# Bachelor of Engineering Program Plan

**Name:**

**Date Submitted:**

**Advisor Name:**

**Advisor Signature:**

**BE Committee Approval:**

**Dual Degree College:**

**Major**

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**Note:** Please include course numbers of courses taken at your home institution.

At least 6 courses must include Significant Engineering Design Content (See INSTRUCTIONS BELOW)

One of ENGS 91, 92 or 93 is required and may be counted either as a mathematics elective or as an engineering sciences elective.*

<table>
<thead>
<tr>
<th>Term &amp; Year (e.g., 08F)</th>
<th>Math &amp; Basic Science</th>
<th>Engineering Science &amp; Design</th>
<th>Significant Design Content</th>
</tr>
</thead>
</table>

## A. MATHEMATICS AND BASIC SCIENCE

1. Math 3 or credit by equivalence
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

2. Math 8 or credit by equivalence
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

3. Math 13
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

4. Phys 13
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

5. Phys 14
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

6. Chem 5 or credit by equivalence
   - Term: 1
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

7. See INSTRUCTIONS for allowable elective courses in Mathematics & Basic Science
   - Term: 1
   - Math & Basic Science: –
   - Engineering Science & Design: –
   - Significant Design Content: –

8. –
   - Term: 1
   - Math & Basic Science: –
   - Engineering Science & Design: –
   - Significant Design Content: –

9. –
   - Term: 1
   - Math & Basic Science: –
   - Engineering Science & Design: –
   - Significant Design Content: –

## B. ENGINEERING CORE

1. ENGS 20 (or COSC 1 and 10)
   - Term: –
   - Math & Basic Science: 0.5
   - Engineering Science & Design: –
   - Significant Design Content: –

2. ENGS 21
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: √
   - Significant Design Content: –

3. ENGS 22
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

4. ENGS 23
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

## C. ENGINEERING DISTRIBUTIVE CORE

1. ENGS
   - Select 2 from ENGS 24, 25, 26, 27
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

2. ENGS
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

## D. ENGINEERING GATEWAY COURSES

1. ENGS
   - Select 2 from ENGS 31 or 32, 33 or 34, 30, 35 or 36, 37
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

2. ENGS
   - Term: –
   - Math & Basic Science: 1
   - Engineering Science & Design: –
   - Significant Design Content: –

## E. ENGINEERING ELECTIVES (UP TO 2 ELECTIVES MAY BE MATH & BASIC SCIENCE)

9. –
   - Term: –
   - Math & Basic Science: –
   - Engineering Science & Design: –
   - Significant Design Content: –

10. –
    - Term: –
    - Math & Basic Science: –
    - Engineering Science & Design: –
    - Significant Design Content: –

11. Three to four course coherent engineering concentration**, at least one with significant design content.
    - Term: –
    - Math & Basic Science: 1
    - Engineering Science & Design: –
    - Significant Design Content: –

12. –
    - Term: –
    - Math & Basic Science: 1
    - Engineering Science & Design: –
    - Significant Design Content: –

13. –
    - Term: –
    - Math & Basic Science: 1
    - Engineering Science & Design: –
    - Significant Design Content: –

14. –
    - Term: –
    - Math & Basic Science: 1
    - Engineering Science & Design: –
    - Significant Design Content: –

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*Why these three courses?

What are your immediate career plans?

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2/27/20
| F. CAPSTONE ENGINEERING DESIGN | 15. ENGS 89 |  | √ |
| C. TOTALS (25 COURSES MINIMUM REQUIRED FOR THE BE) | 16. ENGS 90 |  | √ |
| Math/Sci | Engineering | Design |
| Minimum courses required for ABET | 9 | 13.5 | 6 |
| Thayer requirements for the B.E.: Math/Basic Sci + ENGS ≥ 24.5 |  |  |  |

*Only ENGS 91, 92, and 93 may be counted for engineering sciences credit and NOT any Math courses allowed in lieu of them.

