Department of Mathematics
The Ohio State University

1971-1972 Mathematics Courses

Course Number	Course Title
105	Mathematics for Elementary Teachers
106	Mathematics for Elementary Teachers
107	Mathematics for Elementary Teachers
116	Mathematics for the Behavioral Economic, and Social Sciences I
117	Mathematics for the Behavioral Economic, and Social Sciences II
118	Mathematics for the Behavioral Economic, and Social Sciences III
121	Mathematics for the Business, Social, and Biological Sciences I
122	Mathematics for the Business, Social, and Biological Sciences II
151	Differential and Integral Calculus
152	Differential and Integral Calculus
254	Differential and Integral Calculus
190	Freshman Analysis
191	Freshman Analysis
192	Freshman Analysis
221	Mathematics for Business, Social and Biological Sciences IV
255	Ordinary Differential Equations
415	Ordinary and Partial Differential Equations
416	Vector Analysis and Complex Variables
450	Advanced Calculus I
550	Advanced Calculus I
471	Matrices and Linear Algebra
504	History of Mathematics
507	Advanced Geometry
512	Partial Differential Equations and Boundary Value Problems
513	Vector Analysis
514	Complex Variables for Engineers
545	Mathematical Logic I
551.01	Advanced Calculus II
551.02	Advanced Calculus II
552.01	Physics Mathematics
552.02	Complex Variables I
556.01	Ordinary Differential Equations without Linear Algebra
556.02	Ordinary Differential Equations with Linear Algebra

Course Number	Course Title
557	Orthogonal Series and Boundary Value Problems
560	Topology
568	Linear Algebra I
569	Linear Algebra II
570	Elementary Modern Algebra
570	Introduction to Linear Algebra
571.03	Introduction to Linear Algebra
573	Elementary Number Theory
574	Geometry
577	Discrete Algebraic Structures
580	Three Quarter Algebraic Sequence
581	Three Quarter Algebraic Sequence
582	Three Quarter Algebraic Sequence

Syllabus for Math 106

This course is open only to students whose indicated major is elementary education. It is a continuation of Math 105 and investigates mathematical concepts appropriate for prospective elementary school teachers. The prerequisite for this course is Math 105. The sequence 105 and 106 fulfills a ten-hour mathematics requirement for Elementary Education majors. Math 106 is offered Autumn and Spring Quarters.

Topics covered include relations, measurement, mathematical structure, probability and statistics.

The probable texts for this course are Elementary Mathematics for Teachers by Kelley and Richert (Chapters 7-8) and More Topics in Mathematics for Elementary School Teachers, the 30th Yearbook of the National Council of Teachers of Mathematics (Chapters 11, 13, 15, and 16).

Further information may be obtained from the course coordinator, Professor Jim Schultz.

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Syllabus for Math 107

This course is open only to students whose indicated major is elementary education. It serves as an informal approach to geometry as appropriate for prospective elementary school teachers. The prerequisite for this course is Math 105. (Math 106 is not a prerequisite.) The sequence 105 and 107 fulfills a ten-hour mathematics requirement for Elementary Education majors. Math 107 is offered Autumn and Summer Quarters.

Topics covered include basic definitions, properties of geometric figures, similarity, congruence, linear and angular measure, area, volume, constructions, and geometric transformations.

The probable text for this course is Informal Geometry for Elementary Teachers by Eberle (preliminary edition).

Further information may be obtained from the course coordinator, Professor Jim Schultz.

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SYLLABUS

Mathematics 116 - Mathematics for the Behavorial, Economic, and Social Sciences I

Credit: 5 hours

Coordinator: John Riner

Prerequisite: Math 101 or Math Placement Level III

Text: An Introduction to Calculus with Economic Applications.

Catalog Description: The sequence 116, 117 treats topics in Mathematics with applications to the non-physical sciences. Topics will include analytic geometry, calculus, linear algebra, linear programming, and graph theory; applications.

Outlook: Emphasis is on intuitive understanding. It is hoped that students may feel less intimidated by terminology and symbolism. Primary goal of the sequence is an appreciation of calculus as a great invention of man.

Audience: Generally apprehensive about mathematics. Backgrounds will vary although most have two years of high school mathematics.

Areas listing 116, 117 as suggested courses include: Agriculture (General and Industrial programs); School of Allied Medical Professions; College of the Arts (Division of Design, Visual Communication); Economics, Psychology.

Follow-up Courses: Students may elect 117 to complete the ASC 10 hour requirement for : Skills and Understandings of Analysis and Interpretation: Symbolic Communication.

Note: Students may also elect 116 and any course from CIS or Statistics or Philosophy 150, 250, 650, 653, and 674.

Content and Suggested Time Schedule

I Notation and Functions — 6 days
- Set Language
- Properties of Functions

II Algebra — 9 days
- Axioms and Properties of Real Numbers
- Inequalities
- Absolute Value
- Equations

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1992

III Graphing — 5 days
- Subsets of R^2
  - Inequalities
  - Absolute Value
  - Equations

IV Vectors — 10 days
- R^2
- Lines
- Slope

V Linear Algebra — 13 days
- Matrix Theory
- Linear Transformations

VI Linear Programming — 3 days

SYLLABUS

Mathematics 117 - Mathematics for the Behavioral, Economic, and Social Sciences II

Credit: 5 hours

Coordinator: John Riner

Prerequisite: Mathematics 116

Text: An Introduction to Calculus with Economic Applications

Catalog Description: The sequence 116, 117 treats topics in mathematics with applications to the non-physical sciences. Topics will include analytic geometry, calculus, linear algebra, linear programming, and graph theory; applications.

Audience: Generally apprehensive about mathematics. Backgrounds will vary although most have two years of high school mathematics.

Areas listing 116, 117 as suggested courses include: Agriculture (General and Industrial programs); School of Allied Medical Professions; College of the Arts (Division of Design, Visual Communication); Economics, Psychology.

Follow-up Courses - Mathematics 118 is offered as a bridge between 116, 117 and Math 221 or Math 153 depending on student's need. Students interested in further course work in mathematics should consult with either Professor Riner or Professor Elbrink.

