**Mathematics and Science Requirement (Delete courses and units not taken)**

<table>
<thead>
<tr>
<th>Dept</th>
<th>Course</th>
<th>Title</th>
<th>Transfer/AP Approval by SoE</th>
<th>Unit</th>
<th>Grade</th>
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</table>

**Mathematics (26 units minimum)**

- MATH
  - Calculus (see note 1)

- CS
  - 103 Mathematical Foundations of Computing
  - 109 Introduction to Probability for Computer Scientists

- Plus two electives (see note 2)

**Science (11 units minimum)**

- PHYS
  - 41 Mechanics (or PHYS 21 or PHYS 61)
  - 43 Electricity and Magnetism (or PHYS 23 or PHYS 63)

- Elective (see note 3)

**Technology in Society Requirement (1 course req’d; course must be on Approved list in UGHB Fig. 4-3 the year taken; see note 10)**

**Engineering Fundamentals (13 units minimum)**

- CS
  - 106 Programming Abstractions (B or X)

- ENGR
  - 40M or 40A Introductory Electronics (ENGR 40 also allowed; see note 4)

- Elective: May be an ENGR Fundamentals or an additional CS Depth course (see note 5)

**NOTES**

* All courses listed on this form must be taken for a letter grade (if offered) and can be included under only one category.
* This printed form must be signed by the departmental representative. Changes must be petitioned (see UGHB pg 27-29) and initialed in ink.
* Minimum Grade Point Average (GPA) for all courses in Engineering Funds and CS Core, Depth, and Senior Project (combined) is 2.0.
* Transfer and AP credits in Math, Science, Fundamentals, & TIS must be approved by the SoE Dean's Office. Transfer credits in Computer Science Core, Depth, and Senior Project must be approved by the Computer Science undergraduate program office.
* Courses must be taken for the number of units on the Program Sheet. CS103, 106B/X, 107, 109, 110, and 161 must be taken for 5 units.
  
  (1) Math 19/20/21 or Math 41/42 or AP credit may be used, as long as at least 26 math units are taken. AP Calculus must be approved by SoE.

  (2) Math electives: Math 51, 104, 108, 109, 110, 113; CS 157, 205A; PHIL 151; CME 100, 102, 103 (or EE 103), 104. Completion of Math 52 & 53 will (together) count as one Math elective. Restrictions: CS 157 + Phil 151 may not be used in combination to satisfy the Math electives requirement. Students who have taken both Math 51 and 52 may not count CME 100 as an elective.

  (3) Any course of 3 or more units from the SoE Science List (Fig. 3-2 in the UGHB), Psych 30, or AP Chem may be used.

  (4) Students who take ENGR 40A or 40M for fewer than 5 units are required to take 1-2 additional units of ENGR Fundamentals (13 units minimum), or 1-2 additional units of Depth (26-27 units minimum for track and elective courses).

  (5) See Fig. 3-4 in the UGHB for approved ENGR Fundamentals list. May not be any CS 106.
# CS Graphics Track Program Sheet (continued)

## CS Graphics Track Core, Depth, and Senior Project (43 units minimum)

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

<table>
<thead>
<tr>
<th>Dept</th>
<th>Course</th>
<th>Title</th>
<th>Transfer/Deviation Approval by Dept</th>
<th>Unit</th>
<th>Grade</th>
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### Core (15 units minimum)

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<th>Dept</th>
<th>Course</th>
<th>Title</th>
<th>Transfer/Deviation Approval by Dept</th>
<th>Unit</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS</td>
<td>107 or 107E</td>
<td>Computer Organization and Systems</td>
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<td></td>
<td></td>
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<tr>
<td>CS</td>
<td>110</td>
<td>Principles of Computer Systems</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>161</td>
<td>Design and Analysis of Algorithms</td>
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### Depth; Track and Electives (25 units and seven courses minimum)

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<tr>
<th>Dept</th>
<th>Course</th>
<th>Title</th>
<th>Transfer/Deviation Approval by Dept</th>
<th>Unit</th>
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</table>

- **Track Requirement A**
  - CS 148 Introduction to Computer Graphics
  - CS 248 Three-Dimensional Computer Graphics

- **Track Requirement B (see note 6)**
  - Track Requirement C (see note 7)

- **Track Requirement C (see note 7)**
  - Elective (see note 8)
  - Optional Elective (see note 9)

### Senior Project (1 course required)

<table>
<thead>
<tr>
<th>Dept</th>
<th>Course</th>
<th>Title</th>
<th>Transfer/Deviation Approval by Dept</th>
<th>Unit</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS</td>
<td></td>
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<tr>
<td></td>
<td>At least 3 units of 191, 191W, 194, 194H, 194W, 210B, 294 or 294W (see note 10)</td>
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</tbody>
</table>

**Computer Science Core, Depth and Senior Project Total (43 units minimum)**

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## 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)

1. **Track Requirement B:** Any one of CS 205A; CME 104, 108; MATH 52, 113. (CS 205A is strongly recommended as a preferred choice. Note that students taking CME 104 are also required to take its prerequisite course, CME 102.)
2. **Track Requirement C:** Any two of CS 131 or 231A, 233, 268, 348A, 348B, 348C, 448
3. **Track Electives:** At least two add'l courses selected from the Track Requirement B list, C list, General CS Electives list (see note 9), or the following: ARTSTUDI 160, 170, 179; CME 302, 306; EE 168, 262, 264, 278, 368; ME 101; PSYCH 30, 221
5. The WIM requirement may be met by taking CS 181W as a Technology in Society course or through the Senior Project course (191W, 194W, 210B, or 294W only).