**With the exception of one of either ENGS 34 (prerequisites 20, 22, 23) or ENGS 36 (prerequisites 20, 22, 25), courses to be included in the area of “engineering concentration” will be numbered above ENGS/ENGG 40 and will require at least one prerequisite either from the series ENGS 20-37 or from advanced courses within the sciences. With permission, suitable advanced science courses may count within the concentration. To include ENGS 86 or 88 in the concentration, a proposal, which includes prerequisite courses, a syllabus, learning objectives, and what principles of engineering will be mastered, needs to be submitted in advance (before the fourth week of the term prior to which ENGS 86 or 88 will be taken) and approved by the B.E. Committee. The Computer Science courses permitted in the concentration are COSC 50, 55-83 (except 56, 71, 73, 74). The excluded courses COSC 51, 56 and 84, may be used as engineering electives. Although the requirement is a minimum of three courses in the concentration, students are encouraged to enroll in four courses in their area of concentration.
## INSTRUCTIONS

1. **ADMISSIONS**  Apply for admission and financial aid (if needed) to the Thayer School Academic & Student Affairs Office (Room M103). For students enrolled in the engineering sciences major or dual-degree program, completion of the A.B. major with a GPA of 2.0 or higher in the major guarantees admission to the Thayer School B.E. program. However, one must still file a Student Information Form, a Program Form, and a Financial Aid application (if needed) with the Academic & Student Affairs Office. **ENGS 21** is a prerequisite for admission to the B.E. program. It must be taken prior to enrollment in **ENGS 89/90**

2. **UNDERGRADUATE PROGRAM**  Indicate in the appropriate space if you completed the Dartmouth engineering sciences major, engineering physics major, modified major (give the modifying subject), or dual degree program (give your college and major and include course #’s of courses taken at your home institution).

3. **DEGREE REQUIREMENTS: OVERALL**  The courses listed on this form in satisfaction of degree requirements must meet the following minimum ABET* requirements:
   - One year of mathematics and basic science, which is 9 courses (or course equivalents).
   - 1.5 years of engineering science or engineering design, which is 13.5 courses (or course equivalents).
   - A significant component of engineering design, which is interpreted to be six courses with significant design content
   - One year of humanities and social sciences.

   For the B.E. degree, Thayer School requires 2 additional courses beyond these minimum ABET* requirements bringing the total number of required math and engineering, computer and natural sciences courses to 25. Of the 25, one full course (**ENGS 20 or COSC 1 and 10**) is allowed 0.5 engineering credits, hence the 24.5 appears elsewhere on the form.

4. **MATHEMATICS AND BASIC SCIENCE (SECTION A)**  The following courses in mathematics and basic science are required: Three courses in calculus, through multivariable (**MATH 3, 8, 13**); two courses in physics (**PHYS 13, 14**); one course in general chemistry (**CHEM 5**). AP Credit for **MATH 3, MATH 8** and **CHEM 5** may be used to satisfy ABET Math and Basic Science requirements. One of the applied mathematics courses **ENGS 91, 92, or 93**. Two more non-introductory courses, from the following list: **ASTR 15** and above; **BIOL 12** and above (except 20, 52); **CHEM 6, 10** and above (except 63); **EARS 31, 33, 35, 37, 40-52, 59, 62, 64, 66-75, 79 and above**; **ENVS 30 and 79**; **MATH 17 – 29, 31, 32, 35, 38, 39, 40, 42, 43, 50 and above**; **PHYS 19 or 24, 41** and above (except 48); **PSYC 21, 40, 45, 46, 65**; **COSC 30/ENGS 66**, **COSC 31, 35, 39, 40, 49, 71, 73, 74**.

