

**Stanford University ♦ School of Engineering**  
**Computer Systems Engineering**  
**Robotics and Mechatronics Specialization**  
**2009–2010 Program Sheet**

*Final version of completed and signed program sheet due to the department no later than one month prior to the last quarter of senior year.*

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

Name: \_\_\_\_\_ SU ID: \_\_\_\_\_  
 Email: \_\_\_\_\_ Local Phone: \_\_\_\_\_  
 Date: \_\_\_\_\_ Date B.S. expected: \_\_\_\_\_

**Mathematics and Science Requirements**

| Dept   | Course   | Title  | Transfer/AP Approval |          |      | Unit | Grade |
|--|----------|--|----------------------|----------|------|------|-------|
|  |          |  | ✓ if Transfer        | Initials | Date |      |       |
| <b>Mathematics (25 units minimum)</b>            |          |  |                      |          |      |      |       |
| MATH   | 41       | Calculus   |                      |          |      | 5    |       |
| MATH   | 42       | Calculus   |                      |          |      | 5    |       |
| MATH   | 51       | Calculus   |                      |          |      | 5    |       |
| MATH   | 52 or 53 | Calculus   |                      |          |      | 5    |       |
| CS   | 109      | Introduction to Probability for Computer Scientists <sup>1</sup> |                      |          |      | 5    |       |
| <i>Mathematics Unit Total (25 units minimum)</i> |          |  |                      |          |      |      |       |

**Science (12 units minimum)**

|  |    |                           |  |  |  |   |  |
|--|----|---------------------------|--|--|--|---|--|
| PHYSICS  | 41 | Mechanics                 |  |  |  | 4 |  |
| PHYSICS  | 43 | Electricity and Magnetism |  |  |  | 4 |  |
| PHYSICS  | 45 | Light and Heat            |  |  |  | 4 |  |
| <i>Science Unit Total (12 units minimum)</i>                 |    |                           |  |  |  |   |  |
| <i>Mathematics and Science Unit Total (37 units minimum)</i> |    |                           |  |  |  |   |  |

**Technology in Society Requirement (1 course required; see UGHB Fig. 3-3 for approved list)**

|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|

**Engineering Fundamentals (13 units minimum)**

|  |     |  |  |  |  |   |  |
|--|-----|--|--|--|--|---|--|
| CS   | 106 | Programming Abstractions (B or X)  |  |  |  | 5 |  |
| ENGR   | 40  | Introductory Electronics   |  |  |  | 5 |  |
|  |     | Elective (see UGHB Fig.3-4; 1 course required; may not be CS 106A, B or X) |  |  |  |   |  |
| <i>Engineering Fundamentals Total (13 units minimum)</i> |     |  |  |  |  |   |  |

**NOTES**

- \* This form is available as an Excel file at <http://ughb.stanford.edu/>. The printed form must be signed by the departmental
  - \* Read all emails from the Office of Student Affairs; this is the SoE's only method of conveying key information to Eng majors.
  - \* All courses listed on this form must be taken for a letter grade if offered by the instructor.
  - \* Minimum Grade Point Average (GPA) for all courses in Engineering Fundamentals and Computer Systems Engineering Core and
  - \* Transfer and AP credits in Math, Science, Fundamentals, & TIS must be approved by the SoE Dean's office. Transfer credits in Computer Systems Engineering Core and Depth must be approved by the Computer Science undergraduate program representative. Transfer credit information and petitions are available at <http://ughb.stanford.edu/transfer.html>.
  - \* All courses listed on this form must only be included under one category. Delete courses not taken.
- ( 1 ) Students who complete STATS 116, MS&E 120, or CME 106 in Winter 2008-09 or earlier may count that course as satisfying the CS 109 requirement. These same courses taken in Spring 2008-09 or later cannot be used to satisfy the CS 109 requirement.

