

## Combined Plans

### Engineering and Computer Science

*Adviser: Fred Moore (Physics)*

Note: In December 2016 Whitman formally launched its own 4-year bachelor's degree in Computer Science. The Computer Science option via Whitman's Combined Plan will be eliminated and those admitted with the class of Fall-2017 will be the final students eligible for it.

Whitman College is associated with Caltech, the Fu Foundation School of Engineering and Applied Science at Columbia University, the School of Engineering and Applied Science at Washington University in St. Louis, and the University of Washington School of Engineering in combined programs for liberal education in engineering and computer science. In addition, with consultation and approval from the Engineering and Computer Science Program adviser and the program's advisory committee, students may be able to arrange individual programs combining liberal education with study in engineering or computer science at another nonassociated but ABET-accredited department of engineering and/or computer science.

Typically the combined plans require five years of study. The first three years are spent at Whitman College, and the last two years are spent at the engineering school, where the student completes courses in computer science or one of the branches of engineering. At the University of Washington and at nonaffiliated institutions, more than two years may be necessary to complete the second phase of the combined plan program. Students who transfer to Whitman as candidates for the combined plan must complete a minimum of two years in residence at Whitman and satisfy appropriate modifications of the requirements outlined below. In the combined plan, two degrees are awarded upon successful completion of the program: the degree of Bachelor of Arts, with a major in Chemistry/Pre-Engineering, Mathematics/Pre-Computer Science, Physics/Pre-Engineering or BBMB/Pre-Engineering (Biophysics, Biochemistry and Molecular Biology) by Whitman College; and the degree of Bachelor of Science, with a major in computer science or a field of engineering, by the transfer institution. The requirements for the combined plan are given below in the section titled *3/2 Program Requirements*. Also note the information in the section titled *Notes and Cautions*. Individuals interested in the Computer Science option are particularly cautioned to read and be aware of issues mentioned in the *Notes and Cautions* section.

This combined program requires very careful scheduling—even a semester's delay in starting the program may preclude a student from being prepared to transfer after their third year. Students who are interested in chemical, mineral, metallurgical, or biomedical engineering should take Chemistry 140 (or 125, 126, 135, and 136) and calculus during their first year. Students who are interested in other branches of engineering or in computer science should take Physics 155 or 165 and 156 or 166 and calculus during their first year. The nuances of the requirements at different partner schools mean that students should consult with the 3/2 program adviser before finalizing their first semester. Consultations should continue regularly thereafter, before each subsequent semester, to ensure proper progress in the program.

Students must declare their intent to complete the 3/2 program before the end of their fourth semester in residence at Whitman in order to be eligible to transfer to another institution to complete the program. Transfer students must declare their intent before the end of their second semester in residence at Whitman. Students will have the Engineering and Computer Science program adviser as a major adviser, as well as an adviser from the relevant department (Chemistry, Mathematics, Physics, or BBMB).

### **3/2 Program Requirements**

- I. Earn at least 93 credits and spend three years at Whitman (62 credits and two years for transfer students) with a Whitman grade-point average of at least 2.0.
- II. Complete the Whitman General Studies Program before transferring to another institution.
- III. Complete the mathematics and science courses in lists A and B below, with a cumulative GPA at Whitman in these courses of at least 2.0 and no course grade below C-.
  - A. Computer Science 167, Mathematics 225, 235, and 244; Physics 145 or 155 or 165 and 156 or 166; Chemistry 140, or the full *General Chemistry* sequence (Chemistry 125, 126, 135, and 136).

- B. One of the following four sequences, chosen with the consent of the 3-2 Engineering and Computer Science Program adviser:
1. Physics/Pre-Engineering: Mathematics 240; Physics 245, 246, 255, and 256, and an additional 6 credits of 300/400 level physics coursework;
  2. Chemistry/Pre-Engineering: Chemistry 240, 245, 246, 251, 252, 345, and either 320 or 360;
  3. Mathematics/Pre-Computer Science: (not available to students admitted after Fall-2017): Mathematics 240, 260, Computer Science 270, and an additional 6 credits in mathematics course numbered above 200. Math 358 and 247 are recommended. A grade of B- (2.7) or better in Math 260 is required. For this sequence, please refer to the *Notes and Cautions* section.
  4. BBMB/Pre-Engineering: Biology 111, 205; Chemistry 245, 246, 251, and 252; and any two of the following three lecture-lab combinations: BBMB 324 and 334, BBMB 325 and 335, BBMB 326 and 336.