5. **ENGINEERING CORE AND GATEWAY COURSES (SECTIONS B, C, D)**  The following engineering sciences courses are required for all B.E. candidates regardless of undergraduate major: One course in computer science (**ENGS 20 OR COSC 1 AND 10**), counted as 0.5 **ENGS**; **ENGS 21, 22 and 23**; two courses selected from **ENGS 24, 25, 26 and 27**; two courses selected from two of four different disciplinary areas including **ENGS 31 or 32**; **ENGS 33 or 34**; **ENGS 30, ENGS 35 or 36**; and **ENGS 37**. Students holding either a bachelor’s degree in natural science or the Dartmouth AB in engineering modified with natural science may satisfy the distribution requirement for the gateway courses by electing two courses from the same disciplinary area.

6. **ENGINEERING ELECTIVES (SECTION E)**  At least three of the 6 elective courses must form a coherent disciplinary concentration** in engineering, e.g., EE, ME, etc. One of these three must carry design credit. The remaining 3 electives may be chosen from:
   - **ENGS OR ENGG** courses numbered 24-88 (except 66, 75, 80 and 87), 110-174, 192 and 199. Only one of **ENGS 86 or 88**, may be used in satisfaction of combined A.B. and B.E. degree requirements, and **ENGS 87** may not be counted to satisfy B.E. degree requirements.
   - Engineering management (**ENGM**) courses are excluded from the B.E. program.
   - The applied math courses **ENGS 91, 92, 93, 100, 104, 105, 106** may be counted as engineering sciences or as mathematics.
   - Outside Thayer School: **COSC 50-84** (except 30, 31, 35, 39, 40, 49, 71, 73, 74) and 170-276 (except 174, 179, 189, 210);
   - Two of these 3 electives may include courses in mathematics and basic science as listed in Section 4 above.

7. **CAPSTONE DESIGN PROJECT (SECTION F)**  The two-course capstone engineering design experience, **ENGS 89/90** is required. At least six engineering prerequisites are required, including **ENGS 21 plus five courses selected from ENGS 22-76 (excluding ENGS 75)** and 91 and above.

8. **SIGNIFICANT DESIGN CONTENT (LAST COLUMN)**  In addition to **ENGS 21, 89/90**, at least three additional courses in your program must include significant design content: These courses include: **ENGS/ENGG 26, 31, 32, 33, 34, 36, 37, 44, 51, 57, 58, 60, 61, 62, 64, 65, 69, 71, 73, 75, 76, 111, 124, 125, 126, 128, 129, 130, 135, 145, 146, 147, 150, 157, 158, 163, 165, 166, 169, 171, 173, 174, 240**, and **COSC 50**. **ENGS 86-88** may be approved for design credit by the B.E. program committee, based on evaluation of the work done.

9. **FILLING IN THE COLUMNS, TOTALS**
   - Fill in the term and year when each course was taken (e.g., 08F for fall term, 2008).
   - For two of the elective courses in Section E, place a 1 in the appropriate column to indicate credit for mathematics and natural science or engineering sciences.
   - Place a check in the design column for each course that has significant design content.
• At the bottom of the form, add up the credits in the math/natural science, engineering sciences, and design columns. To be eligible for the B.E. degree, this total must include at least 25 courses with 9 courses minimum in math/natural science, 13.5 courses minimum in engineering sciences, and 6 courses minimum containing engineering design.

10. **APPROVAL**  This form must be completed, signed by your advisor, and returned to the Thayer School Academic & Student Affairs Office, along with your Student Information and Financial Aid forms, at least three terms prior to the expected completion of your B.E. program. The program must be approved by the B.E. Program Committee. Revised program forms should be submitted to the Thayer School Registrar and must be approved by your advisor and the B.E. Program Committee.

11. **GRADE POINT AVERAGE FOR GRADUATION**  For the award of the B.E. degree, a GPA of 2.33 or higher is required in all post-prerequisite courses taken at Dartmouth to satisfy the requirements.

*ABET= the Engineering Accreditation Commission of ABET (Accreditation Board of Engineering and Technology), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012-telephone (410) 347-7700

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