BULLETIN OF YALE UNIVERSITY

UNIVERSITY CATALOGUE NUMBER

FOR THE YEAR

1954–1955

NEW HAVEN

1954
GENERAL STANDARDS

A student in good standing who at the end of a term has an average of 80 or better is placed on the Dean’s Honor List for the succeeding term.

The passing grade in a course is 60. To maintain good standing in his class the student must have passed all his courses in the preceding term and have attained a grade of 70 in at least 60 per cent of his work.

Promotion to Sophomore year: (1) To be promoted to the Sophomore class in June in completely good standing a student must have carried a full Freshman schedule, passed all his courses, and have obtained quality credits (grades of 70 or better) in at least five of his courses.

(2) A student who has failed to be promoted to the Sophomore class in completely good standing, as defined above, will be promoted in June provided he has carried a full Freshman schedule, obtained quality credits in five of his term grades, and has an average term grade below 60. Any student promoted with deficiencies or any student who has been promoted in June with deficiencies must consult at once with the Dean of Yale College and arrange to make up his deficiencies in the ways described below.

(3) A student who has failed to win promotion to the Sophomore class, and who has not been dropped from the Freshman class, should consult with the Dean of the Freshman Year upon receipt of his final grades in June. Normally he will be promoted in September unless he clears his deficiencies in the manners described below.

(4) If a student whose work is not entirely satisfactory is promoted to the Sophomore class, General Warning or other warnings will be imposed in accordance with the rules of Yale College.

Making up deficiencies: (1) Course Credits. A student who has deficiencies in course credits is expected to make up his deficiencies in one of the following ways:

(a) by attending a summer session in an institution approved by the Dean, and securing a grade of at least 70 or C in a course approved by the Dean;

(b) by re-examination in September in the course failed if the failing grade was a 55;

(c) by passing in September an anticipatory examination in a course offered at Yale. Permission for this will be given only if the student has demonstrated in some of his Freshman courses capacity to do superior work.

Yale College

Quality Credits. A student with an insufficient number of quality credits may secure quality credits in one of the following ways:

(a) by securing a grade of at least 80 or B in a course taken in the preceding term;

(b) by securing a grade of at least 70 on a make-up examination to retrieve a failure (see under b above);

(c) by securing a grade of at least 70 on an anticipatory examination in a course offered at Yale (see under a above).

A student may not be admitted to a particular department or field if his grades have been unsatisfactory in courses related to that department or field.

Grades of 70 or better secured on a make-up examination, or on an anticipatory examination, or grades of 80 or B in courses in a summer session may be counted as quality credits.

Promotion to Junior year. No student may gain admission to the Junior class and to the major field of study if he is deficient either in quality or in quantity in the work of the first two years. He is required that he has had two summers in which to repair his deficiencies.

The minimum requirements for promotion to the Junior year are: twenty-term course credits, or their equivalent, with grades better in at least ten term courses.

Requirements for graduation. To be recommended for the bachelors degree, a student must complete successfully the work of all terms and attain grades of 70 in at least 60 per cent of his total work. He must also attain at least six term grades of 70 in the work of his major field in his last four terms; pass the departmental examination or other work required in the field of his major or other field, and be recommended to the faculty by the department chairperson and the Executive Committee of the College.

Students who have failed to meet the requirements for good standing in their respective classes at any marking period are placed on General Warning until the next marking period. Notice of General Warning will be sent to the parent or guardian.

A student who has dropped a course, or failed it with a grade below C in a course must clear his deficiency in the following summer by attending a summer school or by passing an anticipatory examination in the course. Only in cases where students have demonstrated quality in their records will an additional course in a later term be permitted to make up a deficiency. A student who has failed a term with a grade of 55 shall take a re-examination in that course arranged by the Dean’s office. A grade of 60 in a re-examination
will remove the course deficiency, and will restore the student to good standing in his class if all other requirements have been met.

Any student may be dropped from college after two semesters of attendance, or when at the close of a term he has failed in two or more courses.

While the normal time to be spent in the Standard Program for the bachelor's degree is four academic years, it is possible for an exceptionally well-prepared student who has met all the requirements for entrance in the basic studies, program of distribution, and major work to take the degree in three-and-one-half years. Normally, the student planning to take his degree in less than four years must have completed a portion of his requirements by excellent work in Normal School and in his entrance examinations. Such students must, not later than the beginning of their third year in college, secure permission from the Dean to attempt early graduation.

