

1955-56

MATHEMATICS

Professors MYERS (head), BIRD, DIECKMANN, JAMES, OLDS, PURDY, Associate Professor JAMISON; Assistant Professors DANIELS, DUNCAN, HOLDER, LOVAGLIA, MARKS, PRESTON; Instructors HALL, HOGGATT, LARSEN, O'DONNELL.

The courses in the mathematics department are designed to satisfy the needs of students with varying objectives. All students in science and engineering, as well as those who expect to do quantitative work in any of the social sciences, will find adequate instruction for their needs. Prospective teachers in the elementary and secondary schools are able to obtain a minor or major in the field of mathematics. The A.B. degree can be earned with major in pure or applied mathematics, and the M.A. degree in mathematics is available when accompanied by a teaching credential curriculum. The general secondary teaching credential with mathematics as the major or minor subject can be completed in the department. The work required for a major in this department presupposes at least six semesters of high school mathematics, including trigonometry. Deficiencies may be made up by proper selection from courses 6, 7, and 8, or 16 and 18.

The training for the position of mathematician in industry or in government employ is available, and the demand for graduates both in teaching and nonteaching fields vastly exceeds the supply.

For a course to count toward either a major or a minor in mathematics, the grade received must be "C" or better.

1. M.A. DEGREE WITH MAJOR IN MATHEMATICS

The student holding an A.B. degree in mathematics comparable to that outlined in Item 2, below, can complete the work for the M.A. degree and the California General Secondary Credential in twelve months of graduate work, provided sufficient professional training has been included in the undergraduate curriculum. See the *Graduate Division Bulletin* of this college for further details.

2. A.B. DEGREE WITH MAJOR IN MATHEMATICS (PRE-SECONDARY)

The five-year program outlined below qualifies the student for the A.B. degree with a major in mathematics at the end of four years. Required courses include Mathematics 30, 31, 32, 128, 134, at least one of 115, 116, or 118, together with additional courses to total sixteen units of upper division mathematics.

Since the universities require twenty to twenty-four units in upper division mathematics for graduation, the student expecting to transfer after the A.B. degree should include in his undergraduate program more than the minimum figure of sixteen units shown.

3. A.B. DEGREE WITH MAJOR IN MATHEMATICS (NON-TEACHING)

Students following this four-year curriculum for work as mathematicians in industry will pursue what is essentially the same as the outlined program, the difference being that in the upper division years the courses in education will be replaced by courses in advanced physics, chemistry, and engineering depending upon the type of industry in which the student expects to seek employment. In addition, the student may elect to replace the Physics 2A, 2B, in the sophomore year by the three semester course Physics 50, 51, and 52. See the advisor for further information.

4. JUNIOR HIGH SCHOOL MAJOR IN MATHEMATICS

This major is designed to accompany the education major for the student who plans to teach in a junior high school. To qualify for this major the student should complete Mathematics 30, 31, Education 393, 394, and ten units of additional electives in mathematics, including eight units of upper division courses.

5. MINOR IN MATHEMATICS FOR THE A.B. DEGREE

This work is designed to develop strength in a particular branch of mathematics in the student who will enter industry in one of the fields of application of mathematics and to make available courses in pure mathematics to the interested student of the humanities. Courses should include Mathematics 30, 31, and six units of upper division mathematics (selected in consultation with the department head).

6. MINOR IN MATHEMATICS FOR THE A.B. DEGREE (PRE-SECONDARY)

This program will provide the student with a minor for his A.B. degree at the end of four years which will be readily expandable in a fifth year into a minor in mathematics for the general secondary credential. Courses should include Mathematics 30, 31, 128, and at least one of 115, 116, or 118, to total sixteen units.

7. MINOR IN MATHEMATICS FOR THE A.B. DEGREE (TO ACCOMPANY THE GENERAL ELEMENTARY OR GENERAL JUNIOR HIGH SCHOOL CREDENTIAL)

Courses should include Education 393, 395, and eight units of electives in mathematics including at least two units of upper division mathematics courses.