Content and Suggested Time Schedule

I. Limits — 7 days
- Sequences
- Functions
- Continuity

II. The Derivative — 9 days
- Definition
- Techniques
- Increasing, Decreasing, and Concavity
- Applications to Curve Sketching

III. Analytic Geometry — 5 days
- Circle
- Rectangular Hyperbola
- Parabola
- Graphing Techniques

IV. Economic Applications of the Derivative — 8 days
- Total Revenue
- Marginal Revenue, Marginal Cost
- Net Revenue

1972

V. Logarithmic and Exponential Functions — 7 days
- Definitions
- Derivatives
- "Growth" Applications -- Interest

VI. The Integral — 11 days
- Area Approximation
- Definition
- Properties and Basic Theorems
- Basic Techniques
- Applications

SYLLABUS

Mathematics 118 - Mathematics for the Behavorial, Economic, and Social Sciences III

Credit: 5 hours

Coordinator: John Riner

Prerequisite: Mathematics 116 and 117 and permission of instructor

Text: Any suitable calculus text. We have used the program series A Programmed Course in Calculus published by Benjamin and developed by the Committee on Educational Media of the MAA.

Audience: The course is planned for students who have taken 116 and 117 but who find more mathematics necessary or desirable. For example a student who changes his major to an area in the College of Administrative Science and has taken 116 and 117 may take 118. He would then have the equivalent of 121 and 122 and eligible for 123 or 221. Other students may use the sequence (116, 117, 118) as a path into 153 or beyond.

Suggested Content

I Limits and Continuity

II The Derivative
- Slope of tangent line
- Instantaneous rate of change
- Techniques of differentiation
  - Chain rule
- Differentials and approximation
- Maximum and Minimum
- Mean Value Theorem
- Curve Tracing
- Applications

III Transcendental Functions
- Logarithmic
- Exponential
- Trigonometric
- Inverse trigonometric
- Hyperbolic functions.

IV The Integral
- Antiderivatives
- Indefinite integrals
- Techniques of integration
- Applications
  - Area
  - Work
  - Volume
- Improper integrals

Note: This is considerable material to cover in one quarter. However, the general concept should be familiar to the student as a result of 117.

1972

SYLLABUS

MATH 121: Mathematics for the Business, Social and Biological Sciences I.

COORDINATOR: Bert K. Waits

PREREQUISITE: Math placement Level II or a grade of C or higher in Math 101.

AUDIENCE: Freshmen with majors in the College of Administrative Science. (Requirement: Math 121, 122 and 123.) Some students in the biological sciences elect this course. Also, some students in the Colleges of the Arts and Sciences with majors in accounting and psychology will elect this course.

BACKGROUND OF AUDIENCE: A basic knowledge of high school algebra can be assumed. However, Math 121 begins with a review of certain elements of basic algebra - functions and graphing. The overall attitude of the audience towards their mathematics requirement is poor. They are, to say the least, not very well motivated (to the study of mathematics).

FOLLOW-UP COURSES: Mathematics 122 and Mathematics 123 (Math 123 will become Statistics 123 next year.) Mathematics 221 (several variable calculus) can be elected after the 121-122-123 sequence for those needing more mathematics. The Math 221 course serves as a "bridge" course between the 121 sequence and higher level math and statistics courses.

CONTENT: Algebra review including work with inequalities - 2 weeks.
Functions and graphing - 2 weeks.
Exponential, logarithm and trigonometric functions - 2 weeks.
Differential calculus - 4 weeks.

TEXT: (1971-1972 Academic Year) Elementary Analysis and Statistics, Whitney and Shapiro.

SUGGESTED OUTLINE:

Topic	Text Reference (Section)	
Numbers	1	2 weeks
Properties of Real Numbers	2	
Equations	3	
Inequality and Absolute Value Problems	4	
Induction	14	
Functions	10	2 weeks
Lines and Planes	28	
Graphs of Functions	29	
Graphs of Linear Inequalities	32	

Continued on the back

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Topic	Text Reference (Section)	
Exponentials	5	2 weeks
Logarithms	6	
Graphs of the Exponential and Logarithmic Functions	30	
Trigonometric Functions	31	
Sequences	11	4 weeks
Limits of Sequences	16	
Series	17	
Limits of Functions	35	
Limit Theorems	36	
Continuity	37	
Composite Functions	38	
The Derivative	39 and 40	
Differentiation Rules	41	
Geometric Interpretation of the Derivative	42	
Applications	none	

SYLLABUS

MATH 122: Mathematics for the Business, Social and Biological Sciences II.

COORDINATOR: Bert K. Waits

PREREQUISITE: Math 121 or 120.02 or 151 or equivalent.

AUDIENCE: Freshmen with majors in the College of Administrative Science. (Requirement: Math 121, 122, 123.) Some students in the biological sciences also elect this course. Also, some students in the Colleges of the Arts and Sciences with majors in accounting and psychology elect this course.

BACKGROUND OF AUDIENCE: The students have a wide range of abilities and interests. Their background consists of some knowledge of elementary differential calculus (as indicated by grades of D through A in Math 121!).

FOLLOW-UP COURSES: Mathematics 123 (Statistics 123 next year). Math 221 (several variable calculus) can be elected by those needing higher level mathematics. Math 221 serves as a "bridge" course between the Math 121 sequence and higher level math and statistics courses.

CONTENT: Differential calculus including L'Hopital's Rule and Taylor's Formula - 5 weeks
Integral calculus including improper integrals - 5 weeks.

TEXT: (1971-1972 Academic Year) Elementary Analysis and Statistics, Whitney and Shapiro.

SUGGESTED OUTLINE:

Topic	Text Reference	
$D_x f^{-1}(x)$	43	6 weeks
$D_x(\ln x)$ and $D_x e^x$	44	
$D_x \sin x$, $D_x \cos x$, $D_x \tan x$	45	
$D_x \sin^{-1} x$, $D_x \tan^{-1} x$	45	
Implicit Differentitation	46	
Higher Derivatives	47	
Maximum-Minimum Problems	48	
Mean Value Theorem	49	
First Derivative Test	50	
Second Derivative Test	51	

Continued on the back

Topic	Text Reference	
Curve Sketching	none	
L'Hopital's Rule	53	
Taylor's Formula	54	
Area Approximation - Rectangle Method	none	4 weeks
Trapezoidal Rule	62	
The Definite Integral	56 and 57	
Properties of the Integral	58	
Indefinite Integrals	59	
Applications to Area Problems	Prob. 9, p. 334	
Techniques of Integration - Substitution	60	
Techniques of Integration - Parts	61	
Improper Integrals	63	

Syllabi and Recommended Textbook For

Mathematics 151, 152, 254

Text: Leithold, The Calculus, Harper and Row, 1972

Mathematics 151. Lines, functions, graphs. Trigonometric, exponential, log functions, inverse functions, inverse trigonometric functions. Limits, continuity, tangent lines, derivatives (of the above functions), applications. Rolles' theorem, mean value theorem, applications.