ROTC credit. No credit will be given for ROTC courses taken in Junior and Senior years unless the student completes the ROTC program in both courses and accepts a commission at graduation if offered.

THE JUNIOR YEAR ABROAD

Upon recommendation of the Chairman of the department or major and of the Chairman of the French or German or other language department and with the consent of the Dean of Yale College, a student may arrange for a year's study in France, Germany, Switzerland, or Italy preferably at the Junior level but occasionally at the Sophomore level. No student will be allowed to study for the Senior year away from Yale.

This plan is not restricted to majors in language, but is designed for mature and responsible students interested in the language, history, and culture of France or Germany or Italy or who wish to specialize in such subjects as art, government, history, international affairs, music, philosophy, etc.

Candidates should have a minimum competence in the language equivalent to the completion of the Yale College modern language requirement with an honors grade. In order to secure permission for such study abroad they must submit in the preceding term a plan of study and, as soon as possible, evidence of acceptance by a recognized educational institution abroad or the regular Organized Junior Year in Paris sponsored by the Institute for International Education and Sweet Briar College. The amount of credit to be allowed the student toward his degree will depend on the success in carrying his plan to a satisfactory completion. Towards his degree at Yale the student must submit a transcript of his record during his year away.

For summer study abroad sponsored jointly by Yale and another university, including supervised courses in French Language and Literature, History of Art, or International Relations, is open to qualified students.

For admission to the Junior Year Abroad in France or the Summer in Paris, including supervised courses in French Language, consult Mr. G. C. May, 321 WLB; for the Junior year in Germany, consult Mr. Nordmeyer, 307 WLB; for the Junior year in Italy, consult Mr. Bergin, Master's Office, 10.
### CHARTS FOR B.S. PROGRAMS

The charts on the following pages present graphically the specific four-year program in each of the major fields of study leading to the degree of Bachelor of Science.

#### BIOLOGY: PROGRAM IN PLANT SCIENCE

<table>
<thead>
<tr>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. 11 or Science III*</td>
<td>Biol. 28a</td>
<td>Pl. Sci. 31b</td>
<td>Pl. Sci.</td>
</tr>
<tr>
<td>Chem. 12 or 14*</td>
<td>Pl. Sci. 21b</td>
<td>Zool. 37a† or Pl. Sci. 33b†</td>
<td>Zool.</td>
</tr>
<tr>
<td>Math. 11 or 12†</td>
<td>Pl. Sci. 22</td>
<td>Chem. 33</td>
<td>Elective</td>
</tr>
<tr>
<td>Engl. 10 or 15†</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Mod. Lang. ††</td>
<td>Elective†</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

#### BIOLOGY: PROGRAM IN MICROBIOLOGY

<table>
<thead>
<tr>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol. 11 or Science III</td>
<td>Chem. 26a</td>
<td>Microbiol. &quot;a&quot; or &quot;b&quot;</td>
<td></td>
</tr>
<tr>
<td>Chem. 12 or 14*</td>
<td>Biol. 28a</td>
<td>Microbiol. 45 Adv. Chem.</td>
<td></td>
</tr>
<tr>
<td>Math. 11 or 12†</td>
<td>Phys. 11 and 12†</td>
<td>Chem. 33 and 33L</td>
<td></td>
</tr>
<tr>
<td>Engl. 10 or 15†</td>
<td>Distribution*</td>
<td>Zool. 30b or Pl. Sci. 31b</td>
<td>Elective</td>
</tr>
<tr>
<td>Mod. Lang. ††</td>
<td>Elective</td>
<td>Zool. 37a † or Pl. Sci. 33b †</td>
<td>Elective</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td>(1 term)</td>
<td>Elective</td>
</tr>
</tbody>
</table>

#### BIOLOGY: PROGRAM IN ZOOLOGY

<table>
<thead>
<tr>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 12 or 14*</td>
<td>Phys. 11 and 12*†</td>
<td>Chem. 33 and 33L</td>
<td>Zool. 30b or Pl. Sci. 31b</td>
</tr>
<tr>
<td>Math. 11 or 12†</td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Zool. 37a † or Pl. Sci. 33b †</td>
</tr>
<tr>
<td>Engl. 10 or 15†</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Mod. Lang. ††</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

*Degree requirements. See pp. 2–4.
†May be anticipated by excellent work in secondary school. See pp. 18–19.
‡In special cases other courses in plant science may be substituted, see Notes.
§If physics has not been anticipated at entrance, this elective must be taken as a substitute for Chem. 11 or 12.
||Required for the major.

