MATHEMATICS 3320
ABSTRACT ALGEBRA

In how many ways can two red beads and four blue beads be strung on a string to form a necklace?

Label the sides of two cubes with positive integers in ways different from the way the faces of standard dice are labelled so that rolling these *weird dice* is the same as rolling standard dice; that is, the probabilities of getting each of the sums *2,3,...,12* are the same.

Suppose you shuffle a deck of (52) playing cards by first cutting the deck exactly in half and then performing a *ripple* shuffle so that the cards from each half are perfectly interleaved and so that the original top card remains on top. If you repeatedly shuffle the cards in this way, will they ever return to their original order? If so, what is the minimum number of shuffles before they return to their original order?

Problems like these have solutions which require only elementary ideas of abstract algebra. Since abstract algebra plays a central role in mathematics, a course in this subject is traditional in the mathematics curriculum. At Memorial, MATH 3320 is a required course for a student majoring in pure mathematics. While at first glance it might seem a bit esoteric, abstract algebra is in fact very practical with applications to computer science, physics, chemistry and data communications. With the background of the familiar integers, the student discovers that there are many other structures whose similarity and differences with the integers make for interesting comparison.

Text. Two books whose content and level match this course well are *Contemporary Abstract Algebra* by Joseph A. Gallian (D. C. Heath) and *Abstract Algebra* by I. N. Herstein (MacMillan).

Marks. While the exact formula may vary from semester to semester, it is typical to assign 55% of the final grade in this course to a final examination, 30% to a midterm and 15% to homework.

Calendar description. **3320 Abstract Algebra** is an introduction to groups and group homo-morphisms including cyclic groups, cosets, Lagrange's theorem, normal subgroups and quotient groups, introduction to rings and ring homomorphisms including ideals, prime and maximal ideals, quotient rings, integral domains and fields.
Prerequisite: Mathematics 2320.

Offered. Fall