Mathematics 152. Antiderivatives, area, definite integral, fundamental theorem of calculus. Review of transcendental functions. Applications and techniques of integration.

Mathematics 254. Vectors and parametric equations, arc length, differentiation and integration of functions of several variables, line integrals, applications.

Comments: Math 151, roughly Leithold Chs. I-IV, plus material on transcendental and inverse functions.

Math 152. Roughly Leithold, Ch. 5, Section 3 - Ch. 10.

Math 254. Roughly Leithold, Chs. 15 - 18 plus material on line integrals.

Math 190-191-192

Freshman Analysis

Prerequisites: Entrance exams in the 96-99 percentile range, high ranking on special honors exam, and consent of instructor.

The content and mode of presentation of this year sequence is partially up to the instructor. At the end of the year the students should have had the material of the standard calculus sequence and the material of the one variable advanced calculus. Additional technical and theoretical material from analysis should be included.

Outline for '71-72 academic year.

Text: Apostal, Calculus Vol. I, Ginn-Blaisdell

Math 190: Introduction. Sets, Real Number System, Induction
Chapter I - Integral Calculus
Chapter II - Applications of Integration
Chapter III - Continuous Functions
Chapter IV - Differential Calculus
Chapter V - Relationship between Differentiation and Integration
Chapter VI - Logarithm, Exponential, and Inverse Trig. Functions

Math 191 Chapter IX - Complex Numbers
Chapter X - Sequences and Series, Improper Integrals
Complex Power Series
Chapter VIII - Introduction to Differential Equations
Chapter VII - Polynomial Approximation to Functions

Math 192 Metric Theory - Open, closed, and compact sets
Continuous Functions, Uniform convergence
Applications of uniform conver ence- Fourier series,
Fejer's Theorem, and Weierstrass Approximation Theorem
Review of Riemann Integral - Area, Volume, arc length
Introduction to functions of 2 and 3 variables

D. Eustice
2/72

SYLLABUS

MATH 221: Mathematics for the Business, Social and Biological Sciences IV.

COORDINATOR: Bert K. Waits

PREREQUISITE: Math 123 and permission of the department (grades of A or B in the 121 sequence).

AUDIENCE: Administrative Science Freshmen and Sophomores.

BACKGROUND OF AUDIENCE: Calculus of one variable. Grades of A or B in the Math 121-122-123 sequence. The students are well motivated.

PURPOSE OF COURSE: The course should serve as a "bridge" between the 121 sequence and higher level mathematics and statistics courses. Students with Math 121-122-123-221 should be able to elect Math 471, Math 550 or Statistics 425 and 426.

FOLLOW-UP COURSE: Math 471 or Math 550 or Statistics 425.

CONTENT: Introduction to matrix algebra including solving systems of equations - 2 weeks.
Calculus of several variables - 8 weeks.

TEXT: No required text. Any good calculus text would be suitable. Schaum's Matrices would be appropriate for the matrix algebra component of the course.

RESOURCE PEOPLE: Bryce Elkins, Bob Georges (Administrative Science), John Riner, Jerry Silver, Tom Willke.

SUGGESTED OUTLINE: In preparation.

Math 255 Ordinary Differential Equations

This is everyones standard problem solving course in differential equations. The students come out of the calculus sequence and are primarily engineers and computer science majors.

Text: Rainville and Bedient, Elementary Differential Equations, Fourth Ed., Macmillan.

Chapter 1 - §§ 1, 2 two days

Chapter 2 - $1\frac{1}{2}$ weeks

done in conjunction with applications in Chapter 3 .

Chapter 5 - they should read it.

Chapter 6-7-8 - 2 - $2\frac{1}{2}$ weeks

Laplace Transform §§ 50-53, § 57, § 60-61 } $1\frac{1}{2}$ weeks

Chapter 12 - § 64 1 - $1\frac{1}{2}$ weeks

Chapter 17 - 1 week

Chapter 18 - §§ 96, 97, 99, 101, 102, 103 Bessel eqtn $1\frac{1}{2}$ wks

Math 415 Ordinary and Partial Differential Equations.

This is a course designed by a committee (primarily of engineers) which is intended to expose electrical and aeronautical engineering students to problem solving in differential equations. It is a combination of 255 (Diff. Eq.) and (512) Fourier Series and Boundary Value Problems. One hopes to introduce the standard techniques of elementary ordinary differential equations, Fourier trig series, and separation of variables in Partial Differential Equations. The students usually come to the course directly from the calculus sequence.

Text: Boyce and De Prima, Differential Equations

Section Numbers	Days spent	
1.1, 1.2, 2.1 - 2.7	7	
3.1 - 3.62	10	
4.1 - 4.7	10	
10.1 - 10.8	13	
11.1 - 11.6	5	
Optional Material	3 - 5	Systems

MATH 416 - VECTOR ANALYSIS AND COMPLEX VARIABLES

This is primarily an application or problem solving course for undergraduate engineering students. It is a combination of 514 (complex variable) and 513 (vector calculus). Prerequisites is Math 254. The vector analysis portion is needed for engineering courses which many students take concurrently and for this reason should be covered first. Minimal proofs should be the rule (e.g., Cauchy Theorem by Green's Theorem rather than Cauchy-Goursat) or intuitive explanations. The course is a prerequisite for Elec. Eng. and Aer. Eng.

Suggested Schedule--

Vector analysis--15 classes including test

Complex variable--35 classes including test

1. Vector analysis--

TEXT--Schaum's Outline

COMMENT--Use first 3 weeks of quarter. Line integrals and Green's Theorem needed for complex variable. Gauss and Stokes Theorems needed for engineering courses taken concurrently.

Schedule--

Chap. 1-4 -- 4 classes -- treat as review

Chap. 5 -- 5 classes -- include independence of path

Chap. 6 -- 5 classes -- Gauss, Green, Stokes. Omit p. 107.

2. Complex variables--

TEXT--Churchill

Schedule--

Chap. 1 -- 3 classes
Chap. 2 -- 4 classes
Chap. 3 -- 4 classes
TEST
Chap. 4 -- 5 classes
Chap. 5 -- 5 classes
Chap. 6 -- 4 classes
TEST
Chap. 7 -- 6 classes

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OVERALL COMMENT -- Run as a problem course. Minimal proofs.

Math 550 – Math 450 *

Advanced Calculus I

This is the first course in analysis following the basic freshman-sophomore calculus sequence. It should be considered as an introduction to the theory of convergence. The students are math majors and some graduate students from C.I.S, Statistics, and Engineering. It is a prerequisite math course for Math 551 (math) and math 552.

