Possible Sequences for the Physics Major (Revised Spring 2014)

**REQUIREMENTS FOR THE MAJOR:** All courses on the “required” list below, three courses from “core” list, one additional course from either the “core” or “elective” lists, a *Complementary Lab Science* course (see catalog for a list), Math 30, 31, 32 or 107, and Math 60 (Linear Algebra).

**REQUIREMENTS FOR THE MINOR:** Intro courses from the “required” list, Physics 101&lab, at least one core course, and two other upper-division course credits from core, laboratory and elective courses, and Math 30, 31, 32 or 107, & 60.

**Required courses for the major** *(offered every year):*

**Intro Courses**
- Physics 70&lab: Spacetime, Quanta, and Entropy (general introduction for all potential majors)
- Physics 71 (half)*: Introduction to Mechanics
- Physics 72 (half)*: Introduction to Electrodynamics
  *or passing score on the relevant placement test

**Other Required Courses**
- Physics 101&lab: Atomic and Nuclear Physics *(requires 41/42 or 70, at least concurrent Math 32 or 107)*
- Physics 125: (Intermediate Newtonian) Mechanics *(requires 41/42 or 70, Math 32 or 107, Math 60; one of Math 32, 60, or 107 completed prior to taking 125)*
- Physics 142: Electricity and Magnetism *(requires same as Mechanics)*
- Physics 170: Quantum Mechanics *(requires 101, Math 60)*
- Physics 175: Statistical Physics *(requires 101, Math 60)*
- Physics 148: Computational Methods *(requires Math 60)*
- Physics 160: General Relativity *(requires 125)*
- Physics 165: Fluid Mechanics *(requires 125 and Math 60)*
- Physics 171: Advanced Quantum *(requires 170)*
- Physics 180: Applied Mathematics *(requires 41/42 or 70, Math 102)*
- Astronomy 101: Observational Astronomy *(requires 41/42 or 70, Astro 51 or 62)*
- Astronomy 12x/12y: Pair of Astro Upper-Div half courses *(requires Phys 101, Astro 51 or 62)*

**Core Courses** *(all 4 recommended for those pursuing advanced physics studies.)*
- Physics 125: (Intermediate Newtonian) Mechanics *(requires 41/42 or 70, Math 32 or 107)*
  *(spring)*
- Physics 142: Electricity and Magnetism *(requires same as Mechanics)*
  *(spring)*
- Physics 170: Quantum Mechanics *(requires 101, Math 60)*
  *(fall)*
- Physics 175: Statistical Physics *(requires 101, Math 60)*
  *(spring)*

**Upper-Division Elective courses**
- Physics 148: Computational Methods *(requires Math 60)*
  *(odd falls)*
- Physics 160: General Relativity *(requires 125)*
  *(even springs)*
- Physics 165: Fluid Mechanics *(requires 125 and Math 60)*
  *(even falls)*
- Physics 171: Advanced Quantum *(requires 170)*
- Physics 180: Applied Mathematics *(requires 41/42 or 70, Math 102)*
  *(odd falls)*
- Astronomy 101: Observational Astronomy *(requires 41/42 or 70, Astro 51 or 62)*
  *(fall)*
- Astronomy 12x/12y: Pair of Astro Upper-Div half courses *(requires Phys 101, Astro 51 or 62)*
  *(spring)*

**STANDARD PHYSICS MAJOR SEQUENCE:** *(assumes core of 125, 170)*

**FRESHMAN YEAR:**
- Physics 70
- Math 30 [or higher]
- Language 1
- **Fall** Language 2

**SOPHOMORE YEAR:**
- Physics 101
- Math 32
- Complementary Lab Science
- Language 33
- **Spring** Physics 125 [or 128 or 175]
- Math 60 (Linear Algebra)
- Physics 128
- Open

**JUNIOR YEAR:**
- Physics 170 or **STUDY ABROAD**
- Open or SA (or 148, 165, 180, or Astr 101)
- **Fall** Open or SA (or another course from the line above)
- Open
- Physics 142, 160, 171, 175, or Astr 12x&12y
- Open
- Open or SA (or another course from the line above)
- Open

