SOPHOMORE YEAR: Especially able sophomores may register during the second term of sophomore year in honors courses ordinarily open only to juniors and seniors. Sophomores of high achievement may also be given permission to register in upper class courses. This applies particularly to students who have taken advanced courses as freshmen. Eligibility is judged on an individual basis, and permission is obtained from the appropriate department at the time of registration.

JUNIOR AND SENIOR YEARS: A central feature of the Williams curriculum is the honors program (page 50) which provides an opportunity for students of superior initiative and ability to exercise originality and responsibility as scholars.

Another opportunity for advanced work available to students enrolled in the honors program is known as independent study. When a particularly able honors candidate wishes to pursue the study of a subject not covered by the normal course offering of the College, arrangements may be made for him to undertake a semester, or more, of independent study with a specially assigned member of the faculty. Arrangements for independent study are made with the appropriate department at the time of registration.

OPPORTUNITIES IN THE CREATIVE ARTS

Williams College recognizes the varied needs of both the disciplines which form part of the college's curriculum and of the students enrolled within its programs. Certain disciplines, especially those concerned with the creative arts, can benefit from an increased use of independent projects for its students, even for those who may not be honors students in the college-at-large. These projects normally do not form a part of the usual classroom program within that discipline. In addition, these independent projects realize more fruitfully the potential of the individual talent of the student and will guide the student in the growth of that talent and interest. All of these things the college desires to foster. It is generally conceded that an exclusively classroom oriented approach to the arts is unsatisfactory; it must be fortified by practical experience within that discipline.

The architect and humanitarian, Walter Gropius, in his Convocation Address at Williams College on September 22, 1963 stated:

This unintegrated society of ours needs participation in the arts as an essential counterpart to technology... for art develops intuition... In our era of expediency and mechanization, the predominant educational aim ought to be to call forth creative habits; vocational skill should be a by-product only, a matter of course. The student's mind... will become increasingly inventive when he is guided not only by intellectual studies but also by practical experiments in forming, building, constructing things to come, a program of 'search' rather than 're-search'.

Qualified students at Williams are encouraged to make use of special electives in the creative arts in addition to the normal courses and extracurricular activities within these fields. These special electives in the creative arts, listed with the course announcements under Art, Drama, English (Creative Writing), and Music, have been formulated by the various departments and disciplines for those who demonstrated talents and interests which the college hopes the individual student will wish to develop. Students should confer with the appropriate faculty member before registering for these courses.

Attention is directed to the Hubbard Hutchinson Memorial Fellowship for graduate study described on page 40.

REQUIREMENTS FOR THE BACHELOR OF ARTS DEGREE

Required Number of Courses

Twenty year courses, or the equivalent in semester courses, are required for the degree. The senior major course counts as two one-year courses.

Residence Requirement

A minimum of two years of residence is required for the degree.

Foreign Language Requirement

All Williams students are required to fulfill a minimum language requirement in one of two ways: (1) by achieving a satisfactory score on the College Entrance Examination Board Language Achievement Test, or (2) by passing
a 103-104 course in Greek, Latin, German, Russian, French, Italian, Spanish, or the 105-106 course in Spanish at Williams.

**Distribution Requirement**

Two one-year courses, or their equivalent in semester courses, must be completed in each of the following three divisions by the end of the sophomore year:

**Division I. Languages and the Arts**
- Art
- Comparative Literature
- Drama
- English
- French
- German
- Greek
- Italian
- Latin
- Music
- Public Speaking
- Russian
- Spanish

**Division II. Social Studies**
- Anthropology
- Classical Civilization
- Economics
- History
- Philosophy
- Political Science
- Psychology
- Religion

**Division III. Science and Mathematics**
- Astronomy
- Biology
- Chemistry
- Geology
- Mathematics
- Physics
- Political Economy
- Political Science
- Psychology
- Religion
- Romanic Languages
- Spanish
- French
- Russian

**The Major**

Juniors are required to choose a major field of concentration. The selection is normally made at the time of registration in the spring of the sophomore year. But qualified students may request permission to register provisionally in a major at the end of their freshman year.

**General Structure**

The program of the major normally consists of:

1. Three or four one-year courses* in the major subject, taken in a prescribed sequence and culminating in the double-credit senior course. These are known as sequence courses.