Text: Avner Friedman – Advanced Calculus
– Holt, Rinehart, Winston

1. Sequences and series of constants
   Chapter 1
   Chapter 5 Sections 1, 2, and 3 } 4 weeks

2. Functions of one variable 4 weeks
   Chapters 2 and 3

3. Sequences and series of functions 2 weeks

* Math 450 is a comparable course for Math Education majors.

H. D. Colson 2/15/72

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M 471

Matrices and Linear Algebra

A course designed in conjunction with the Department of Industrial Engineering for students in the area of operations research. This course is not for majors and only carries 4 hrs credit. There is a prerequisite of 153 but don't count on the students having any familiarity with the material.

Text: Noble; Applied Linear Algebra
(It has been used once may not be the best available).

Topics (Not necessarily in order of coverage)

1. Matrices and systems of equations
2. Linear independence and rank
3. Space of n-tuples over R; bases and dimension
4. Inverses of matrices and determinants
5. Abstract vector spaces

Important to intersperse applications thoughout the course.

James R. C. Leitzel 2/72

MATH 504
(History of Mathematics)

This course is an <u>introduction</u> to the history of Mathematics. Since it is principally taken by ~~Math Education~~ students in their sophomore and junior years, their backgrounds are extremely spotty; and as a whole they are weak mathematically. The best one could expect is that all the students have completed Math 254 and Math 571. (This course is required by the Math Education Department and is <u>definitely not recommended in its present form</u> for our own majors). The purpose of this course is to expose the students to the <u>good</u> mathematics of yesteryear. Math 504 has prerequisites ~~and is~~ 505 or 507 and is terminal. The actual course content should be at the discretion of the individual teacher; however, based on past experience I recommend certain topics which seem to be within the grasp of these students and omit others which seem to be beyond them. I emphasize that this should be a tough course and one should take the students as far as possible.

TEXT: EVES: History of Mathematics
(It is very readable with lots of problems; however, great care should be taken in choosing the problems as at least 1/2 of them are not accessable to these students.)

COURSE STRUCTURE: I strongly recommend a lecture-recitation type arrangement with a maximum of 12 students in a recitation section.

SYLLABUS:

I - Students should be required to read Eves

II - A <u>term paper</u> should be required; this paper should be at least 80% mathematics and the rest history. The purpose of this paper is to have the student really dig in and learn a certain small portion of mathematics, well. (On file in my office are several examples of these term papers.) I would count them from 1/4 to 1/2 of the total course grade.

III - Possible lecture topics:
(At least one topic should be covered in great depth, 3 to 4 weeks.)

1. Number Theory*
2. Counting and the Abacus
3. General Solution of Polynomial Equations
4. Irrational Numbers (extremely tough as a major topic)
5. Astromony and its effect on development of mathematics
6. Cantor Theory*
7. Conic Sections
8. Calculus
9. Parallel problem and non-Euclidean geometry
10. Euclids Elements
11. Axiomatics
12. Boolean Algebra
13. Fields and Extensions

*Have been covered in depth with success.

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IV - Some outside reading should be mandatory. (I have lists.)

Sandy Scheick
February 1972

A FEW IDEAS FOR TERM PAPERS IN MATH. 504

The abacus
Algebraic numbers
Angle trisection
Babylonian mathematics
Boolean algebra
Calculating prodigies
Chinese mathematics
Congruences
Conic sections
Construction with compasses only
Construction with other instruments
Construction with ruler only
Continued fractions
Counting boards
Dissections
Dot-age and d-ism
e
Egyptian mathematics
Elegant proofs
Fibonacci numbers
Finger arithmetic
Game theory
The golden section
Greek algebra
Greek calculus
Higher dimensions
i
Indian mathematics
Inequalities
Irrational numbers
Large numbers
Latin squares
Logarithms
Magic squares
Map-making
Mathematical symbolism
Mathematics and art
Mathematics and astronomy
Mathematics and music
Mathematics south of the Sahara
Mayan mathematics
Non-Euclidean geometry
Non-standard analysis
Number theory
Paradoxes
The parallel postulate
π
Polygonal numbers
Polyhedra
Polynomials
Prime numbers
Probability
Projective geometry
Puzzles and games
Pythagorean theorem
Quipus (from Peru)
Real numbers
Renaissance mathematics
Taylor's series
Transcendental numbers
Transfinite numbers ($\aleph_0$, etc.)
Unsolved problems
What is a limit?
Women in mathematics

Abel
Abu Kamit
Al-Khowārizmī
Apollonius
Archimedes
Bernoulli
Boole
Cantor
Cardano
Cauchy
Descartes
Diophantus
Dodgson (Carroll)
Eudoxus
Euler
Fermat
Galois
Gauss
Leibniz
Lobachevskii
Newton
Pascal
Riemann
Russell

Math 507   Advanced Geometry

This course is required of students in secondary education having minors in the teaching of mathematics and, perhaps, 75% of the students are enrolled in Education College.

The present course (Autumn 1971) is divided about equally into two portions; first, a review of the content of high school geometry combined with generalizations and related new material and second, a study of various transformations with emphasis on circular inversion. Text material is suppelmented by a unit on finite geometry (computer taught), by use of coordinates, and by special topics.

TEXT: Miller, College Geometry, Appleton-Century-Crofts

Chapters 1-4   4½ weeks

Chapters 5-6   4½ weeks

The listed prerequisite is integral calculus which serves to restrict the course to non-freshmen. (Students seem woefully week in elementary analytic geometry.) Math 507 is a prerequisite for Math 608 (which is not required for any student.).

Math 512

Partial Differential Equations and Boundary Value Problems

This course is a three hour course with a lot of material with little emphasis on theory. A day-by-day outline based on the following texts is available.

Texts: Miller, Partial Differential Equations in Engineering Problems, Prentice-Hall.

Holl, Maple, and Vinograde, Introduction to Laplace Transform, Appleton-Century-Crofts.

Chapter II - Fourier Series

Chapter III- Separation of Variables

Chapter 1 - Definition and Elementary Properties (Laplace Transform)

Chapter 2 - Sufficient Conditions for Existance, Convolution Integral

Chapter 5 - Applications to Linear Partial Differential Equations

D. Eustice

2/72

MATH 513 - VECTOR ANALYSIS

Students are mainly graduate engineers with minimal or ancient mathematical background. Prerequisites are calculus and differential equations (255 or 556). Many have not taken a math course for several years. Students should learn to handle vector notation, vector operations, line-surface integrals, and they should be able to read and apply theorems. Ample class time should be devoted to problems.