**SENIOR YEAR:**
- Physics 190 and 193
- Physics 191
- Physics 148, 165, 180, or Astr 101
- **Fall** Physics 191
- Physics 142, 160, 171, 175, or Astr 12x&12y
- Open
- Open

Note that Physics majors planning to study abroad should go abroad in the **full of their junior year** *(the only alternative is to take the required 174 course spring of the sophomore year, which is not recommended).*
### Astrophysics Option:

**Required Courses** (see previous side for prerequisites)

- **Physics Introductory Sequence and Physics 101**
- **Astronomy 62** Introduction to Astrophysics *(requires Intro Physics)*
- **Astronomy 101** Observational Astronomy
- **Advanced Astronomy** Two half-courses from the Astr 120 series or Astr 051 and one from the Astr 120 series
- **Physics Core (2 courses)** Physics core: any two of 125, 142, 170, 175
- **Physics Adv. Lab** Physics 128 or Physics 174
- **Advanced Physics** Courses from the following: Physics 125, 128, 142, 148, 160, 165, 170, 171, 175, 180
- **Physics 190, 191 & 193** Senior Seminar, Senior Thesis, & Senior Exercise

*Astrophysics majors are encouraged to take an introductory Computer Science course with an Open slot.*

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 101</td>
<td></td>
<td>Physics 125</td>
</tr>
<tr>
<td>Math 32 (or Astro 101)</td>
<td></td>
<td>Math 60 (Linear Algebra)</td>
</tr>
<tr>
<td>Open</td>
<td></td>
<td>Astronomy 62</td>
</tr>
<tr>
<td>Language 33</td>
<td></td>
<td>Open or Physics 128</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Astronomy 101 (or Open)</td>
<td>Astronomy 12x &amp; 12y</td>
<td></td>
</tr>
<tr>
<td>Physics 148, 165, 170, or 180</td>
<td>Physics 142, 160, or 175</td>
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<tr>
<td>Open</td>
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<td>Open</td>
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<tr>
<td>Open</td>
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</tbody>
</table>

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<thead>
<tr>
<th>SENIOR YEAR</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Physics 190 and 193</td>
<td>Physics 191</td>
<td></td>
</tr>
<tr>
<td>Open or Physics 191</td>
<td>Physics 142, 160, 171 or 175</td>
<td></td>
</tr>
<tr>
<td>Open or Physics 148, 165, 170, or 180</td>
<td>Open</td>
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<tr>
<td>Open</td>
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<td>Open</td>
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</tbody>
</table>

### Physics Major Starting in the 2nd Semester of Freshman Year

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>Physics 71/72</td>
<td></td>
</tr>
<tr>
<td>Math 30 [or higher]</td>
<td>Math 31 [or higher]</td>
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</tr>
<tr>
<td>ID 1</td>
<td>Open</td>
<td>Language 2</td>
</tr>
<tr>
<td>Unknown</td>
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</table>

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 70</td>
<td>Physics 52/54 @ HMC (PHYS101 replacement)</td>
<td></td>
</tr>
<tr>
<td>Math 32</td>
<td>Math 60 (Linear Algebra)</td>
<td></td>
</tr>
<tr>
<td>Complementary Lab Science</td>
<td>Physics 128</td>
<td></td>
</tr>
<tr>
<td>Language 33</td>
<td>Open</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUNIOR YEAR</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>Physics 170 or STUDY ABROAD</td>
<td>Physics 174</td>
<td></td>
</tr>
<tr>
<td>Open or SA (or 148, 165, 180, or Astr 101)</td>
<td>Physics 125, 142, 171, 175, or Astr 12x&amp;12y</td>
<td></td>
</tr>
<tr>
<td>Open or SA</td>
<td>Open (or another course from the line above)</td>
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<tr>
<td>Open or SA</td>
<td>Open</td>
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<tr>
<td>Open or SA</td>
<td>Open (or another course from the line above)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SENIOR YEAR</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 190 and 193</td>
<td>Physics 191</td>
<td></td>
</tr>
<tr>
<td>Open or Physics 191</td>
<td>Physics 142, 160, 171, 175, or Astr 12x&amp;12y</td>
<td></td>
</tr>
<tr>
<td>Open (or Physics 170 if SA last year)</td>
<td>Open (or another course from the line above)</td>
<td></td>
</tr>
<tr>
<td>Physics 148, 165, 180, or Astr 101</td>
<td>Open</td>
<td></td>
</tr>
</tbody>
</table>
# PHYSICS MAJOR STARTING IN THE SOPHOMORE YEAR

