

DIVISION III: *Science and Mathematics*

Astronomy 1-2, Biology 1-2 or 3-4, Chemistry 1-2, 1a-2a\*, or 3-4, Geology 1-2, Mathematics 1-2 or 3-4, Physics 1-2, 1a-2a\* or 3-4.

*Electives*

A sophomore may choose his electives from the courses listed above, or from the following: English Composition 1a-2a (creative writing); French 5a-6a (composition and conversation); Spanish 5a-6a (composition and conversation); Air Science 3-4 (Air Science 1-2 may *not* be elected in sophomore year).

In addition to five courses, physical education is required.

*Divisional Requirements for AF ROTC Students*

Beginning with the year 1954-55, students enrolled in AF ROTC will be permitted to postpone one year-course of the Division requirements until their junior year.

*Prerequisites for a Major*

Every student should include among his freshman and sophomore courses the prerequisite of any major that he is at all likely to select. He should also note that certain of the courses listed above, which are in his major field, may count toward the fulfillment of major requirements. The detailed structure of each major, including prerequisites, precedes the list of courses in each department under "Courses of Instruction".

*Junior and Senior Years**The Major*

M In his junior and senior years the student concentrates part of his work in his major subject. The program of the major normally consists of three courses in the major subject which are taken in a prescribed sequence, and two "parallel" courses (which can be taken simultaneously with the "sequence" courses). A student may major in art, biology, chemistry, classics, economics, English, French, geology, German, history, American history and literature, mathematics, music, philosophy, physics, political economy, political science, psychology, or Spanish. Two of these are interdepartmental majors, political economy being offered jointly by the departments of economics and political science, and American history and literature by the departments of English and history.

\*For explanation of courses numbered 1a-2a, see previous footnote. "Note on courses numbered 1a-2a". page 74

T To be eligible for any major, a student must have received grades of *C minus* or better each semester of the prerequisite course and any other course taken in the sophomore year which is required in the major. A student who falls below this standard may major in this subject only with the approval of the Committee on Academic Standing in consultation with the chairman of the department. A description of the detailed structure of each major precedes the list of courses in each department under "Courses of Instruction".

*The Senior Major Course*

A central feature of the Williams major is the double-credit course taken in senior year. (Seniors register for only four separate courses including this double-credit course.) This course differs in many ways from other courses in the College. Since it is taken only by majors, the students share a common body of knowledge derived from their earlier sequence courses; and since it counts as two courses, the students have extra time for reviewing their earlier work and for writing papers which correlate various aspects of what they have learned. Hence, double credit is allowed for this work because it has a double function: it not only extends the student's knowledge of his major subject, but it also coordinates the material of his earlier courses in the major.

*The Major Examination*

The success with which the student has achieved an over-all understanding of his major subject is tested by a comprehensive examination on the major, taken at the end of his senior year. The double-credit senior course, providing special opportunities for correlation and review, and the major examination thus work together to insure that the Williams graduate has not merely received passing grades in a number of separate courses, but has organized and assimilated what he has learned.

*Completion of the Major*

The passing of each major course and of the major examination is necessary for the completion of the major. In addition, the student must obtain a general grade of *C minus* or higher in the major. This grade is determined by combining the grades attained in all the major courses and the grade attained in the major examination. The latter must count at least one fifth of the total. A student who receives a grade of *E* in the first semester of the

Entering freshmen who plan to become architects should take Mathematics 1-2, and are advised to take Art 1-2 (listed as a sophomore course) in their freshman year, and Mathematics 13-14 and another art course, presumably Art 7, 8, in their sophomore year. Art 5-6, the junior course in basic design, is a prerequisite for all senior work in architectural design. The latter (Art 13-14) is conducted by a registered architect to a limited enrollment. In special cases where there is unusual aptitude, a sophomore who established a good record in Art 1-2 in his freshman year may be admitted to Art 5-6 in order to allow two years of architectural study, provided that the second year is on an honors basis.

### Grades

The following grade system is used: *A*, excellent; *B*, good; *C*, fair; *D*, passing; *E*, failing. These letters with plus and minus value have the following numerical equivalents in calculating grade averages:

A+ = 12	B+ = 9	C+ = 6	D+ = 3	
A = 11	B = 8	C = 5	D = 2	E = -1
A- = 10	B- = 7	C- = 4	D- = 1	

### Completion of Courses

A student must secure a passing mark in the class work of a course in order to be admitted to the final examination. A course is considered completed for any semester when the student has obtained a grade as high as *D minus*, based on both the daily work and the final examination. If he fails to do this, he must cancel the deficiency in one of these ways:

- (1) repeat the course;
- (2) forfeit one semester's credit and take another full year course;
- (3) in case of a first-semester failure in certain courses, obtain a grade as high as *C minus* in the work of the second semester;
- (4) in the case of a failure in the first semester of senior year pass a special re-examination before the middle of the last semester with a grade of *C minus* or higher. This does not apply, however to a failure in the first semester of the senior major course. In this case the senior is dropped from college at mid-year.

