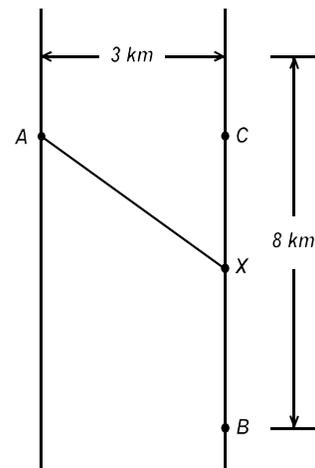


MATHEMATICS 1000
CALCULUS I

There is a power source at point A on a bank of a straight river 3 km wide and a city at point B 8 km downstream on the opposite bank. Suppose we want to lay cable connecting A and B as cheaply as possible. There are various possibilities. The shortest route is the straight line from A to B but this route lies entirely under water. It costs \$12,000 dollars a metre to lay cable under water and only \$3,000 dollars a metre to lay cable over land. The route that requires the least amount of underwater cable is the route directly across the river A to C and then overland from C to B but this plan would require the most cable. In general, the cable could be laid from A to a point X across the river between C and B and then from X to B . How should cable be laid joining A and B in order to minimize the total cost?



Calculus is a beautiful subject that dates back to the time of Archimedes (287-212 BC). For almost 2,000 years a handful of his calculations stood as the isolated achievement of a great genius. England's Sir Isaac Newton (1642-1727) and Germany's Gottfried Leibnitz (1646-1716) gave the world all of present day calculus, perhaps the most fundamental area of mathematics because of its wide applicability to the physical and social sciences. The problem above is a typical *optimization* problem for whose solution calculus is the perfect tool.

Mathematics 1000 is required for entry into any science program, business, engineering, and pharmacy. It is a course in *differential* calculus with a brief introduction to *integral* calculus, the subject of Mathematics 1001.

Text. *Varies. Consult instructor before purchasing.* Course Notes by Bruce Watson is available at the general office of the Mathematics and Statistics Department.

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. The remaining 45% is based on a combination of (usually) two term tests and homework.

Calendar description: **1000 Calculus I** is an introduction to differential calculus, including algebraic, trigonometric, exponential, logarithmic, inverse trigonometric and hyperbolic functions. Applications include kinematics, related rates problems, curve sketching and optimization. Four lecture hours per week.

Prerequisite: MATH 1090 or a combination of placement test and high school Mathematics scores acceptable to the Department.

Usage Limitation: at most 9 credit hours in Mathematics will be given for courses completed from the following list subject to normal credit restrictions: Mathematics 1000, 1031, 1050, 1051, the former 1080, the former 1081, 1090, the former 1150 and 1151

Offered. Fall, Winter, Spring