The aforementioned four tracks reflect the Whitman degree that the student will receive on successful completion of the program. The Physics/Pre-Engineering track typically requires the student to complete a degree in a physical branch of engineering, industrial engineering, operations research or a closely related field at the partner school. The Chemistry/Pre-Engineering track typically requires a chemical engineering degree at the partner school. The Mathematics/Pre-Computer Science track typically requires a degree in computer science or computer engineering at the partner school. The BBMB/Pre-Engineering track requires a degree in biomedical engineering or bioengineering at the partner school.

- IV. Complete the requirements for a degree in computer science or a field of engineering at one of the affiliated institutions — Caltech, Columbia University, Washington University in St. Louis, and the University of Washington — or in any other ABET-accredited program in the United States.

## Notes and Cautions

- I. Three of the four affiliated institutions (but not the University of Washington) require that students seeking admission secure a recommendation from the 3-2 program adviser. Even with a recommendation from the 3-2 program adviser, admission to some of the affiliated institutions is not guaranteed. Under normal circumstances, to secure a recommendation from the 3-2 program adviser at Whitman and to be admitted to any of the four affiliated programs, students will need cumulative and mathematics-science grade-point averages of at least 3.0. Washington University in St. Louis and Columbia University normally accept students who are recommended by the 3-2 program adviser at Whitman, take the prerequisite mathematics and science courses, satisfy the general education and credit requirements set by their institutions, and meet their GPA standards (3.3 for Columbia and 3.25 for Washington University in St. Louis).
- II. Nearly all institutions have higher (than 2.0) overall and mathematics-science GPA requirements for transfer admission, and/or additional course, credit, or general education requirements. Here are two examples. 1) Along with additional requirements that depend on the intended program (e.g., civil engineering, electrical engineering), Columbia University requires that students spend “approximately” three years at Whitman, complete 97 (not 93) credits at Whitman, and take the equivalents of Economics 100 or 101, 102, and Composition 170 (or 210). 2) Caltech recommends (strongly) that ALL 3-2 program students (regardless of which track the individual is following) to take Physics 245, 246, 255, and 256.
- III. Students receive a Whitman College degree after completing requirements above and, in particular, after receiving a B.S. degree with a major in the appropriate field from an affiliated institution or from a nonaffiliated but ABET-accredited program. Completing a degree in a nonaffiliated program or at the University of Washington may take more than two years.
- IV. The Whitman pre-engineering majors are only given to students who successfully complete their 3/2 program. If a student does not receive a B.S. degree from a transfer institution, he or she must satisfy the requirements for a non-pre-engineering Whitman College major in order to graduate from Whitman and may need to keep this possibility in mind as they schedule courses at Whitman.

- V. For individuals interested in the Computer Science option: it is critical to contact the program adviser early in your time at Whitman College. The hierarchical nature of the mathematical coursework required for this option along with the scheduling rotation and enrollment limits of specific mathematics courses make this course of study challenging to accomplish in three years. Indeed, there are a variety of scenarios (including starting this path late) that may preclude an individual from pursuing this option without either additional time at Whitman (beyond the normal three years) or coursework taken elsewhere.
- VI. Individuals interested in biomedical engineering should be aware that the required pre-engineering coursework (i.e., classes to be completed at Whitman) varies widely from one partner institution to another. In particular, a student wanting to do biomedical engineering at Columbia should consider following the Physics track at Whitman and supplementing those courses to complete Columbia's requirements. In contrast, a student wanting to do biomedical engineering at Washington University in Saint Louis should follow the BBMB track at Whitman. Clearly, anyone wanting to pursue biomedical engineering should be in close contact with Whitman's 3/2 adviser.

## Forestry and Environmental Management

*Adviser: Nicholas Bader (Geology)*

Whitman College has an association with the Nicholas School of the Environment at Duke University, Durham, N.C. The Cooperative College Program is designed to coordinate the education of students at Whitman College with graduate programs in the broad area of resources and environment offered at Duke University. Participating students are accepted into either of two degree programs, the Master of Forestry (M.F.) or the Master of Environmental Management (M.E.M.). The cooperative program is designed to accommodate students after three years of study at Whitman or upon graduation from Whitman. Duke requires applicants to take the Graduate Record Exam (general test without any advanced subject tests) in October or December of the year prior to the desired year of entrance. Those students who complete the necessary qualifications and who choose to enter Duke after three years may qualify for one of the professional master's degrees with four semesters at Duke, in which at least 48 credits are earned. Upon completion of the requirements of the Duke program, the student will be awarded the Bachelor of Arts degree in the appropriate field by Whitman College. See the Nicholas School of the Environment website, [www.nicholas.duke.edu](http://www.nicholas.duke.edu), for additional information.