8. GENERAL SECONDARY CREDENTIAL WITH MAJOR IN MATHEMATICS

The student holding the A.B. degree with mathematics as the major subject from an accredited institution and with an acceptable grade average will be able to complete in one year the departmental requirements for the general secondary credential with a major in mathematics by following this program. In certain instances the student who holds the A.B. degree in a subject other than mathematics but who has had a number of courses in mathematics will be able to complete the requirements for a major in this department by the end of the fifth year.

While there follows a detailed outline of this five-year program, courses should include Mathematics 30, 31, 32, 134, 128, one of 115, 116, or 118, Education 394, and six units of upper division mathematics electives, together with Mathematics 201A and three units of graduate mathematics electives, to total thirty-six units.

This department asks all majors to present a year of college physics, and a semester of speech. In addition, students should present upper division credit in algebra, synthetic geometry, and advanced analysis. Course work in fields of application of mathematics, such as statistics, astronomy, navigation, physics, applied mechanics, surveying, descriptive geometry, and finance is desirable.

9. GENERAL SECONDARY CREDENTIAL WITH MINOR IN MATHEMATICS

Although his major interest is in another field, the student who completes this minor will be qualified to teach a course in mathematics if called upon to do so. Courses should include Mathematics 30, 31, 128, one of 115, 116, or 118, Education 394, and Mathematics 201A.

PROGRAM RECOMMENDED FOR MATHEMATICS MAJORS

All mathematics majors are requested to include in their programs: one year of college language (French or German); one year of college physics (generally Physics 2A, 2B); one semester of public speaking (Speech 2A); a minor (in a subject taught in high school when the student plans to continue for the teaching credential).

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units

FRESHMAN YEAR		FRESHMAN YEAR	
Fall Semester	Units	Spring Semester	Units
Physical education	1/2	Physical education	1/2
Engl. 2A—English Composition	2	Engl. 2B—English Composition	2
Hist. 17A—U. S. History	3	Hist. 17B—U. S. History	3
Math. 30—Analytical Geometry and Calculus	5	Math. 31—Calculus	5
French or German 1A (recommended)	5	French or German 1B	5
15.5		15.5	
SOPHOMORE YEAR			
Physical education	1/2	Physical education	1/2
Hyg. 3 or 11—Hygiene	2	Sp. 2A—Public Speaking	2
Phys. 2A—General Physics	4	Phys. 2B—General Physics	4
Soc. Sci. 4—American Constitution	3	Biol. 10—General Biology	3
Literature, Philos, and/or Arts	2	Psy. 55—General Psychology	3
Math. 32—Intermediate Calculus	3	Math. 134—Advanced Calculus	3
Math. 3—Slide Rule	1		
15.5		15.5	
JUNIOR YEAR			
Literature, Philos, and/or Arts	3	Literature, Philos, and/or Arts	3
Mathematics	3	Mathematics	3
Ed. 149—American School System	2	Ed. 150—The Learner	3
Ed. 123—Audio Visual Laboratory	1	Minor or electives	3
Minor or electives	3	General Education electives	3
General Education electives	3		
15		15	
SENIOR YEAR			
Mathematics	4	Mathematics	3
Ed. 170—Curriculum and Instruction	4	Ed. 394—Secondary School Mathematics	2
Minor or electives	8	Methods course in minor	2
		Minor or electives	9
16		16	
GRADUATE YEAR			
Math. 201A—Teaching of Mathematics	3	Math. 201B—Teaching of Mathematics	3
Graduate elective in major or minor	3	Ed. 145—Student Teaching	9
Graduate elective in Education	3	Graduate elective in Education	3
Minor or electives	6		

The required professional courses have been changed effective September, 1955. Although the new courses are included in the above program a student who has part of the former requirement met may continue with the earlier set of professional courses.

See Teacher Education section of this Bulletin for further details.

DESCRIPTION OF COURSES

A. Fundamentals of Arithmetic. For students who need to strengthen their knowledge of arithmetic computation and reasoning.