**Notes:**
- Some cases, modern language may require an additional two terms of study.
- In special cases some other course in plant science or zoology may be substituted, see Notes.
- Microbiol. 45 must be included in the Senior year.
- Microbiol. 45 is required for the major.

**Additional Notes:**
- Selected courses from Plant Science 36b or 38a or Microbiology 40a.
### BIOCHEMISTRY

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chem. 13 or 14</strong></td>
<td>Chem. 27</td>
<td>Chem. 33 and 33L or Chem. 35 and 35L</td>
<td>Chem. 36 and 34L</td>
<td><strong>Biochem. and Zool.</strong></td>
</tr>
<tr>
<td><strong>Biol. 11 or Science III</strong></td>
<td>Math. 21 or 25</td>
<td>Microbiol. 405</td>
<td><strong>Biochem. and Zool.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Math. 11 or 12</strong></td>
<td>Phys. 22 and 23</td>
<td>Zool. 30b</td>
<td>Elective</td>
<td><strong>Zool. 30b</strong></td>
</tr>
<tr>
<td><strong>Engl. 10 or 15</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Mod. Lang.</strong></td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
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</tbody>
</table>

### CHEMISTRY

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chem. 13 or 14</strong></td>
<td>Chem. 27</td>
<td>Chem. 33 and 33L or Chem. 35 and 35L</td>
<td>Chem. 36 and 34L</td>
<td><strong>Two courses selected from Chem. 41, 45, 47</strong></td>
</tr>
<tr>
<td><strong>Biol. 11 or Science III</strong></td>
<td>Math. 21 or 25</td>
<td>Microbiol. 405</td>
<td>Chem. 34 and 34L</td>
<td>Chem. 44a and b or Chem. 44a and 44b</td>
</tr>
<tr>
<td><strong>Math. 11 or 12</strong></td>
<td>Phys. 22 and 23</td>
<td>Zool. 30b</td>
<td>Distribution*</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Engl. 10 or 15</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Mod. Lang.</strong></td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

### COMBINED BIOLOGICAL AND MEDICAL STUDIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biol. 11 or Science III</strong></td>
<td>Zool.</td>
<td>Zool.</td>
<td>Taken in Medical School</td>
<td><strong>Zool.</strong></td>
</tr>
<tr>
<td><strong>Chem. 12 or 14</strong></td>
<td>Phys. 11 and 12*</td>
<td>Phys. 11 and 12*</td>
<td>Zool.</td>
<td><strong>Zool.</strong></td>
</tr>
<tr>
<td><strong>Math. 11 or 12</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Engl. 10 or 15</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Mod. Lang.</strong></td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

*Degree requirements. See pp. 2-4.
†May be anticipated by excellent work in secondary school. See pp. 18-39.
‡In some cases, modern language may require an additional two terms of study.
†To qualify for the B.S. degree, a student must have a satisfactory grade in his class at the end of the first year in medical school.

### GEOLOGY

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior Year</th>
<th>Senior Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geol. 20</strong></td>
<td>Geol. 12a and 12b</td>
<td>Geol. 30</td>
<td>Geol. 35a and a &quot;b&quot; course</td>
<td><strong>Geol. Geol. Science other than Geology</strong></td>
</tr>
<tr>
<td><strong>Chem. 13 or 14†</strong></td>
<td>Phys. 11 and 12*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Math. 11 or 12</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Engl. 10 or 15†</strong></td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td><strong>French or Ger.</strong></td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
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</tbody>
</table>

Degree requirements. See pp. 2-4.
†May be anticipated by excellent work in secondary school. See pp. 18-39.
‡In some cases, modern language may require an additional two terms of study.
†To qualify for the B.S. degree, a student is expected to take a summer course in zoology, such course counting as one of the five year courses (beyond Geology 10) that compose the major.
## Mathematics