TEXT--Vector Calculus--Lindgren

COMMENT--Level of text is about right. Supplementary problems (e.g., Vector Calculus--Schaums) may be needed.

Suggested Schedule--

Ch. 1 --	Vector algebra, geometry, operations	5 days
Ch. 2 --	Vector functions of 1 variable, space curves, arc length	6 days
Ch. 4 --	Vector functions of position, chain rule surfaces, del operator, line and surface integrals	9 days
Ch. 5 --	Integral Theorems Gauss, Green, Stokes, path independence	6 days

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MATHEMATICS 514: COMPLEX VARIABLES FOR ENGINEERS

This is a "skills" course, taken by certain engineering students, both undergraduates and graduates. The emphasis should be on problems, and not on proofs. The course has a 513 (or equivalent) prerequisite, which should save some time on line integrals and allow a Green's theorem proof of the Cauchy Integral Theorem. The course is not a prerequisite for other mathematics courses, but the subject matter is needed in the students engineering courses.

TEXT: Churchill, Complex Variables and Applications, (2nd Ed.), McGraw-Hill, is the canonical text. At times, other complex variables books are used, or the complex variables chapters from some engineering math book, like Wiley or Kreysig.

A Possible Syllabus--(Churchill):

Chapter 1 3 days

Chapter 2 3 days

(play down limits, continuity, etc.)

Chapter 3 4 days

TEST

Chapter 4 3 days

Chapter 5 5 days

(don't do the Goursat proof)

TEST

Chapter 6 3 days

(Lots of practice obtaining series, no proofs, minimal theory.)

Chapter 7 6 days

F. W. Carroll

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Mathematics 545: Mathematical logic 1.

Outline (for the course catalog). A first course in the study of formal logical systems and their applications to the foundations of mathematics. Topics include: definition of mathematical proof, statement calculus, predicate calculus, first order number theory, consistency, completeness.

Prerequisites: (537, 542), 153, or permission of instructor. 5 credits, 5 classes per week.

Comments. About half of the students are mathematics majors. The remainder come principally from computer science, philosophy, and mathematics education. The mathematical preparation of the students is quite varied: some have only the minimal prerequisite (which was put in in order to keep out students having no college mathematics, since ("infinitesimal") calculus per se is of no direct use here), whereas others have extensive mathematical background. About half of the students have had some training in logic (mainly in the philosophy department); this is sometimes helpful and sometimes hindranceful. The purpose of the course is to introduce the students to working in formal systems, with particular attention paid to one formulation of predicate calculus (for practice).

Text. Usually, Margaris, First order mathematical logic, §§1-25. (Especially written for this course.)

Mathematics 546: Mathematical logic 2

Outline. More advanced topics in first order theories, chosen from: general theorems about first order theories, such as Goedel's completeness and incompleteness theorems; model theory; recursive function theory; abstract machines; set theory. (The content is variable.)

Prerequisites: 545 {I require a grade of at least B.} 5 credits, 5 classes per week. Text. (None, although the remainder of Margaris is often used.)

Comments. The class has been very small, generally from mathematics and philosophy.

—L. F. Meyers

Math 551.01 Advanced Calculus II

Several variables for math majors primarily. 550 is a prerequisite. Students are presumed to be interested in Theory and familiar with one variable analysis. Computational aspects of partial derivatives, vector operations, line integrals have been met briefly in 254. This course is not a prerequisite for other math courses, but is frequently taken prior to 552 (complex variable) and 556, 557 (ordinary and partial differential equations).

Text: Friedman Advanced Calculus

Suggested syllabus

Ch.6 - Topology and convergence in E^n, limits and continuity of functions of several variables. (2 1/2 weeks)

Ch. 7 - Partial derivatives, Mean value Theorem, Jacobians, inverse and implicit functions (3 weeks)

Ch. 4,8,9 integration - (one variable, multiple, surface)
time is limited, so concentration on one of these chapters is preferable.
minimal content - line integrals, Green's lemma, Path independence.

Math 551.02 Advanced Calculus II

A vector calculus course for engineering-physics and physics undergraduates. 550 is not a prerequisite. Course should include theory and applications, but epsilontic proofs are not the main thrust. Students should be able to use the results with thoughtfulness and precision at the end of the course. 551.02 is a prerequisite for Physics 555, 626, 627, 705 which dictate the minimal content.

Text: Friedman Advanced Calculus

Suggested schedule

Ch.6 §1-6 convergence, limits, continuity on E^2 & E^3.
(parametrization of curves and surfaces might be introduced)
(could omit lim sup and lim inf) (3 weeks)

Ch.7 §1-3, 5-7 partial derivatives, directional derivatives, chain rule, mean value theorem, Jacobians, implicit and inverse functions
(omit functional dependence. § 8 on vectors is review and could be postponed until needed in line and surface integrals). (3 1/2 weeks)

Ch.9 §1-11 line integrals, Green's lemma, independence of path, surface integrals
Divergence and Stokes Theorem (3 1/2 weeks)

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MATHEMATICS 552.01

This is a course primarily for Physics undergraduates, and is recommended for them. The five hours should allow some depth as well as considerable problem solving. On the other hand, the students will not have had 550 and should not be expected to give analytic proofs. Applications may be included, as time and taste allow.

TEXTS: Churchill, Pennisi, Kaplan, Nehari, etc., etc.

The content should be at least equivalent to the first eight chapters of Churchill.

A POSSIBLE SYLLABUS:

4 days	Complex Arithmetic and Geometry
4 days	Analyticity, Cauchy-Riemann equations, harmonic functions
6 days	Exponential, trigonometric, logarithm functions, branches
5 days	Conformal mapping, linear fractional transformations
	TEST
10 days	The Cauchy Integral Theorem and its immediate extensions and applications
5 days	Taylor and Laurent series representations
	TEST
12 days	The Residue Theorem and applications

F. W. Carroll

MATHEMATICS 552.02

This is a rigorous first course in complex variables. It has a 550 (or equivalent) prerequisite. It should be taken by undergraduate mathematics majors and by any student intending to do serious work in graduate analysis and applied mathematics. Careful statements of theorems, a proof of the Goursat version of the Cauchy integral theorem, concern about uniform convergence, and justifying interchange of operations would all be in the spirit intended for this (as yet untaught) course. On the other hand, the students must learn technique in problem solving, comparable at least to that acquired in MA 514.