One unit; fall, spring

3. Slide Rule. Use of the slide rule in calculations involving multiplication, division, powers, roots, logarithms, trigonometric functions, and in the solution of right and oblique triangles. Prerequisite: Trigonometry (may be taken concurrently).

One unit; fall, spring

4. Mathematics for Nurses. A review of the fundamental processes of arithmetic as applied to problems in nursing, followed by practice in the use of the metric and apothecaries systems in the making of solutions and in computing dosages.

Two units; fall

Bird, Lovag

Marks, O'Donnell

6. Basic Mathematics for General Education. Quantitative education program of nontechnical students. Mathematical ideas as processes with numbers, proportion graphs. Suited to students with little or no high school for students with more than one year algebra and one year

Three units; fall, spring

7. Intermediate Algebra. An intensive course in algebra material through progressions; open only to students with mathematics (1 1/2 years of algebra and 1 year of geometry)

Three units; fall, spring

8. Trigonometry. An elementary course with application with at least 3 years of high school mathematics (2 years geometry), or credit in Math. 7.

Three units; fall, spring

16. Algebra. This course together with Math. 18 covers 6, 7, and 8 in one year. Exponents, fractions, linear equations, radicals and quadratic equations.

Five units; fall, spring

18. Algebra and Trigonometry. Quadratic systems, binomial theorem, inequalities, complex numbers, and together with a full course in plane trigonometry. Prerequisite: school algebra or Math. 16.

Five units; fall, spring

21. Mathematics of Finance. Simple interest, discount, compound interest, annuities, amortization, depreciation. Brief course. Prerequisite: Two years of high school algebra

Five units; fall, spring

30. Analytic Geometry and Calculus. Plane and solid geometry by the differentiation and integration of algebraic functions. To assure competence a placement examination in trigonometry is given on the first day of this course. Student requirements are usually expected to take Math. 8 or 18

Five units; fall, spring

31. Calculus. Differentiation and integration of trigonometric applications of derivative, differential, and integral. Prerequisite: Math. 31.

Five units; fall, spring

32. Intermediate Calculus. Partial derivatives, multiple and differential equations as included in the elementary calculus.

Three units; fall, spring

35T: Introduction to Calculus. The differentiation and integration of functions. This is a transition course designed to prepare students for analytic geometry as a separate subject for subsequent registration.

Two units; fall

50. Elementary Statistics. Graphical representation; frequency, dispersion, and skewness; the normal curve; trend and correlation. Prerequisite: 1 1/2 years of algebra or Math. 6

Three units; spring

Upper Division Courses

In the following group of courses those marked with * are given in alternate years. Thus if a student plans to take a particular course marked he must register for it at the first opportunity after the status since it will probably not be offered again during his stay.

104. History of Mathematics. Historical survey of mathematics from earliest beginnings to modern times. Prerequisite: 1 year of mathematics.

Two units; fall (offered in 1956-57)

* Given in alternate years.

1955-56

applicants must check with the Admis-
satisfactory progress toward completion of
education.

requests four faculty members of his acquaint-
y with ratings on forms which accompany
faculty members should not all be from one
as many as two from the college of last

ment is also required to secure a rating in
committee. Frequently the course in Speech 2A
part. In other cases the applicant will appear
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d try to secure the clearance by the early

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ing for teacher-education approval, appli-
st test and a personality reactionnaire. Make
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tory rating on a thorough physical examina-
screening procedure. This examination must
interviews may be scheduled. It is also neces-
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six months of issuance of the credential.
eneral weakness manifested in the aforemen-
rable traits of character or personality may
or teacher-education.
until all the prerequisites to acceptance indi-
courses in education have teacher-education

TEACHING CREDENTIALS

of the state colleges received teaching creden-
Thereafter, in accordance with state regula-
tated term. The expiration date is shown on
re named by the State Department of Edu-
holder to apply for renewal directly to the
ornia.
may secure California public-school-service
ic requirements and presentation of evidence
t certified copies thereof, verifying declara-

DEGREE REQUIREMENTS

THE BACHELOR OF ARTS DEGREE

This degree is offered with majors in the several fields listed on page 30. Specific requirements for the degree in each field are outlined in the departmental sections of this bulletin. All candidates for graduation must satisfy the general regulations described below, as well as those outlined by the major department.

