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