141, 143, 171; BIOC 241; Dbio 210; Surg 101, or a class from note 3

( 7 ) The WIM requirement may be met by taking CS 181W or 182W as a Technology in Society course or through the Senior Project course (191W, 194W, or 210B only).