INTERMODULAR DESCRIPTION SHEET:	UMAP Unit 670

TITLE: LEAST SQUARES, FISH ECOLOGY, AND THE CHAIN RULE

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MATH FIELD: Statistics, Calculus, Differential Equations

APPLICATIONS FIELD: Population Biology

TARGET AUDIENCE: Students in a sophomore-level course in either multivariable calculus or differential equations.

ABSTRACT: *The application*: Differential equation models are used to study the effect of the amount and spatial distribution of the food supply on the amount fish eat. These models are combined into a single, more encompassing model via the multivariable chain rule. The original research was by V. S. Ivlev, a Soviet biologist. His experimental data is included. The use of least-squares techniques to fit model parameters to the data is emphasized and is discussed in detail in an appendix that may be used independently as an introduction to the concepts and practice of the least-squares method.

PREREQUISITES: Acquaintance with the multivariable chain rule, separable differential equations, calculation of extreme points of a function of two-variables, and criterion for such a point to be a minimum. No background is assumed in biology.

RELATED UNITS: Curve Fitting via the Criterion of Least Squares (Unit 321)
by John W. Alexander Jr.
Fitting Equations to Data, I (Unit 433)
by Thomas M. Lamm