(Assumes that one has two semesters of calculus)

**SOPHOMORE YEAR:**
- Physics 70
- Math 32
- Complementary Lab Science
- Language 33
- Physics 71, 72 if needed
- Math 60
- Physics 125 or 128
- Open

**JUNIOR YEAR:**
- Physics 101
- Open (or Physics 148, 165, or 180)
- Open
- Physics 128 or 125
- Physics 174
- Physics 142, 160, or 175
- Open

**SENIOR YEAR:**
- Physics 190&193
- Physics 191
- Physics 170 (or maybe 148, 165, or 180)
- Open
- Physics 191
- Physics 142, 160, or 175
- Open or Physics 170 if not taken
- Open or Education 170G or 375

A student planning to go to graduate school in physics should take Physics 142 before taking the GRE exam fall term senior year. In other cases, it might be all right to delay taking Physics 142 until spring term senior year.

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**TEACHING OPTION:** People interested in a career in high-school teaching may substitute two introductory courses in other sciences (or one introductory course and Math 102) in place of an upper-division elective. Psychology is recommended. Education 170G and 375 count towards an MA in Education and teaching credential through CGU. CGU’s 4+1 Pathway for Teachers has paid internships and scholarships specifically for future science teachers.

**JUNIOR YEAR:**
- Physics 170 (or **STUDY ABROAD**)
- Psych 51
- Open or Education 170G
- Open
- Physics 174
- Physics 142, 160, 171, 175, or Astr 12x&12y
- Open or other intro science
- Open

**SENIOR YEAR:**
- Physics 190 and 193
- Open or Physics 191
- Open (or Physics 170 if not taken)
- Open or Education 170G or 375
- Physics 191
- Physics 142, 160, 171, 175, or Astr 12x&12y
- Open
- Open

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**PRE-MED/PHYSICS OPTION:**

**FRESHMAN YEAR:**
- Physics 70
- Math 30 [or higher]
- ID 1
- Chemistry 1a (or 51)
- Physics 71 and/or 72 (or 125)
- Math 31 [or higher]
- Open
- Chemistry 1b (unless 51 completed)

**SOPHOMORE YEAR:**
- Physics 101
- Math 32
- Bio 40
- Language 1
- Physics 125
- Biology 41C
- Math 60
- Language 2

**JUNIOR YEAR:**
- Chemistry 110a
- Language 33
- Open
- Chemistry 110b

**SENIOR YEAR:**
- Physics 190&193
- Physics 170
- Open
- Physics 191
- Physics 175
- Open
- Open
### ENGINEERING PHYSICS OPTION:

**FRESHMAN YEAR:**
- **Fall**
  - Physics 70
  - Math 30 [or higher]
  - ID 1
  - Language 1
- **Spring**
  - Physics 71 and/or 72 (or 125)
  - Math 31 [or higher]
  - Open
  - Language 2

**SOPHOMORE YEAR:**
- **Fall**
  - Physics 101
  - Math 32
  - Open or SA
  - Language 33
- **Spring**
  - Physics 125 [or 128 or 175]
  - Math 60 (Linear Algebra)
  - Physics 128
  - Open

**JUNIOR YEAR:**
- **Fall**
  - Physics 170
  - HMC Engr 59 (Math 102 co-req)
  - Open or SA
  - Open or SA
- **Spring**
  - Physics 174
  - Physics 142, 160, 175, or Astr 12x&12y
  - Open (or another course from the line above)
  - HMC Engr 82 or 83 or 85 (Eng 59 pre-req)

**SENIOR YEAR:**
- **Fall**
  - Physics 190 and 193
  - Open or Physics 191
  - Open (or Physics 170 if SA last year)
  - Open, Physics 148, 165, 180, or Astr 101
- **Spring**
  - Physics 191
  - Physics 142, 160, 171, 175, or Astr 12x&12y
  - Open (or another course from the line above)
  - Open