THE BACHELOR OF SCIENCE DEGREE

This degree is offered at San Jose in the fields of engineering, medical technology and nursing. The general requirements described below and the specific courses listed in the engineering, medical technology and nursing sections of this bulletin, must be completed for graduation.

THE BACHELOR OF EDUCATION DEGREE

The purpose of this degree is to increase the professional competence of California public school teachers. To be eligible for candidacy the student must be a California public school teacher, who has earned a minimum of 60 semester units of standard college work. For further information refer to the teacher-education section of this bulletin.

THE MASTER OF ARTS DEGREE

The master of arts in the fields of school service was authorized for San Jose State College in 1949 by the State Board of Education. Graduate credit earned at San Jose subsequent to September 1, 1946, plus a maximum of six semester units from other accredited graduate schools, may be applied toward the 30 semester units necessary for the degree. All graduate credit applied toward the master's degree must be earned within seven years of the date the degree is awarded. Detailed requirements are given in the Graduate Division Bulletin.

UNIT AND RESIDENCE REQUIREMENTS

A total of 124 semester units of credit must be earned for graduation with the bachelor of arts and bachelor of education degrees. For the bachelor of science degree in engineering, 132 semester units are required. Of these amounts, for the bachelor of arts and bachelor of science degrees, 30 semester units must be earned at San Jose State College in on-campus (not extension) courses.

The bachelor of education degree requirements call for 30 semester units of credit earned in residence. Of that amount, at least 12 semester units must be earned in courses given on the San Jose State College campus, after the completion of 90 of the 124 semester units. The remainder of the residence requirement may be satisfied with credit earned from the college through extension or on the basis of examination.

For the master's degree, 24 of the required 30 units of graduate credit must be earned in residence.

SCHOLARSHIP

An over-all average of "C" (2.0) or better is required for graduation. Candidates for teaching credentials must have a total average of better than "C" (see "Approval of Candidacy for Teacher Education"). Graduate programs at San Jose and in many other colleges call for better than a "C" average in the undergraduate work. Students planning to do graduate work should consult early in their undergraduate years, the graduate curricula requirements of this or other colleges.

GENERAL EDUCATION

The college offers a number of courses designed exclusively to meet general education needs in particular areas and many other courses used partly to meet these needs. There is a continued effort to adjust general education programs to individual students in terms of their interests, past experiences, and needs, through advisers and personnel counselors. Programs of students in all departments are

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13 1/2

15 1/2

15

16

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		FRESHMAN YEAR	
	Fall Semester	Units	Spring Semester
	Physical education	1/2	1/2 Physical education
	Engl. 2A—English Composition	2	2 Engl. 2B—English Composition
	Hist. 17A—U. S. History	3	3 Hist. 17B—U. S. History
	Math. 30—Analytical Geometry and Calculus	5	5 Math. 31—Calculus
	French or German 1A (recommended)	5	5 French or German 1B
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	Soc. Sci. 4—American Constitution	3	3 Biol. 10—General Biology
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	Math. 32—Intermediate Calculus	3	3 Math. 134—Advanced Calculus
	Math. 3—Slide Rule	1	
		JUNIOR YEAR	
	Literature, Philos, and/or Arts	3	3 Literature, Philos, and/or Arts
	Mathematics	3	3 Mathematics
	Ed. 149—American School System	2	3 Ed. 150—The Learner
	Ed. 123—Audio Visual Laboratory	1	3 Minor or electives
	Minor or electives	3	3 General Education electives
	General Education electives	3	
		SENIOR YEAR	
	Mathematics	4	3 Mathematics
	Ed. 170—Curriculum and Instruction	4	2 Ed. 394—Secondary School Mathematics
	Minor or electives	8	2 Methods course in minor
			9 Minor or electives
		GRADUATE YEAR	
	Math. 201A—Teaching of Mathematics	3	Math. 201B—Teaching of Mathematics
	Graduate elective in major or minor	3	Ed. 145—Student Teaching
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3. Slide Rule. Use of the slide rule in calculations involving multiplication, division, powers, roots, logarithms, trigonometric functions, and in the solution of right and oblique triangles. Prerequisite: Trigonometry (may be taken concurrently).
One unit; fall, spring