<table>
<thead>
<tr>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 11 or 12†</td>
<td>Math. 21, 23, or 25</td>
<td>Math.</td>
<td>Math. 12, Lang. †</td>
</tr>
<tr>
<td>Chem. 12†</td>
<td>Phys. 11 and 12†</td>
<td>Math.</td>
<td>Math. Eng. 1 or 12†</td>
</tr>
<tr>
<td>Eng. 10 or 15†</td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Math. 11 or 12†</td>
</tr>
<tr>
<td>Mod. Lang.*†</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

## Physics

<table>
<thead>
<tr>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 12 or 14†</td>
<td>Phys. 22 and 23§</td>
<td>Phys. 31</td>
<td>Three courses: 30b, 370, 380b, 412, 445, 50</td>
</tr>
<tr>
<td>Math. 11 or 12†</td>
<td>Math. 21, 23, or 25</td>
<td>Math. 30 or 46</td>
<td>Math. 21 or 25</td>
</tr>
<tr>
<td>Engl. 10 or 15†</td>
<td>Distribution*</td>
<td>Distribution*</td>
<td>Elective</td>
</tr>
<tr>
<td>Mod. Lang.*†</td>
<td>Distribution*</td>
<td>Elective</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

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*Degree requirements. See pp. 2-4.
†May be anticipated by excellent work in secondary school. See pp. 18-19.
‡A Senior essay, or seminar, at the option of the department may be substituted for the equivalent of a year course in the major in Senior year.
§May be taken in Freshman year if Mathematics 21, 23, or 25 is taken currently.
||Substitution of other physics courses is sometimes desirable.
promotion, as outlined in the preceding paragraph, either with respect to course credits, or to quality credits, or to both, and who has not been dropped from the Freshman year, should consult the Dean of Freshmen. If not promotable in June, he may be promoted in September if he shall clear his deficiencies in one of the manners prescribed.

Freshmen should note that one of the requirements for all undergraduate degrees is that quality credit grades be secured in 60 per cent of all courses required for the degree.

If a student whose work is not entirely satisfactory is promoted to the Sophomore class, General Warning or other penalty will be imposed in accordance with the rules of the school in which he will be registered.

**Yale College**

**William Clyde DeVane**, Ph.D., Litt.D., LL.D., Dean.
**Richard Cushman Carroll**, M.A., Associate Dean.
**Lewis Merriman Wiggins**, Ph.D., Assistant Dean.

Yale College offers courses of study in the liberal arts and sciences leading to the degrees of Bachelor of Arts (B.A.) and Bachelor of Science (B.S.). The two requirements of a liberal education are the achievement of a liberal breadth, and the mastery of a particular study or group of studies. The work of Sophomore year is designed to carry on work begun in Freshman year and to introduce the student to new fields of study. In Junior and Senior years opportunity is provided for a greater degree of concentration in a subject or in a field of major interest, the student's comprehension of which is tested by his independent work in the field during his last two years and by a departmental or comprehensive examination at the close of his Senior year.

**Courses of Study**

Each program of courses for the B.A. or B.S. degree must provide first of all for the fundamental studies and the breadth of distribution which are essential to a well-rounded education and basic to sound progress and concentration in the major field. To qualify for the degree the student must satisfy the requirements of the faculty.

*The ways in which deficiencies may be cleared are described in The Freshman Year Rules for Attendance, Scholarship, and Conduct. A copy of this pamphlet is given to each Freshman.*

*The Undergraduate Courses of Study bulletin lists the individual courses and hours of subjects of instruction open to undergraduates.*
IV. Laboratory Science.\footnote{For students contemplating a B.S. degree, Chemistry 12 or 14 is strongly recommended for Freshman year and, in most cases, required. No candidate for the B.S. degree may be exempted from a college course in laboratory science. If he qualifies for an "exception" at the time of admission, he may elect an advanced course in the same science as an alternative to the election of a new science from those listed.}

Science II, III; Chemistry 11, 12, or 14; Geology 10 or 12a and 12b; Physics 12 and 11; Biology 11.

These requirements may be anticipated by excellent work in school and validating scores on the appropriate tests of the College Entrance Examination Board. See the Schedule of Exemptions, pages 106-107.