*Two one-semester courses are considered to be the equivalent of a one-year course.

2. One or two additional one-year courses. One or both of these courses may be specifically prescribed by the major department. Most departments permit some choice among alternatives, including, in appropriate cases, courses in subjects related to the major. Since these additional courses are taken along with the sequence courses they are called parallel courses.

The courses required by many departmental major programs require prerequisite courses in related departments. A description of the detailed structure of each major precedes the list of courses in each department under "Courses of Instruction".

**Major Fields**

Majors are offered in the following fields:

*American Civilization
- Mathematics
- Art
- Biology
- Chemistry
- Classics
- Greek
- Latin
- Economics
- English
- Geology
- German
- History

+Music
+Philosophy
+Physics
+**Political Economy
+Political Science
+Psychology
+Religion
+Romanic Languages
+Spanish
+French
+Russian

**Senior Major Course**

A central feature of the major at Williams is the double-credit course taken in senior year. This course differs in two respects 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, it provides opportunity for coordinating earlier work and for writing papers which correlate various aspects of what they have learned.

**Major Examination**

The student's overall 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 correla-

*Offered by the Department of History.
**Offered jointly by the Departments of Economics and Political Science.
tion 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.

Provisional Registration in Departmental Major in Sophomore Year

Early concentration in a major field of interest is open to students having well-formulated educational objectives. Students may request permission at the end of their freshman year to register provisionally as majors with departments of their choice. This permission carries the privilege of registering for as much as four semesters of course work in the same department during the sophomore year. Permission for provisional registration is obtained from the chairman of the appropriate department at the time of registration in the sophomore year.

The Junior Year Abroad

Qualified students may apply for any one of several arrangements for spending the junior year abroad. A student may study in Europe, Africa, Asia or Latin America under programs arranged with his adviser and the approval of the chairman of his major department and of the Dean and the Academic Standing Committee. A student who wishes to avail himself of this opportunity must have a good academic record and competence in the language of the country in which he plans to study. In general two years of study of the language at the college level are necessary to provide adequate preparation.

Corrective Composition

It should be noted that Williams does not require a year's course in English Composition, since most entering freshmen have received training in the fundamentals of mechanics (spelling, punctuation, grammar, and sentence structure) before coming to college. If any freshman shows that he needs further drill, he is assigned to Corrective Composition, a program of non-credit remedial work in which the student meets once a week with a member of the English department and concentrates on his special deficiencies. Most courses involve a good deal of formal writing, and close check is kept on the development of the student's powers of expression. Furthermore, any student who demonstrates the need for this instruction may be assigned to Corrective Composition at any time during his college career by a member of the faculty.
MATHEMATICS (Div. III)

DEPARTMENTAL STAFF FOR 1964-65

Chairman, Professor G. L. Spencer, II
Acting Chairman, Professor H. W. Oliver

Professor Richmond, Professor Jordan, Professor Oliver, Professor Spencer, Associate Professor Kozelka, Assistant Professor Feeman, Assistant Professor Grabois. Mr. Levitz**.

COURSES OF INSTRUCTION 1965-66

MAJOR PROGRAM

Sequence courses

| Mathematics 101  | Introduction to the Calculus |
| Mathematics 102  | Elementary Calculus |
| Mathematics 201  | Linear Algebra |
| Mathematics 202  | Calculus of Several Variables |
| Mathematics 301-302 | Advanced Calculus |
| Mathematics 401-402 | Advanced Differential Equations |

Parallel courses

| Mathematics 305-306 | Introduction to Abstract Algebra |

The departmental sequence gives the student an understanding of the principles and processes of the calculus and their applications to physical and geometric problems. Mathematics 305-306 must be taken as a parallel course. 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. In most cases he will be expected to replace the sequence courses 301-302, 401-402 by 301, H302, H401-H402.

In addition the honors candidate must undertake one of the following alternatives:

(a) Two elective one-semester courses from among Mathematics 204 and the 300 and 400 non-sequence courses offered by the department.

(b) One or two years of independent work. This work culminates in a senior thesis. The department is prepared to direct work in actuarial mathematics, algebra, analysis, geometry, mathematical foundations, statistics and topology. While the thesis need not contribute to the existing knowledge of mathematics, it will require the exercise of individual initiative.

