Math 117: General Course Outline

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Catalog Description

117. Algebra for Applications. (4) Lecture, three hours; discussion, one hour. Requisite: course 115A. Not open for credit to students with credit for course 110A. Integers, congruences; fields, applications of finite fields; polynomials; permutations, introduction to groups.

Textbook

L. Childs, *A Concrete Introduction to Higher Algebra,* 3rd Ed., Springer-Verlag.

Reviews & Exams

The following schedule is based on 26 lectures. The remaining three classroom meetings are for midterm exams and a review.

Schedule of Lectures

Lecture	Section	Topics
1-2	Ch 2 A--D	Induction and binomial theorem
3	Ch 3 A	Division theorem, bases
4-5	Ch 3 B--D; Ch 4 A, B	Euclidean algorithm, Bezout's identity, unique factorization
6-9	Ch 5; Ch 6	Congruences, congruence classes, and error-correcting codes
10-11	Ch 7	Rings and fields
12-13	Ch 9 A--D	Theorems of Euler and Fermat
14	Ch 10 B	RSA codes
15-16	Ch 12 A, B	Chinese remainder theorem
17	Ch 12 C	Application of Chinese remainder theorem to RSA cryptography
18-20	Ch 13, ch 14	Polynomials, unique factorization
21	Ch 15 D, F, C	Complex numbers, fundamental theorem of algebra
22-23	Ch 17 A, B	Congruences modulo a polynomial and Chinese remainder theorem
24-26	Ch 18	Fast polynomial multiplication, fast Fourier transform

Comments

Note: The book contains a wealth of interesting topics (e.g. Sturm's theorem, group theory), which can be substituted for material in the last five lectures at the instructor's discretion.

Outline update: D. Gieseker, 1/97

For more information, please contact Student Services, ugrad@math.ucla.edu.