2. PROGRAM OF DISTRIBUTION

The purpose of the program of distribution is to provide the student with a broad view of the world he lives in and to equip him with the means of understanding it. This entails a knowledge of inanimate and animate nature through the appropriate sciences, a large view of man in the perspective of time, an acquaintance with the great ideas which have influenced the actions of men in the past, and continued to do so in the present, and a knowledge of the significant institutions of modern society. It also entails a comprehension of the arts, the ideas, and the aspirations of men. To obtain so large a view in all its fullness is properly the occupation of a lifetime. Practical considerations compel the division of knowledge into certain large and reasonably well-defined areas.

To lay strong foundations and to ensure a comprehensive view the College requires every student to elect a full-year course or two term courses in the same subject in four of the groups numbered from I to V below:

1. The Classical Languages, Literature, and Civilization.\footnote{Courses in Latin or Greek at the level of 22 or above or two term courses in classical civilization (including Religion 106).}

The Judaic-Christian Tradition in Western Civilization.\footnote{Courses in English above 15 or in the modern foreign languages above 39 when such courses are literary rather than linguistic. Candidates for the B.S. degree will ordinarily satisfy this requirement by English 24 or 27.}


III. Anthropology, Economics, Geography, Political Science, Psychology, Sociology.

IV. History, Philosophy, Religion.

V. Natural or Physical Science.\footnote{Candidates for the B.S. degree must elect a course from this group, which will normally be the course in physics required for their prospective major.}

The same course may not satisfy more than one degree requirement. No student will be promoted to the Junior class who has not completed all of the basic requirements and at least two of the distribution requirements.

3. REQUIREMENTS OF MAJOR PROGRAMS

At the end of Freshman year, students will choose the degree for which they wish to qualify. Those seeking the B.S. degree in Yale College will elect their majors at this time. Those entering the B.A. program will postpone the election of their major until the end of Sophomore year. All candidates for a bachelor's degree in Yale College must elect one of the major programs in the list on page 102. In every case the student shall plan his schedule of courses in his major field in consultation with a representative of the department or program concerned, and must secure the consultant's written approval before the schedule is handed in. The student should acquaint himself fully with all the requirements of the major he plans to enter, with regard not merely to his immediate choice of courses but to the plan of his entire work in his last two or three years in college.

Candidates preparing themselves for entrance to medical school must be a major in an approved Departmental or Divisional Program. In addition, their programs must include Physics 11 and 12, Chemistry 12 or 14 and Chemistry 33 and 33L, Biology 11, or equivalents. Students contemplating graduate work should inquire concerning the language requirements of the subject in which they are interested. Normally, a reading knowledge of both French and German is required of candidates seeking a Ph.D. degree.

Every program in Junior year shall consist of five full courses; in Senior year each B.A. program shall consist of the fifth part of the student's time allocated to preparation for the departmental or comprehensive examination. All B.S. programs shall consist of five full courses.

THE DEPARTMENTAL MAJOR (B.A. OR B.S.)

The major consists of the equivalent of six year courses in a single subject, normally taken, with the exception of the prerequisite, during Junior and Senior years. B.A. candidates, who take only four courses in Senior year, will be limited to five formal courses in the major subject, the equivalent of a sixth course being represented.

*Students intending to major in architecture and to take the combined six-year curriculum offered in conjunction with the School of the Fine Arts should have received this decision by the end of Freshman year.
Departmental Majors Leading to B.A. Degree
Chemistry
Geology
Mathematics
Microbiology
Physics

Divisional Majors Leading to B.A. Degree
History, the Arts, and Letters
Political and Economic Institutions: Their History, Philosophy, and Analysis
Human Culture and Behavior
Special Divisional Majors†

Divisional Majors Leading to B.S. Degree
Biochemistry
Biophysics

Special Majors Leading to B.A. Degree
Mathematics and Philosophy
Physics and Philosophy
Foreign Area Studies
Chinese Studies
Japanese Studies
Russian Studies
Southeast Asia Studies
Scholars of the House

by the time allocated to preparation for the departmental examination. One of the major courses may, with the advice and approval of the department, be an advanced course in a related subject. The major may also include one prerequisite course, commonly taken during the first two years. Qualified candidates may take one of the six major courses during Sophomore year.

Students taking the Departmental Major will be excused from examinations in the courses of their major subject for the second term of Senior year, but will be required to pass a departmental examination in order to qualify for the degree.