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If a failure occurs in the first semester of a year-course, the student may, with the consent of the instructor, continue the course. Credit for the first semester of a year-course may be canceled because of failure in the second semester, upon the recommendation of the department concerned and with the approval of the Committee on Academic Standing.

If a student because of illness or protracted absence from college or for special reasons has not completed the daily work of a course at the end of a semester, he must secure permission from the Dean to take the final examination and an extension of time to complete the daily work. In the case of absence from a final examination, a make-up examination may be given only at a time to be determined by the Dean.

If a student's total absences in any course exceed fifty per cent of the exercises of the semester, the work may not be made up nor may any credit be allowed for the course for that semester except by special vote of the Committee on Academic Standing. This applies to honors candidates as well as to students on the Dean's List.

### Transfer Credit

No credit is given for courses taken in other institutions in which the grades received were lower than *C minus*.

### Graduation Requirements

The number of year-courses, or their equivalent in semester-courses, required for graduation is twenty. A student must also secure semester grades of *C minus* or better in at least one half of the total number of courses required for graduation and must attain a major grade of *C minus* or higher based upon the work in the major courses and in the final general examination.

All courses taken in the senior year must be passed, even though they are not necessary to complete the number of courses required for graduation.

### Bachelor Of Arts

The degree of Bachelor of Arts is conferred, by vote of the Trustees at Commencement, upon students who have completed the requirements as to courses and grades to the satisfaction of the

*English 12 Modern Drama*

*Junior course.* Prerequisite, English 1-2.  
Hour L Exam M

O'NEILL

*English 13 The English Novel: Richardson to Meredith*

*Junior course.* Prerequisite, English 1-2.  
Hour A Exam E

BUSHNELL

*[English 14 The English Novel: Hardy to the Present Day*

*Junior course.* Prerequisite, English 1-2.  
Hour A Exam

*History 5-6 Studies in European History*

*Junior course.* Prerequisite, History 1-2 or 1a-2a.  
Hours B, K Exam B

FAY, ROHR

*Philosophy 4 History of Modern Philosophy*

*Junior course.* Prerequisite, Philosophy 1-2.  
Hour C Exam L

BOWER

*Philosophy 7 The Philosophy of History*

*Junior course.* Prerequisites, Philosophy 1-2 and a course in history.  
Hour B Exam G

MILLER

*Philosophy 8 American Philosophy*

*Junior course.* Prerequisite, Philosophy 1-2.  
Hour B Exam G

STENSON

*19-20 American History and Literature - Changing Factors in American Life and Thought*

A study of the genesis and development of attitudes and conditions in twentieth century American life, stressing the changes in the national culture brought about by the advance in science and the Industrial Revolution. Selected contemporaneous essays, treatises, novels, and plays, which present the issues as they appeared to the people at the time.

*Senior course.* Required course in the major. Prerequisites, History 3-4 (3a-4a) and English 7, 8.

Hour 1-2:30 Mon., Wed. Exam P

KELLER, MANSFIELD

*101 Junior Honors Course*

A group exercise during the first term of junior year for candidates for the degree with honors in History and American History and Literature.

Introduction to various approaches to history. A study by each student of the life and work of a great historian who has written in his field of special interest. Instruction in the problems of techniques of writing history,—the nature of historical evidence, types of source material, and the techniques of historical criticism. Problem papers designed to train students in organizing, writing, and documenting historical essays.

One meeting a week with occasional informal evening meetings.

Hour 1-2:30 Th.

KELLER, MANSFIELD, WAITE, ROHR

*102 Junior Honors Course* } During the second semester of junior year and during senior year each honors candidate works independently with a member of the department.  
*103-104 Senior Honors Course* } The objective is the preparation of a senior thesis.

KELLER

Hour Arr.

*Latin (Div. I)*

(For description of courses see under CLASSICS)

*Mathematics (Div. III)*

Chairman, Professor D. E. RICHMOND

Professor RICHMOND, Professor WELLS, Associate Professor JORDAN, Assistant Professor OLIVER, Assistant Professor MEAD.

MAJOR—Sequence courses: Mathematics 1-2, 3-4, 5-6, 9-10. Parallel course: Mathematics 7-8.

The departmental sequence gives the student an understanding of the principles and processes of the calculus and their applications to physical and geometric problems. The parallel course continues his study of algebra and geometry. The major examination will be concerned principally with these courses. The major aims to develop the student's mathematical power and insight and to prepare him to appreciate the place of mathematics in the modern world.