Possible Texts: Ahlfors, Hille (Vol. I), Levinson and Redheffer.

Possible Syllabus:

5 classes	Algebra and geometry of complex numbers
10 classes	Analytic functions, elementary power series, elementary functions
	TEST
7 classes	Linear fractional transformations, topological concepts, conformality
10 classes	The Cauchy Integral Theorem and formula, their consequences, open mapping, maximum modulus
	TEST
5 classes	Series representations
5 classes	Residue Theory and applications
6 classes	Optional topics, e.g., Riemann surfaces, harmonic functions, infinite products, analytic continuation

F. W. Carroll

Math 556.01
Ordinary Differential Equations
without linear algebra.

This course is not intended to be a cookbook problem solving course in ordinary differential equations course, but should be considered as a brief introduction to the theory and solution of initial value problems. I feel that linear problems should be emphasized, and that at least one existence-uniqueness theorem should be proved. The sole prerequisite is the calculus sequence, and you will encounter a wide range mathematical background in the course. The course is prerequisite to 557 (Orthogonal series and boundary value problems), so there is no deep need for introducing boundary value problems in this course. You are likely to find a large portion of the audience to be physics and math majors. In view of the former group, an occasional example is in order, but the primary thrust of the course is mathematical.

Text: E. A. Coddington, An introduction to Ordinary Differential Equations, Prentice-Hall.

My attack would be as follows:

Chapter 1 - First order linear equations (stressing the idea that $y' + ay = b$ serves as a model for most of what follows)

Chapter 2 - Second order linear equations with constant coefficients

Chapter 3 §§ 1 thru 6 Second order variable coefficients up to analytic coefficients.

Chapter 5 - §§ 4 thru 7 The existence and uniqueness theorem.

This completes the absolute minimum content of the course. With time left, go back to chapter 3 §§ 7 ff and proceed into chapter 4 through Bessel equations.

W. Davis
2 / 72

Math 556.02

Ordinary Differential Equations with Linear Algebra.

The course is an introduction to the theory of ordinary differential equations, and not merely a problem solving course. The linear algebra prerequisite allows us to study n-dimensional systems of the form $Y' = AY + G$ in some detail. Further, at least one existence-uniqueness theorem should be presented. The students must have at least 571 linear algebra to survive this one. One purpose is to firm up their linear algebra and to begin showing the connections with analysis. This is another of the prerequisites to 557 (Boundary value problems) so that topic need not be introduced here. We hope that a large portion of the audience will take 556-557 sequentially. The audience will probably contain primarily math majors, but there will also be others (notably from physics).

Text: F. Brauer and J. Nohel, Introduction to the Theory of Ordinary Differential Equations, Benjamin.

Remark: The text is written in a verbose manner and has many misprints. It simply seems to be the best available for our goals.

Chapter 1 should be covered very quickly. A couple of days with students reading most of it should be enough.

From Chapter 2, look at and learn

1) Variables separable and

2) First order linear $y' = p(t)y + q(t)$.

The second provides the model for solution and theory of second order linear and the systems $Y' = AY + G$. Here one can point out variation of parameters, etc.

3) Very little time should be devoted to Chapter 3 - a special case of Chapter 6.

4) Most of your time will probably be spent in Chapter 6. You will need to develop e^{At} for $n \times n$ constant matrices, etc.

5) Do an existence - uniqueness theorem (Chapter 7).

This is minimal content at this point. It will take some work to get here. If you have time left, you have them well prepared to start studying stability theory (intro. in the text). If you are more traditionally oriented, do some powers series methods and Bessel equations. If you want some fun, get them some computer time and do a little numerical work.

W. J. Davis (2/72)

Math 557

Orthogonal Series and Boundary Value Problems

Prerequisite: Math 556(.01 or .02)

This course should provide the students with a good working knowledge of both the theory and application of the course material.

Text: Rabenstein, _Introduction to Ordinary Differential Equations_, Academic Press.

Chapter 6 - Orthogonal Polynomials(Omit 6.9 Tchebycheff)

Chapter 7 - Eigenvalue Problems

Chapter 8 - Fourier Series

Chapter 11- Partial Differential Equations

If time,

Chapter 10 - Laplace Transform

D. Eustice

2/72

Mathematics 560: Topology

This is a standard treatment of general topology with an emphasis on metric spaces and associated ideas such as uniform continuity, completeness, total boundedness, Baires theorem. Continuous maps, compactness, connectedness in topological spaces are examined. Convergence via sequences, nets and filters are studied as well as subspaces and product spaces. Math 254 is the only prerequisite.

Text: Undergraduate Topology, Robert H. Kasriel, W. B. Saunders Company, 1971

Chapter 1	Sets, functions, relations	3 days
Chapter 2	Structure of R, R^n	3 days
Chapter 3	Metric spaces	4 days
Chapter 4	Metric spaces, continued	4 days
Chapter 5	Metric spaces, continued	4 days
Chapter 6	General Topological spaces	5 days
Chapter 7	Compactness	5 days
Chapter 8	Connectedness	4 days
Chapter 9	Quotient spaces	3 days
Chapter 10	Nets and Filters	4 days
Chapter 11	Product spaces	4 days

Summary of M570, Winter Quarter, 1972

R. Gold

<u>Audience</u>: The course started with 28 students and finished with 21. All but 8 of the original class had the course 573; of the 7 students who dropped, 6 had not had 573. There were a few CIS students with scheduling difficulties that prevented their taking 577. Most of the students were math majors who had had 571 and were willing to commit themselves to 2 but not 3 additional quarters of algebra.

<u>Prerequisites</u>: The course used almost no formal results from number theory except for the division algorithm in Z .

<u>Text</u>: Lang, <u>Algebraic Structures</u>.

<u>Contents</u>: I. Group Theory (Lang, chapter II, sections 1, 2, 3, 4, 6).

Cyclic groups and dihedral groups, mappings, orders of elements, La Grange Theorem, homomorphisms, quotient groups.

(No permutation groups, Sylow Theorems, correspondence theorems, decomposition theorems).

II. Rings (Lang, chapter III, sections 1, 2, 3).

Z_m (clock-arithmetic), rings of matrices, Z, Q, C, continuous real-valued functions on [0, 1]; ideals, homomorphisms, quotient rings (no prime or maximal ideals).

III. Last week: Definitions and examples of integral domains and fields.

Elementary Modern Algebra

This somewhat controversial course is intended to give students a one quarter experience with algebraic ideas. Technically, both 571 and 573 are prerequisite but the 573 is sometimes ignored. This means students come to the course with varying doses of number theory and linear algebra. (My own feeling is that most students who do not have time to take both 573 and 570 are best advised to take 573; that most students who have time to take 571, 573, 570 are best to take the 580 sequence.)