For B.A. candidates, the Departmental Major may be either Standard or Intensive. In the Intensive phase, at least one of the courses must be a discussion course. The student in the Intensive Major must write a Senior essay. The essay shall count as one of the courses in the major in Senior year. Only students in the Intensive phase of the B.A. Departmental Majors shall be considered for departmental honors. In the B.S. Departmental Majors, no distinction between Standard and Intensive is made, but a student must write an essay or do other independent work in order to qualify for departmental honors.

THE DIVISIONAL MAJOR (B.A.)

The Divisional Majors listed on page 102 are offered to students who wish to elect broader programs of study in their last two years of college than the Departmental Majors allow. The over-all program of the student shall consist of five year courses, or their equivalent, in Junior year, and four in Senior year with the fifth part of the time allocated to preparation for the comprehensive examination at the end of Senior year. In the Divisional Major itself no precise number of courses is prescribed, and no particular courses are prescribed, except that specified seminars are required to aid in the integration of the work of the major. To make sure that the major is genuinely divisional in its scope, the student may not take more than four courses during his Junior and Senior years in a single subject and will normally choose one elective outside his Divisional Major.

As in the Departmental Major, the Divisional Majors offer both Standard and Intensive programs. The task of the student in either case is to prepare himself through his courses and his reading to take a comprehensive examination at the end of his Senior year. These examinations will consist of essay questions. The student in the Intensive Divisional Major will write during his Senior year an essay which shall count as one of his four Senior courses. Only those students in the Intensive phase of the Divisional Majors are eligible for departmental honors.
Linguistics

Linguistics 20, The Structure of Language. Mr. Bloch.
M, W, F, 1.45.

English and other languages are presented as objects of scientific study, with emphasis on the discovery of formal units and inferential patterns. Orientation: the social setting of language and dialect; the problem of correctness; the relation of speaking and writing; phonetic structure: the phonemic principle. Morphological structure: the morphological principle. Satisfies the general requirement in Formal Thought.

Malayan

(See under Indic and Far Eastern Languages and Literatures)

Master of Arts in Teaching

The Master of Arts in Teaching program is a liberal arts and graduate program for the preparation of high school teachers.

Mathematics

Mathematics 51 and 52 are designed primarily for students registered in the program leading to the degree of Master of Arts in Teaching. Mathematics 51 and 52 are required for this program.

M.

Th, 1:45-3:45.

Examinations for the B.A. or the B.S. degree electing to major in mathematics should note the following paragraphs.

Electives. Mathematics 11 or 12 and 21, 23, or 25, or the equivalent. Mathematics 11 or 12 and 21, 23, or 25, or the equivalent.

The major. The major in mathematics will normally consist of ten courses in mathematics to be chosen from those open to undergraduates numbered 20 or higher. Each student shall take at least one course in three of the four fields: Algebra (Mathematics 50, 53b, 56b, 58b), Analysis (Mathematics 30, 32, 34a, 35b), Applied Mathematics (Mathematics 42, 44a, 46), and Geometry (Mathematics 60a, 60b, 66b). In some instances permission may be granted to take some of the required term courses in related fields. Note: Mathematics 62 and 64a and Mathematics 62 and 64b will alternate, being given each year.

See page 9, p. 48, in regard to graduate courses.
Mathematics

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Qualified students majoring in mathematics may, with the approval of the department, write a Senior essay. They must submit with their essay a statement in writing from the faculty member who is to supervise the work. A student who does not write a Senior essay must take three courses each term in mathematics during the Senior year.

See also Philosophy 45b, Philosophy of Mathematics.

Note: Qualified Sophomores may, with the permission of the instructor, take any of the following courses numbered 30 or above.

Mathematics 11, Mathematical Analysis. Mr. Hedlund.

3. T, Th, S, 8:30.

For students who have not passed trigonometry for economy and the elements of analytic geometry and calculus.

Mathematics 12, Analytic Geometry and Calculus. Consult Mr. Begle.

3. T, Th, S, 8:30.
7. T, Th, S, 8:30.
8. T, Th, S, 9:15.

For students who have passed trigonometry for entrance. An introductory course in the fundamental ideas of the differential and integral calculus. A sufficient amount of analytic geometry for the first year included.