The major for the Whitman degree will be biology or geology, depending on the courses taken at Whitman. The specific requirements to be completed at Whitman College are as follows:

- I. For the biology major, the following courses are required: a minimum of 22 credits of biology to include Biology 111, 112, 205, 215 or 277, plus a minimum of eight additional credits in courses above the 200 level; Chemistry 125, 126, 135, 136, or 140; Economics 100 or 101, 102; Geology 125 (or 110 or 120); Mathematics 125, a statistics course. In addition, the following courses are recommended: Computer Science 167, Economics 307, a year of physics.
- II. For the geology major, the following courses are required: a minimum of 22 credits of geology to include Geology 125 (or 110 or 120), 227, 350, and at least 10 additional credits in courses numbered above 300; Biology 111, 112; Chemistry 125, 126, 135, 136, or 140; Economics 100 or 101, 102; Mathematics 125, a statistics course. In addition, the following courses are strongly recommended: Biology 215 or 277, Computer Science 167, Economics 307, and a year of physics.
- III. Students must have a minimum of two years of residence at Whitman and have completed a minimum of 94 credits.
- IV. Students who wish to participate in this program as a 3-2 candidate must obtain a recommendation from the Duke/Whitman 3-2 Committee. However, Duke University reserves the right to make the final decision regarding acceptability of the student for admission.

## Oceanography

*Advisers: Nicholas Bader (Geology) and Kate Jackson (Biology) (on Sabbatical, Spring 2018)*

Whitman College is associated with the School of Oceanography of the University of Washington in a program for liberal education in biological or geological oceanography. The plan requires five years of study; typically three years at Whitman College and two years at the University of Washington. Students complete a Bachelor of Arts degree in either Biology or Geology from Whitman College and a Bachelor of Science in Oceanography from the University of Washington. At Whitman College, all candidates must complete the appropriate requirements outlined below, receive a recommendation from Whitman College, and apply as transfer student to the University of Washington.

This plan requires careful scheduling. Students must declare one of these majors by the end of their fourth semester in residence at Whitman College (transfer students must declare at the end of their second semester in residence at Whitman College). Interested Whitman students should contact the Whitman Oceanography adviser in their first year at Whitman, and the University of Washington Oceanography academic adviser (Michelle Townsend, mtown@u.washington.edu) when they apply for transfer to coordinate with the admissions office, and to answer questions about course planning.

In order to secure a recommendation from Whitman, a student must satisfy the following requirements during his or her three years at Whitman:

- I. Earn at least 94 credits and spend three years at Whitman (62 credits and two years for transfer students) with a Whitman grade-point average of at least 3.0.
- II. Complete the First-Year Experience, required of all first-year students attending Whitman.
- III. Complete the General Studies Distribution Requirements at Whitman.
- IV. Complete certain mathematics and sciences courses including those listed below, with a cumulative GPA at Whitman in these courses of at least 3.0.

### **Required Math and Science Courses at Whitman College: All Candidates**

- I. *Mathematics*: 125, 126, and 225, 235 or an approved Statistics course (see Whitman Oceanography adviser for current list).
- II. *Chemistry*: 125, 126, 135, 136, and 245 (2 semesters “General Chemistry” with labs) or 140.
- III. *Geology*: 110, 120, or 125. It is strongly recommended that students also take an additional course at Whitman College pertinent to the field of Oceanography, such as Biology 178 or 278, or Geology 130.
- IV. *Biology*: 111 and 112
- V. *Physics*: 155 and 156, or the advanced version of 165 and 166 at Whitman College; or the Physics 121, 122, 123 series at the University of Washington; or Physics 155 at Whitman College and Ocean 285 at the University of Washington.

Also, it is strongly recommended that students take an introductory Marine or Atmospheric Science class at Whitman College, such as Biology 178 or 278, or Geology 130.

### **Additional Required Courses at Whitman College for Biology-Oceanography Majors**

Biology-Oceanography students must also take Biology 205, Chemistry 245, and one course from each of the three upper division Biology and/or BBMB courses in Molecular/Cell, Organismal, and Ecology/Evolution categories at Whitman College. At UW, they must take at least seven semester-equivalent credits of upper-division biology electives, and three semester-equivalent credits of independent research; and they must take the Biology Graduate Record Examination and attain a score sufficient to satisfy Whitman’s requirements.

### **Additional Required Courses at Whitman College for Geology-Oceanography Majors**

Geology-Oceanography students must also take Geology 227, 350, 358, 368, and four or more credits in geology courses numbered above 300 at Whitman College. At UW, they must take at least 12 semester-equivalent credits of upper-division geology electives; and they must take the geology department written major examination and attain a score sufficient to satisfy Whitman’s requirements.