*The Degree with Honors in Mathematics*

The candidate for this degree carries the departmental sequence and the parallel course. He undertakes one or two consecutive years of individual work suited to the student's interest and aptitude, under the direction of a member of the department. This work culminates in a senior thesis. The department is prepared to direct work in actuarial mathematics, analysis, geometry, algebra, statistics, mathematical physics, and mathematical foundations. While the thesis need not contribute to the existing knowledge of mathematics, it will require the exercise of individual initiative.

This degree should be taken by students who intend to pursue graduate study in mathematics and by those who enjoy independent work.

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Mathematics

Williams

1-2 *Elementary Calculus and Analytic Geometry*

Numbers, functions and graphs, derivatives, integration, logarithmic and exponential functions, complex numbers and the trigonometric functions, analytic geometry of the conics.

*Freshman course.*

Hours *A, B, C, D, J, K, M* Exam *F* RICHMOND, JORDAN, OLIVER, MEAD

3-4 *Calculus*

Formal integration. Definite integrals. Introduction to differential equations, applications. Analytic geometry, plane and solid, using vector methods. Partial derivatives. Infinite series.

*Sophomore course.* Prerequisite, Mathematics 1-2.

Hours *A, B, K, M* Exam *F* RICHMOND, JORDAN, OLIVER, MEAD

5-6 *Advanced Calculus*

An introduction to the more rigorous methods of calculus, including the theory of limits, derivatives, definite integrals, infinite series and improper integrals. Functions of two variables, partial differentiation and multiple integration.

*Junior course.* Prerequisite, Mathematics 3-4.

Hours *C, J*

Exam *F*

*First semester:* OLIVER

*Second semester:* JORDAN

[7-8 *Algebra and Geometry*

General introduction to modern developments.

Theory of numbers. Foundations of algebra. Set theory. Groups, rings, and fields. Vector algebra, matrices, and determinants. Geometry and group theory. Projective geometry.

*Junior course.* Prerequisite, Mathematics 3-4.

Hour *L* Exam *M*

MEMBERS OF THE DEPARTMENT]

9-10 *Advanced Differential Equations and Special Topics*

First order differential equations. Theory of linear equations. Integration in series. Laplace transforms. Introduction to boundary value problems; Fourier series and general expansion problems with applications to the theory of vibrations and wave mechanics.

Vector calculus. Theory of functions of a complex variable.

*Senior course.* Required course in the major. Single credit course for non-mathematics majors. Double credit course with supplementary meetings for mathematics majors. Prerequisite, Mathematics 5-6.

Hour *C* Exam *L*

RICHMOND, OLIVER, MEAD

Mathematics, Music

12 *Foundations of Mathematics*

A study of the fundamental concepts of mathematics. The axiomatic method. Theory of sets. The real number system. Groups. Philosophy of mathematics.

*Junior course.* Prerequisite, Mathematics 3-4.

Hour *L* Exam *M*

RICHMOND

13-14 *Engineering Drawing and Descriptive Geometry*

Principles of orthographic and auxiliary projections; isometric, oblique, perspective and section drawings, freehand and with the use of instruments; space visualization; American Standard Association conventions and symbols. Fundamental concepts concerning lines, planes, and curved surfaces, including analytic representation; intersection and development of surfaces; applications to engineering problems.

*Junior course.* Prerequisite, Mathematics 1-2. Students must provide themselves with a set of drawing instruments, architect's scale, and triangle.

Hour *M* Exam *R*

WELLS

*Statistics I Introduction to Mathematical Statistics*

Elements of probability. Probability and frequency distributions. Sampling theory, with application to problems of statistical inference such as determining confidence limits, making elementary significance tests, testing for randomness. Analysis of pairs of measurements, including least squares methods.

*Junior course.* Prerequisite, Mathematics 3-4.

Hour *D* Exam *C*

JORDAN

101-102 *Junior Honors Course*103-104 *Senior Honors Course*

RICHMOND

*Music (Div. I)*

Chairman, Professor R. G. BARROW

Professor BARROW, Assistant Professor SHAINMAN, Assistant Professor NOLLNER.

MAJOR—(with historical emphasis)—*Sequence courses:* Music 1-2, 3-4, 19-20 (Section A.) *Parallel courses:* Any four semesters of Music 5, 6, 9, 10, 11 or 12.

MAJOR (with theory emphasis) *Sequence courses:* Music 1-2, 3-4, 19-20 (Section B.) *Parallel courses:* Music 7-8 and any two semesters of Music 5, 6, 9, 10, 11 or 12.

A fee of \$6 a year will be required for all students taking a course in music.