Mathematics 14, Mathematics for Architects. Mr. Votaw.

The purpose of this course is to familiarize the student with the fundamentals of plane trigonometry, analytic geometry, and calculus, and to give an introduction to the course considerable emphasis is laid on applications to science and design. For students of architecture. Open to undergraduates with permission of the department. Consult Mr. Begle.


Elementary analysis, probability, and statistics. An introduction to statistical methods for those who intend to major in a social or biological science. The elementary mathematics needed is given in the course. Notes: Mathematics 16 does not prepare for engineering or for advanced courses in mathematics or in the sciences. The second term may be taken independently for credit, but the student has the equivalent of the first term.

Mathematics 23, Calculus (continued). Consult Mr. Rickart. Consult Mr. Begle.

3. T, Th, S, 8:30.

The course covers essentially the topics treated in Mathematics 21 but with more emphasis on the fundamentals and with further applications in science and engineering, including motion under a central force, Kepler's planetary motion, the simple pendulum treated with elliptic integrals, and a brief discussion of Laplace's theory of determinism. For students who have passed Mathematics 21 or the equivalent.

Mathematics 25.


College Discussion Groups for Sophomores in Mathematics will be available as follows:

Timothy Dwight, Mr. Bernard

Mathematics 34b, Differential Equations. Mr. Kakutani.


Study of differential equations, ordinary and partial, with emphasis on the methods of the second order. After Mathematics 30, 32, or 46.

Mathematics 36b, Functions of a Complex Variable. Mr. Kakutani.


Introduction to the theory of functions of a complex variable. After Mathematics 30, 32, or 46.

Mathematics 42, Statistics. Mr. Votaw.


Frequency distributions, computation of statistical parameters, normal least squares, curve fitting, testing of goodness of fit, sampling for large and small samples, correlation theory in two and several variables, testing of statistical hypotheses, design in experiments. Preferred after Mathematics 21, 23, or 25; also open to Sophomores after Mathematics 12.

Mathematics 46, Higher Mathematics for Students of Science and Engineering. Mr. ——.


The advanced topics of differential and integral calculus, with their applications, including differential equations. After Mathematics 21, 23,
Mathematics 52a, Theory of Numbers. Mr. Ore.
M, W, F, 10.10.
An introductory course on the theory of numbers with emphasis on the historical mathematical development. Number systems, methods of recording numbers by various peoples, the properties of numbers, primes, perfect and amicable numbers, algorithm, solution of Diophantine problems, the theory of continued fractions with application to various special problems.
Mathematics 21, 23, or 25.

Mathematics 52b, Probability. Mr. Ore.
M, W, F, 10.10.
The basic laws of probability, applications to problems of all kinds, the law of large numbers, normal and other probability. After Mathematics 21, 23 or 25.

Mathematics 54b, Determinants and Matrices. Mr. Jacobson.
T, Th, S, 11.10.
Basic properties of determinants and linear equations, elements of linear vector spaces and characteristic values. Mathematics 21, 23, or 25.

T, Th, S, 11.10.
A survey of the basic properties of certain algebraic systems and integral domains, fields, and groups. A development of number systems and including the field of complex numbers.

Mathematics 64a, Topology. Mr. Bernard.
M, W, F, 11.10.
This course is to include a discussion of the fundamental properties of Euclidean space as well as an introduction to the general approach to abstract spaces. There will also be an introduction to combinatorial topology, with particular reference to two-dimensional faces.

Mathematics 65b, Differential Geometry. Mr. Hedlund.
M, W, F, 11.10.
Applications of calculus to the study of the geometry of curves and surfaces in three-dimensional Euclidean space; intrinsic geometric properties of manifolds and connections with manifolds and topology.

Mathematics 50, Higher Algebra. Mr. Mills.
T, Th, S, 9.10.
Topics of algebra which are useful for the further pursuit of applied mathematics, especially actuarial or statistical work. After Mathematics 11 or 12.

MECHANICAL ENGINEERING

Mathematics 36, Advanced Calculus; Mathematics 32, An Introduction to Fourier Theory; Mathematics 44a, Calculus of Finite Differences; Mathematics 60a, Synthetic Projective Geometry; Mathematics 62, Analytic Geometry.