4. Mathematics for Nurses. A review of the fundamental processes of arithmetic as applied to problems in nursing, followed by practice in the use of the metric and apothecaries systems in the making of solutions and in computing dosages.
Two units; fall

Bird, Lovan
Marks, O'Donnell

106. Mathematics in General Education. A course for nontechnical students, designed to show the importance of mathematics in general education by surveying the foundations, growth, applications, and recreations of mathematics. The influence of mathematics upon man's concept of the world around him will be stressed. No mathematical prerequisite is required; any mathematical skills necessary will be developed in the course.

Two units; fall

James

108.* Theory of Numbers. Euclid's algorithm, study of prime numbers, congruences of first and higher degrees, theorems of Fermat, Euler, and Wilson, quadratic residues. Prerequisite: Math. 31.

Two units; fall

Olds

115. Projective Geometry. An introductory course including primitive forms, ideal elements, incidence, duality, special figures, harmonic properties, perspectivity and projectivity, related forms, conics, cones, and reguli, specialization to metric geometry. Prerequisite: Math. 31.

Three units; spring

Dieckmann

116. College Geometry. A synthetic treatment of such subjects as similarity, harmonic arrays, inversion, poles and polars, cross-ratio, involution, and ruler and compass constructions. Recommended for prospective teachers of high school mathematics. Prerequisite: Math. 31.

Three units; fall

Jamison

118. Non-Euclidean Geometry. Hyperbolic and elliptic plane geometry and trigonometry, with emphasis on historical and logical development. Prerequisite: Math. 31.

Two units; fall

Dieckmann

128. Theory of Equations. Complex numbers, determinants and matrices, inequalities, permutations-combinations, and probability, algebraic equations, cubic and quartic equations, and numerical approximations to the roots of an equation. Prerequisite: Math. 31.

Three units; fall, spring

James, Myers

129.* Statistics and Probability. Permutations, combinations, frequency functions, games of chance; empirical and theoretical frequency distributions; moments as descriptive statistics of distributions; moment generating functions; relationships of binomial, normal, and Poisson distributions; distributions of means and differences of two means; correlation and regression. Prerequisite: Math. 32 and 50 or permission of instructor.

Three units; spring

Bird

132. Introduction to Differential Equations. A transition course for students whose work in the elementary calculus did not include differential equations; designed to prepare for subsequent registration in Math. 133 or 134. Covers equations of first order and first degree, and linear equations.

Two units; fall

Staff

133. Engineering Mathematics. Continuation of Mathematics 32 for students in engineering and science, followed by selected topics in elementary numerical analysis including: accuracy in numerical calculations, dimensional analysis, curve fitting, least squares, alignment charts, graphical and numerical differentiation and integration, approximate solution of differential equations, harmonic analysis, statistical methods in engineering. Prerequisite: Math. 32.

Three units; fall, spring

James, Olds

134. Advanced Calculus. Limits and continuity, Riemann integral, differentiation of integrals, line integrals, Green's theorem, gamma function, Fourier series, and theory of ordinary differential equations. Prerequisite: Math. 32.

Three units; fall, spring

Myers

141. Partial Differential Equations. Partial differential equations of physics and engineering, orthogonal functions, Fourier series, Legendre functions, Bessel functions, and boundary value problems. Prerequisite: Maths. 133 or 134.

Two units; spring

Lovaglia

* Given in alternate years

142. Vector Analysis. The algebra of vectors, the differentiation of vectors, the differential operators gradient, divergence, and curl, together with applications to geometry and physics. Prerequisite: Math. 32.

