Preface

In July 1992, 45 researchers gathered at Mt. Holyoke College for a week long conference on adaptive designs. Papers were presented by both well-known and new researchers, and covered such broad areas of applications as engineering, clinical trials, pharmacologic studies, quality control, and computer science. Twenty of those papers are presented in this volume. Each paper was refereed for merit by researchers in similar areas.

The conference on adaptive designs was one of a series of summer conferences, co-sponsored by the American Mathematical Society, the Institute of Mathematical Statistics, and the Society for Industrial and Applied Mathematics. A generous grant was received from the National Science Foundation, which covered travel expenses for the participants. The organizing committee consisted of Professor Stephen Durham of The University of South Carolina (co- chair), Professor Nancy Flournoy of The American University (co-chair), Professor Gordon Simons of The University of North Carolina, and Professor Michael Woodroofe of The University of Michigan.

An adaptive design is an experimental design that chooses future points of experimentation based, wholly or in part, on responses observed at previous points of experimentation. While similar in spirit to the Bayesian philosophy of incorporating prior information in an experiment, adaptive designs can be either Bayesian or frequentist, as evidenced by the papers in this volume. While sequential in nature, adaptive designs can fit into the traditional sequential analysis framework, but many do not, as also evidenced by the papers in this volume. Hence adaptive designs are best categorized as an independent subdiscipline of the experimental design discipline.

Because adaptive designs rely on previous responses, stochastic processes are generated which require the full arsenal of results on dependent observations. In particular, the rich theory of martingales is used in many of the papers in this volume. While the theory of i.i.d. sampling has been the primary focus of statistics until recently, we now have the tools for estimation and inference to fully develop designs which impose dependencies. Potentially more efficient, more ethical, and perhaps even more sensible designs are being developed under the adaptive framework. These papers show progress toward this goal.