OMITTED COURSES

Mathematics 30, Advanced Calculus; Mathematics 32, An Introduction to Fourier Theory; Mathematics 44a, Calculus of Finite Differences; Mathematics 60a, Synthetic Projective Geometry; Mathematics 62, Analytic Geometry.

MECHANICAL ENGINEERING

Mechanical Engineering. Mr. Bair, Mr. Keator, Mr. Phelps. 8
Rec., T, Th, S, 8; Comp., M, 1.45–3.35.
Rec., T, Th, S, 9.10; Comp., W, 1.45–3.35.
Rec., T, Th, S, 11.10; Comp., F, 1.45–3.35.
Survey of several fields of mechanical engineering with emphasis on the applications of the fundamental sciences. For students majoring in other than mechanical engineering.

Mechanical Technology. Mr. Keator. 3 hrs.
Rec., T, Th, S, 8;
Lab., T, M, 1.45–3.35.
T, F, 1.45–3.35.
W, 1.45–3.35.
Study of equipment and processes for power generation and manufacturing. Consists of lectures, laboratory work, and visits to industrial plants.

Kinematics. Mr. Crossley. 3 hrs.
Rec., T, Th, S, 8;
Lab., T, M, 1.45–3.35.
T, F, 1.45–3.35.
W, 1.45–3.35.
Study of importance of kinematic chains. Graphical and analytical study of configurations and velocities in mechanisms, including use of instantaneous axes, vector analysis, and relative velocities; accelerations in mechanisms; design of cam; kinematics of toothed action, and motion.

Dynamics of Machines. Mr. Crossley. 3 hrs.
Rec., T, Th, S, 8;
Lab., T, M, 1.45–3.35.
T, F, 1.45–3.35.
W, 1.45–3.35.
Study of dynamics of machines with an introduction to vibration. May include rotor balancing, engine balancing, critical speeds, and applications, inertia effects and dynamic stress in machine and governor theory. After E.M. 23b and Mathematics 21. For students in mechanical engineering.

Thermodynamics. Mr. 4 hrs.
Rec., T, Th, S, 10.10; Comp. or Lab., T, 1.45–3.35.
TYPICAL PROGRAMS FOR THE B.A. DEGREE

<table>
<thead>
<tr>
<th>Major</th>
<th>Freshman year</th>
<th>Sophomore year</th>
<th>Junior year</th>
<th>Senior year</th>
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<tr>
<td><strong>STANDARD DEPARTMENTAL MAJOR</strong></td>
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<tr>
<td>English*</td>
<td>Distribution†</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
</tr>
<tr>
<td>Modern Language*</td>
<td>Distribution†</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
</tr>
<tr>
<td>Formal Thinking*</td>
<td>Distribution†</td>
<td>Elective</td>
<td>Elective</td>
<td>Elective</td>
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<tr>
<td>Laboratory Science*</td>
<td>Elective</td>
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<tr>
<td>Elective</td>
<td>Elective</td>
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<tr>
<td><strong>B.A. MAJOR FOR PREMEDICAL STUDENTS</strong></td>
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<tr>
<td>Chemistry†</td>
<td>Chemistry</td>
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<td>Major</td>
<td>Major</td>
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<tr>
<td>Biology†</td>
<td>Physics</td>
<td>Zoology</td>
<td>Major</td>
<td>Major</td>
</tr>
<tr>
<td>Modern Language*</td>
<td>Distribution†</td>
<td>Major</td>
<td>Major</td>
<td>Major</td>
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<td>Elective</td>
<td>Elective</td>
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</tbody>
</table>

*Basic requirements, see pp. 2–3; for possible exemptions from English, modern language, formal thinking, and science, see pp. 18–19.
Each exemption will add one elective to the student's program. A student who begins a modern language in college will, in general, need to carry it for a second year to meet the requirement in this field.
†For distribution requirements, see pp. 3–4. The order in which these are to be met is not prescribed. Of the five listed only four must be fulfilled except that premedical students are required by medical school to complete both requirements in science.
‡Mathematics is highly recommended.
For information about elective air science and tactics, military science and tactics, or naval science, see pp. 168–173.
The charts above show how the distributional and major requirements for the B.A. may be taken care of. The order in which the B.A. requirements may be met is optional but no student will be promoted to the Junior class who has not completed all of the basic requirements and at least two of the distributional requirements.