Two units; spring

Bird

143.* Numerical Analysis. Numerical solution of simultaneous linear equations, matrices and determinants, finite differences, interpolation, numerical solution of equations, numerical solution of ordinary and partial differential equations, relaxation methods, least squares approximations, nonlinear equations, design of computational routines, machine calculations. Prerequisite: Math. 133.

Three units; spring (offered in 1956-57)

Olds

146.* Advanced Analysis. Advanced topics in the subject of real variables. Prerequisite: Math. 134.

Three units; spring (offered in 1956-57)

Bird

148.* Complex Variable. Conformal mapping, study of analytic functions, complex integration, residues, and power series. Prerequisite: Math. 134.

Two units; spring

Olds

180. Special Study. Individual study in a specific field. Registration to be approved by department head.

Two units; on demand

Staff

Ed. 393. Elementary School Mathematics. Development and meanings of numbers. Topics of arithmetic from point of view of meanings, uses, and history. Organization and methods of teaching basic skills and facts. Prerequisite: fulfillment of the requirement in fundamentals of arithmetic.

Two units; fall, spring

Larsen, Marks, Purdy

Ed. 394. Secondary School Mathematics. Basic course in teaching of secondary mathematics. The place and function of mathematics in secondary education, the improvement and evaluation of instruction, and the teaching of the subject matter of secondary mathematics.

Two units; fall, spring, summer

Jamison

Ed. 395. Curriculum and Instruction in Elementary School Mathematics. A study of problems in teaching mathematics, including courses of study, methods and content for instruction, evaluation of learning, construction of units, and use of visual aids. Prerequisite: Educ. 393.

Two units; spring

Purdy

Graduate Courses

201A. Teaching of Mathematics. Mathematics for the changing curriculum. Emphasis on the subject matter of secondary mathematics for general education. Quantitative study of subjects related to the lives of all citizens.

Three units; fall

Jamison

201B. Teaching of Mathematics. Mathematics for the enrichment of the secondary school program. Emphasis on the study of secondary mathematics from the viewpoint of higher mathematics. Selected topics from higher mathematics and applications of mathematics useful to the secondary teacher for understanding and motivation.

Three units; spring

Jamison

211A. Higher Geometry. Projections, special configurations, homogeneous Cartesian coordinates in the plane, linear dependence, cross-ratio and harmonic division, line coordinates in the plane, duality, projective transformations on a line and in the plane, geometry of the complex plane, involutions, collineations and correlations.

Three units; fall

Dieckmann

211B. Higher Geometry. Types of geometry, conics, point curves and line curves, poles and polars, projective theory of conics, the circle, inversion, homogeneous Cartesian coordinates in space, plane coordinates, duality, surfaces, transformations, line geometry. Prerequisite: Math. 211A.

Three units; spring

Dieckmann

* Given in alternate years.

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221A. Higher Algebra. A selection from the following: Postulational development of the integers. Construction of the rational numbers, the real numbers, and the complex numbers. Elementary theory of groups, rings, integral domains, fields, and polynomials.

Three units; spring

221B. Higher Algebra. A selection from the following: Elementary theory of vector spaces and matrices; set theory; boolean algebra; transfinite arithmetic; algebraic number theory. Prerequisite: Math. 221A.

Three units; on demand

231A. Higher Analysis. Dedekind cuts and the real number system. The Borel theorem. Continuous functions of a real variable. Definition of the Riemann integral. Conditions for its existence. Some properties of the integral. Uniform convergence.

Three units; on demand

231B. Higher Analysis. The complex number system. Analytic functions. Cauchy-Riemann equations. The Cauchy integral theorem. Taylor series. Laurent series. Prerequisite: Math. 231A.

Three units; on demand

241A. Advanced Numerical Analysis. A continuation of Mathematics 143 with particular attention to preparation of problems for machine computation.

Three units; on demand

251A. Machine Computation. A study of machine calculation including consideration of desk, relay, and electronic devices.

Three units; on demand

298. Special Study. Advanced individual research and projects. Maximum credit of four units.

One to four units; fall, spring

299. Thesis.

Two units; fall, spring