*On sabbatical leave 1964-65
**Second semester 1964-65
101 Introduction to the Calculus
Functions, graphs, continuity. Derivatives and applications. Area and integration. Exponential, logarithmic and trigonometric functions.
Freshman course.
Hours A, B, J, K

MEMBERS OF THE DEPARTMENT

102 Elementary Calculus
Continuation of Mathematics 101.
Methods of integration. Introduction to differential equations. Infinite series with applications.
Should be elected by those who are likely to major in mathematics or physics.
Freshman course. Prerequisite, Mathematics 101.
Hours A, B, J, K

MEMBERS OF THE DEPARTMENT

103 Elements of Calculus
An intensive coverage of the content of first year calculus for students who have training in calculus but are not prepared to enter Mathematics 201.
Freshman course.
Hours D, M

MEMBERS OF THE DEPARTMENT

104 Introduction to Statistical Inference
Designed for students with interests in the biological or social sciences.
Freshman course. Prerequisite, Mathematics 101 or 103.
Hours D, L, M

MEMBERS OF THE DEPARTMENT

105 Concepts in the Calculus
Intuitive introduction to the ideas of the calculus, including functions, graphs, Derivatives, integrals, and applications.
Designed for students who do not intend to continue the study of Mathematics. Credit will not be given for both Mathematics 105 and Mathematics 101.
Freshman course.
Hours C, L

MEMBERS OF THE DEPARTMENT

106 Elements of Modern Algebra
Introduction to elementary number theory and to basic concepts of modern algebra.
Designed for students who do not intend to continue the study of Mathematics.
Freshman course.
Hours C, L

MEMBERS OF THE DEPARTMENT

201 Linear Algebra
Linear systems, vector spaces, matrices, determinants, and quadratic forms.
Sophomore course. Prerequisite, Mathematics 102, 103, or 104.
Hours B, C, J, M

MEMBERS OF THE DEPARTMENT

202 Calculus of Several Variables
Partial derivatives and differentials of vector functions, and applications. Multiple integration. Taylor series.
Sophomore course. Prerequisite, Mathematics 201.
Hours B, G, M

MEMBERS OF THE DEPARTMENT

204 Intermediate Statistical Inference
Tests of statistical hypotheses, with emphasis on small-sample tests from normal populations: t-test, F-test, chi-square. Contingency tables and other non-parametric tests. Introduction to utility theory. Applications directed towards the behavioral sciences.
Sophomore course. Prerequisite, Mathematics 104.
Hour MN

KOZELKA

301-302 Advanced Calculus
Topics in convergence with applications to series, differentiation, and integration. Vectors, differential equations, partial differentiation, multiple integration.
Junior course. Prerequisite, Mathematics 202.
Hours 301-F, L; 302-F

MEMBERS OF THE DEPARTMENT

304 Foundations of Mathematics (Not offered 1965-66)
Junior course. Prerequisite, Mathematics 202.

Hour

305-306 Introduction to Abstract Algebra
Axiomatic development of the natural numbers, the integers, and the rational numbers. Integral domains, fields, rings, groups, vector spaces, matrices, determinants, linear equations. Non-majors may take the first semester of this course without the second.
Junior course. Prerequisite, Mathematics 201.

Hour B

GRABOS
308 (formerly 303) Elementary Number Theory (Not offered 1965-66.)

*Junior course. Prerequisite, Mathematics 202.*

Hour D

310 Numerical Analysis

*Junior course. Prerequisite, Mathematics 202.*

Hour QG JORDAN

312 Theory of Games (Not offered 1965-66.)
Mathematical definition of games: algebraic and geometric interpretation of strategies. The fundamental theorems concerning solutions. The duality theorem relating games and linear programming problems. Degenerate cases and other special problems.

*Junior course. Prerequisite, Mathematics 201.*

Hour

401-402 Advanced Differential Equations

*Senior course. Required course in the major. Single-credit course for non-mathematics majors. Double-credit course with supplementary meetings (Hour FR) for mathematics majors. Prerequisite, Mathematics 301-302.*

Hour JK RICHMOND

407 Differential Geometry (Not offered 1965-66.)
Theory of curves and surfaces in Euclidean space with emphasis on local intrinsic geometry of surfaces. Introduction to problems in the global theory of surfaces.

*Senior course. Prerequisite, Mathematics 301.*

Hour DE