**Computer Systems Engineering (53 units minimum)**

| Dept                           | Course     | Title   | Transfer/AP Approval |          |      | Unit   | Grade |
|--------------------------------|------------|---|----------------------|----------|------|--------|-------|
|                                |            |   | ✓ if Transfer        | Initials | Date |        |       |
| <b>Core (32 units minimum)</b> |            |   |                      |          |      |        |       |
| CS                             | 103        | Mathematical Foundations of Computing <sup>2</sup>        |                      |          |      | 5      |       |
| CS                             | 107        | Computer Organization and Systems <sup>3</sup>            |                      |          |      | 5      |       |
| CS                             | 108 or 110 | Object-Oriented Systems Design, or Principles of Comp Sys |                      |          |      | 4 or 5 |       |
| EE                             | 102A       | Signals and Systems I                                     |                      |          |      | 4      |       |
| EE                             | 102B       | Signals and Systems II                                    |                      |          |      | 4      |       |
| EE                             | 108A       | Digital Systems I   |                      |          |      | 4      |       |
| EE                             | 108B       | Digital Systems II  |                      |          |      | 3 or 4 |       |
| Senior Project                 |            | CS191, 191W, 194, 210B, 294 or 294W (see notes 4, 5)      |                      |          |      | 3      |       |

*Computer Systems Engineering Core Total (32 units minimum)*

**Depth (19 units minimum)**

|      |      |  |  |  |  |   |  |
|------|------|--|--|--|--|---|--|
| CS   | 205A | Mathematical Methods for Robotics, Vision and Graphics |  |  |  | 3 |  |
| CS   | 223A | Introduction to Robotics                               |  |  |  | 3 |  |
| ME   | 210  | Introduction to Mechatronics (or EE 118)               |  |  |  | 4 |  |
| ENGR | 105  | Feedback Control Design                                |  |  |  | 3 |  |

**Plus two to three of the following (see note 6; delete courses not taken from form)**

|      |      |   |  |  |  |   |  |
|------|------|---|--|--|--|---|--|
| AA   | 278  | Optimal Control and Hybrid Systems        |  |  |  | 3 |  |
| CS   | 223B | Introduction to Computer Vision           |  |  |  | 3 |  |
| CS   | 225A | Experimental Robotics                     |  |  |  | 3 |  |
| CS   | 225B | Robot Programming Laboratory              |  |  |  | 4 |  |
| CS   | 277  | Experimental Haptics                      |  |  |  | 3 |  |
| ENGR | 205  | Introduction to Control Design Techniques |  |  |  | 3 |  |
| ENGR | 206  | Control System Design                     |  |  |  | 4 |  |
| ENGR | 207A | Linear Control Systems I                  |  |  |  | 3 |  |
| ENGR | 207B | Linear Control Systems II                 |  |  |  | 3 |  |

*Computer Systems Engineering Depth Total (19 units minimum)*

**Computer Systems Engineering Core + Depth Total (52 units minimum)**

**Program Approvals**

*Departmental*

Printed Name: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

*School of Engineering (signature not required prior to graduation)*

Printed Name: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**NOTES (continued from page 1)**

- ( 2 ) Students who have taken either CS 103X or CS 103A, B are considered to have satisfied the CS 103 requirement. Students taking CS103A, B may complete the lower number of elective courses in a given specialization (see footnote 6).
- ( 3 ) The name of CS107 has changed. The previous CS 107 course titled *Programming Paradigms* also fulfills this requirement.
- ( 4 ) The WIM requirement may be met by taking CS 181 as a Technology in Society course or through the Senior Project course (191W, 194, 210B, or 294W only).
- ( 5 ) Independent study projects (CS 191 or 191W) require faculty sponsorship and must be approved, in advance, by the advisor, faculty sponsor, and the CSE senior project advisor (Robert Plummer or Patrick Young). A signed approval form, along with a brief description of the proposed project, should be filed with the department representative in Gates 182 the quarter before work on the project is begun.
- ( 6 ) Students who take CS 103A, B may complete the lower number of elective courses in a given specialization (i.e., one less elective than students taking CS 103X or CS 103).