### 3-2 PRE-ENGINEERING OPTION:

**FRESHMAN YEAR:**
- **Fall**
  - Physics 70
  - Math 30 [or higher]
  - ID 1
  - Language 1
- **Spring**
  - Physics 71 and/or 72 (or 125)
  - Math 31 [or higher]
  - Open
  - Language 2

**SOPHOMORE YEAR:**
- **Fall**
  - Physics 101
  - Math 32
  - Chem 1a
  - Language 33
- **Spring**
  - Physics 125 [or 128 or 175]
  - Math 60 (Linear Algebra)
  - Chem 1b
  - Physics 128

**JUNIOR YEAR:**
- **Fall**
  - Physics 170
  - Math 102
  - Open or SA
  - Open or SA
- **Spring**
  - Physics 174
  - Physics 142, 160, 171, 175, or Astr 12x&12y
  - Open (or another course from the line above)
  - Open

**SENIOR YEAR:**
- Transfer to either Caltech or Washington University (St. Louis).
### 2-1-1-1 DARTMOUTH PRE-ENGINEERING OPTION:

<table>
<thead>
<tr>
<th>Year</th>
<th><strong>Fall</strong></th>
<th><strong>Spring</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESHMAN</td>
<td><strong>Physics 70</strong></td>
<td><strong>Physics 71 / 72</strong></td>
</tr>
<tr>
<td>POMONA</td>
<td><strong>Math</strong></td>
<td><strong>Math</strong></td>
</tr>
<tr>
<td></td>
<td><strong>ID 1</strong></td>
<td><strong>General Education</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Language</strong></td>
<td><strong>Language</strong></td>
</tr>
<tr>
<td>SOPHOMORE</td>
<td><strong>Physics 101</strong></td>
<td><strong>Physics 174</strong></td>
</tr>
<tr>
<td>POMONA</td>
<td><strong>Math</strong></td>
<td><strong>Math</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Chemistry</strong></td>
<td><strong>General Education</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Language</strong></td>
<td><strong>Computer Science</strong></td>
</tr>
<tr>
<td>JUNIOR</td>
<td><strong>ENGS 31 / ENGS 32 – Digital Electronics</strong></td>
<td><strong>ENGS 36 / ENGS 25 – Chemical Engineering</strong></td>
</tr>
<tr>
<td>DARTMOUTH*</td>
<td><strong>Upper Division Elective</strong></td>
<td><strong>Intro to Thermodynamics</strong></td>
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<td><strong>or</strong></td>
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<tr>
<td></td>
<td><strong>ENGS 33 / ENGS 34 – Solid Mechanics</strong></td>
<td><strong>ENGS 21</strong></td>
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<td><strong>ENGS 22</strong></td>
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<tr>
<td>SENIOR</td>
<td><strong>Physics 190</strong></td>
<td><strong>Clinic</strong></td>
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<tr>
<td>POMONA</td>
<td><strong>Clinic</strong></td>
<td><strong>Physics 142</strong></td>
</tr>
<tr>
<td></td>
<td><strong>General Education</strong></td>
<td><strong>Physics 125 or 175 (prefer 125 @ Pomona)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Physics 191</strong></td>
</tr>
</tbody>
</table>

**BACHELOR OF ENGINEERING**

**DARTMOUTH***

**Pomona Substitution Rules**
- Physics 142 must be taken at POMONA ONLY
- Physics 174 must be taken at POMONA ONLY
- Physics 128 can be substituted with Dartmouth ENGS 31/ENGS 32
- Upper division elective can be taken at Dartmouth
- Physics 175 can be substituted with Dartmouth ENGS 36/ENGS 25 (sub 175 or 125, not both)
  - or
- Physics 125 can be substituted with Dartmouth ENGS 33/ENGS 34 (sub 125 or 175, not both)(prefer 125 @ Pomona)

*Please note that Dartmouth is on the quarter system and not semesters. It may be necessary for you to take classes during the summer quarter in order to meet all requirements. Please see the link below for sample schedules at Dartmouth.