The important thing to be said is that this course is not intended to acquaint students with a large variety of algebraic ideas lest it become simply a vocabulary course with students gaining only superficial understanding of many concepts. The instructor is urged to chose a limited number of topics and pursue these in reasonable depth. For example we have had teachers do the algebra necessary to get Galois theory for characteristic 0 . We have had teachers do group theory and ring theory with no field theory in the course at all.

Because this course is not prerequisite to any other, we do not need to guarantee that the subject content of each section is the same. However, it probably can be agreed that the course should contain the fundamentals of group theory, similar to the treatment in Lang's Structures, and move out from there.

Of the following suggested textbooks, the one by Lang has been used often and seems to be appropriate to the level of this course.

Suggested texts:

Joseph Landin, An Introduction to Algebraic Structures, Allyn and Bacon, Boston, 1969.

Serge Lang, Algebraic Structures, Addison Wesley, Reading, Mass., 1967.

Emil Aritin , Modern Higher Algebra: Galois Theory, notes by A.A. Blank, New York University, 1947.

Birkhoff-MacLane, A Survey of Modern Algebra, third ed., Macmillan, New York, 1965.

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Joan Leitzel
(February, 1972)

M 571.03

Introduction to Linear Algebra

This is a specific subsection of the general 571 designed for CIS majors. This particular course would be given primarily in Winter Quarter as part of the two quarter sequence 571-577. It would be taught as part of a sequence. The idea being to incorporate ideas of number theory as well as linear algebra to give the student an adequate base for the structural discussions of 577.

Text (for sequence) Birkhoff and MacLane; Survey of Modern Algebra

Topics:

A: Elementary Number Theory

- (a) Integers, gcd's, Euclid's algorithm, unique factorization.
- (b) Congruences and the ring structure of Z_n.
- (c) Groups'. Unit groups and Lagrange theorem.
- (d) The fields Z_p and primitive roots.
- (e) Sets, mappings, permutation groups.

B: Vector spaces and systems of equations (over arbitrary fields - particularly the finite fields)

- (a) Independence, bases, dimension
- (b) Inner product (with respect to a basis)
- (c) Matrices, determinants and systems of equations.
- (d) Matrices as transformations (group codes over Z_p).

James R. C. Leitzel 2/72

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M 571

Introduction to Linear Algebra

Currently this course as well as M 573 (elementary number theory) serves as a prerequisite for M 570 (the structures course). However this course also plays a role as service course to students in the physical sciences and engineering. If the enrollment is sufficient there is a break down of classes according to areas of interest, so a little of what follows is subject to modification depending on the particular interests of the class. For the most part this is the student's first encounter with abstraction. The first weeks will be slow going. There is a prerequisite of M 153 but the students usually don't remember much. The course should have a heavy enrollment of math majors or majors in mathematical science. The emphasis of the course typically is on linear transformations and their efficient description via matrices. Inner product spaces and quadratic forms should be treated and the geometric and physical interpretations pointed out. Highly probable that all examples will be spaces over the real and complex numbers.

Texts: It is possible that not one text will be suitable for all sections so to give an idea of level - the following are suggested:

(1) Lang - Linear Algebra, 2nd Ed., Addison - Wesley

(2) Fisher; An Introduction to Linear Algebra; Dickenson

(3) Page & Swift; Linear Algebra; Ginn

Topics (Not necessarily in order of coverage)

1. Abstract vector spaces - basis and dimension
2. Linear transformations and matrices
3. Systems of equations and rank
4. Inverses of matrices and determinants
5. Inner product spaces - orthogonality
6. Characteristic polynomial and eigenvalues
7. Principal Axis theorem (Spectral theory)

Remark: The first six of these may be realistic, at least examples of 7 should be incorporated. There is undoubtedly not enough time to do canonical forms nor much with invariant spaces and direct sum decompositions leave it for later courses.

James R. C. Leitzel 2/72

Math 573

Elementary Number Theory

At present this course and M 571 (Linear Algebra) serve as prerequisites for M 570 (the structures course). However some students will take this number theory course and not go on, so this is not to be treated as part of a two quarter sequence. Furthermore some members of a typical class will have 571, others not; thus there will be a fairly wide spectrum of ability to deal with mathematical proof. In fact previous experience has shown that this course is the first exposure the student has to abstract ideas and the construction of formal proof. Part of the instruction of the course is to develop in the student a reasonable facility with proof formulation. The audience should consist primarily of math majors but there will alsobe some secondary Ed majors and CIS people. In its role as prerequisite for 570, the course should provide the concrete examples for the abstract structures of group, ring and field to follow - only however by implicit example. This course also provides a good (and needed) opportunity to indicate the interrelatedness of mathematics as a discipline; examples and applications should be drawn from analysis and geometry whenever possible and feasible.

Text: Niven & Zuckerman; An Introduction to the Theory of Numbers, Wiley.
(Not the best for the course as described, but no other is either).

The following topics would provide the basic core for the course:

1. Divisibility properties of rational integers; primes; Euclidean algorithim; unique factorization; greatest common divisor; least common multiple.

2. Diophantine equations: $ax + by = c$.

3. Congruences; (introduction to groups, rings, fields in this connection); Euler's function; the unit groups mod n ; elementary properties of finite abelian groups, cyclic groups; Euler-Fermat theorem; the field properties of Z_p .

4. Linear congruences; Chinese Remainder theorem, unit groups, power congruences: $x^n = a(p)$.

5. Extensions and generalizations of these number theoretic ideas; polynomial rings over fields, the Euclidean property and unique factorization; and specifically, an example where unique factorization does not hold.

As time, and the class, permits, other topics might be included, such as:

A. Further experience with elementary number theoretic functions; the σ and τ functions; greatest integer function; Moebius function.

B. Construction of complex numbers (as ordered pairs of reals); and as quotient ring $R[x]/(x^2+1)$; Elementary properties of roots of unity.

C. Quadratic and Jacobi Reciprocity.

D. Fibonacci and Lucas Numbers; tests for primality.

E. Units in quadratic number fields; continued fractions, Pell's equation.

F. Analytic aspects of number theory.

MATHEMATICS 574: GEOMETRY

It is difficult to give much detail about this course, since it has been taught infrequently during the last few years, and the size and composition of the class is uncertain. (It was given in Spring 1970 as 574-694 to about 6 students with extremely varied backgrounds, and did not run in 1971 because of low enrollment. It is scheduled for Spring 1972). The class is expected to consist mainly of regular Math. majors. The course has 570, 571 as prerequisites, and is not a prerequisite of any other course. It seems that its aim should be to introduce some basic ideas of Projective Geometry, emphasizing the relation with Algebra, but at the same time providing experience with purely geometrical methods.

