Biostatistics and Informatics Research Curriculum

The statistical group has active, grant-supported research in developing, testing and implementing various techniques of statistical analyses. There is a focus on mathematical modeling applicable to cancer research. Individual projects focus on how to incorporate quality of life measures into survival models. There is an ongoing series of RO-1 supported investigations of models for extending and predicting results of expanded clinical trials in the clinical arena. Other active research interests include:

- Mathematical modeling in risk assessment survival analysis with an emphasis on cure-rate models
- Methods of modeling a statistical inference applied to cancer surveillance and screening
- Quantitative inference on the sequence of genetic events in cancer progression

1. REQUIRED LECTURE:

"Biostatistics in Cancer Control" (by H. Zhao)

Topics: Issues of recruitment, sampling, design, assessment points, primary and secondary endpoints, patient assessment burden, forms design, database development, aspects of implementing and conducting cancer control clinical trials in a medical setting.

2. REQUIRED CORE COURSES:

(1) Introduction to Biostatistics (BST 463) Review of basic statistical and data-analytic methods in medical and clinical research. Topics include summarizing and displaying data, diagnostic tests, hypothesis tests and confidence intervals, methods for comparing means and proportions, and regression analysis. The StataQuest computer software package is introduced and used. The course is strongly use-oriented, stressing practical understanding and interpretation not mathematical derivation. **(H. Zhao)**

(2) Statistical Methods for Biomedical Applications (BST 464) Statistical analysis of clinical trials and observational studies. Analysis of covariance, multiple regression, logistic regression, log-linear analysis, and survival analysis. (Kaplan-Meier curves and the Cox models). Measurement Error. **(D. Oakes, H. Zhao)**

(3) Introduction to SAS for Windows (PM 429): This six-week course will present an introduction to the SAS system for Windows. The focus of the course will be on data management and statistical analysis using SAS. The student will gain an understanding of SAS as a research tool through the completion of a research project of their own design. Prerequisites: BST 463 or equivalent and knowledge of MS Windows. **(Biostatistics staff)**

3. ELECTIVE COURSES:

Global Public Health Informatics (PM 454)
Structural Equation Modeling (CSP 514)
Data Analysis: General Linear Applications II (CSP 519)
Applied Multivariate Analysis (BST 441)
Statistical Modeling Techniques (BST 479)

4. REQUIRED CORE SEMINARS:

Introduction to Medical Informatics - The levels of expertise among clinical research trainees with regard to computers and telecommunications are expected to be highly variable. The goal of this four-session seminar in Year 1 is to orient the trainee to computer and communication resources available to them at the University of Rochester. An overview of the University's computer resources and telecommunications network including the trainees' access to information on the Intranet, Internet, etc will be provided. **(A. Yakevlov, H. Wu)**

Advanced Research Informatics - In Year 2, a second series of workshops on Advanced Medical Informatics will be held. These will expand upon the use of the Internet and introduce the concept of the "Virtual Research Center," based in the CCOP web site. This innovation will be used by the trainee to collaborate with other scientists, working as a team, who may be at great distances. This is an approach being used by investigators in the CCOP research base to develop manuscripts/concepts/protocols. At the end of this workshop, the trainee should be comfortable with technologies needed to participate in a worldwide network of clinical researchers. **(T. Pearson, T. Dyer, G. Morrow)**

Department of Statistics and Computational Biology Seminar Series - This bi-weekly series has included seminars on the following among the recent presentations: "Nonparametric Regression Methods for Longitudinal Data Modeling with Applications in AIDS Clinical Trials", "Functional Response Models and their Applications to Psychosocial Research", "Interval-censoring, Medical Researches and Statistical Methods", "Modeling Breast Cancer Screening" **(A. Yakevlov, H. Wu, H. Zhao)**

5. INDIVIDUAL MENTOR RESEARCH OPPORTUNITIES:

Parametric methods of survival analysis and cure rate estimation; quantification of the role of age in breast cancer survival; utility of mechanistic models of cancer detection in analysis of the impact of breast cancer screening in population-based settings; Stochastic modeling of multi-type cell systems. **(A. Yakovlev)**

Models for extending and predicting results of expanded clinical trials in the clinical arena. (**H. Wu)**

Mathematical models of quality of life and its effect on survival. (**H. Zhao)**