The following tentative syllabus is proposed for Spring 1972.

1) The complex projective plane. Use of homogeneous coordinates and dual coordinates. Projectivities and cross-ratio. Conics. Collineations and correlations. Applications to the real Euclidean plane.

2) Some axiomatics of projective and affine planes. Rôle of Desargues' and Pappus' Theorems.

3) (If time permits) Complex projective 3-space. Introduction to projective n-space.

There seems to be no one textbook which covers this material at a suitable level. Some sources are:

1) E. A. Maxwell: The Methods of Plane Projective Geometry Based on the Use of General Homogeneous Coordinates. Cambridge, 1948.

2) J. G. Semple and G. T. Kneebone: Algebraic Projective Geometry. Oxford, 1952.

3) H. S. M. Coxeter: Projective Geometry, Blaidsdell, 1964.

Prof. Jill Yaqub

Math 577 Discrete Algebraic Structures

This course in discrete and finite algebraic structures is intended for CIS people and has been designed with considerable input from CIS faculty. It has a 571 prerequisite. (We are right now running an experimental two-quarter course in linear and discrete algebra for CIS students. If this works out, we will expect a high percentage of the CIS students to take the two-quarter sequence rather than 571 and 577.)

It is the wishes of CIS that this course be an honest algebra course with relevancies to computers being pointed out as they arise. We have been using Birkhoff-MacLane (Survey of Modern Algebra, third ed., Macmillan, N.Y., 1965) as a text. The following list of topics indicates minimal content:

I. Elementary number theory and an introduction to algebraic structures.

a) The integers, g.c.d.'s and the Euclidean algorithm, unique factorization.

b) Congruences, linear Diophantine equations.

c) Arithmetic of polynomials, rational roots.

d) The rings Z_n of residue classes modulo n.

e) Groups: the groups of units in Z_n, Lagrange's Theorem.

f) The fields Z_p and primitive roots.

g) Sets, mappings, groups of permutations, Cayley graphs.

h) Group codes over Z_p.

II. Polynomial rings.

a) G.c.d.'s and the Euclidean algorithm, unique factorization.

b) Congruences and factor rings.

c) Finite fields.

d) Polynomial codes.

III. Boolean algebra

Joan Leitzel

(February, 1972)

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Math 580, 581, 582 Three Quarter Algebra Sequence

This sequence is intended to include the content of 573, 571, and 570 but to permit the presentation of the ideas of number theory and algebra in a more integrated, coherent way. The audience is primarily junior and senior majors with perhaps a couple of first-year graduate students. Some will have had linear algebra and others not; this seems to make little difference in their performance.

Each year 5 or 6 students seem to develop particularly well and begin to think in terms of graduate school. When I taught this course two years ago, I separated these people into a special additional seminar winter quarter and had them work through Abraham's, Linear and Multilinear Algebra (Benjamin). Tom Ralley has two small sections from his class working now: one is more advanced topics from group theory and the other in number theory.

Each instructor is free to develop this course as he feels most appropriate for his students. I used two texts: one in number theory and Dean's Elements of Abstract Algebra (Wiley). I probably would not use Dean again.

I am including the syllabus of my own course to give an idea of what can realistically be attempted.

Elementary number theory: Arithmetic of rational integers, mathematical induction, divisibility, primes, Euclidean algorithm; number theory in selected examples of other rings

Basic ring and ideal theory

Additional number theory: congruences, Chinese Remainder Theorem, unit groups, linear diophantine equations.

Mappings: surjections, injections, bijections; symmetries of geometric configurations.

Elementary group theory: permutation groups, dihedral groups, cyclic groups; subgroups, cosets, La Grange Theorem, normal subgroups, quotient groups, direct sums, homomorphisms, isomorphisms, Cauchy's Theorem, p-groups, Sylow Theorems, classification of groups of order ≤ 15.

Linear algebra: radius vectors, coordinate geometry; independence, basis, subspaces, quotient spaces, field extensions, linear transformations, duality, inner products, orthogonal transformations, matrices and determinants, similarity, systems of linear equations, eigenvalues and vectors, quadratic forms, quadric surfaces in R^2 and R^3.

Basic field theory: complex numbers, algebraic number fields; normal extensions; Galois theory (characteristic 0); ruler - compass constructions; quadratic reciprocity and Jacobi symbol.

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Syllabus for Math 105

This course is open only to students whose indicated major is elementary education. It is a study of the basic properties of the real numbers as appropriate for prospective elementary school teachers. Content is intended to be relevant to the mathematics curriculum for grades K-8. The prerequisite is Math 101 or Level III on the OSU Mathematics Placement Exam. Students must complete either 105 and 106 or 105 and 107 to fulfill a ten-hour mathematcs requirement for Elementary Education. Math 105 is offered Winter, Spring and Summer Quarters.

Topics covered include sets, whole numbers, integers, rational numbers, real numbers, other number bases, and basic operations and their algorithms.

The probable text for this course is Elementary Mathematics for Teachers by Kelley and Richert (Chapters 1-6).

Further information may be obtained from the course coordinator, Professor Jim Schultz.

1972

TO: Math Faculty (especially undergraduate advisors)

RE: New Course Offering: The History of Mathematical Ideas

A pilot will run Spring 1973 under Math 594; projected instructor Charles Saltzer.

CREDIT: 5 hours; 3 classes MWF at 12:00 p.m. or 1:00 p.m.

PREREQUISITES: 550 and 571 or permission of instructor.

PROBABLE TEXTS:
1) Euclid's Elements 3 vol. (Heath Translation);
2) The Works of Archimedes;
3) The Exact Sciences in Antiquity, Neugebauer;
4) Geometry, Descartes;
5) Essays on the Theory of Numbers, Dedekind;
6) A Concise History of Mathematics, D. J. Struik.

CONTENT: The development of fundamental ideas in mathematics, the interaction between science and mathematics, and the problems concerning which axiomatic systems are desirable will be studied. Topics will include the development of the concepts of continuity, the real number system, the development of algebraic symbolism, infinity, the concept of an algorithm, and proof theory. Extensive readings in the works of great mathematicians will be emphasized.

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