Preface

This book is intended for a first course, at the senior or beginning graduate level, in the calculus of variations. It will also be of use to those interested in self-study.

There are already many excellent books on this topic. I cite a number of these texts throughout this book. I have added another book, this book, because I wanted a text that is especially well suited to the Amath 507 class that I teach at the University of Washington.

My Amath 507 students are typically applied mathematicians, physicists, and engineers. I have thus included numerous examples from fields such as mechanics and optics; I have also included many examples with immediate geometric appeal. Because of my students' strong interest in applications, I have also introduced constraints earlier than usual.

My students also enjoy learning the history of science. So I have resisted the temptation of immediately jumping to the most modern results. I instead follow the historical development of the calculus of variations. The calculus of variations has an especially rich and interesting history and a historical approach works exceptionally well for this subject.

Finally, I teach on a quarter system. So I have taken the opportunity of writing this book to collect and organize my thoughts on

the calculus of variations in what I hope is a concise and effective manner.

I am grateful to my Amath 507 students for their enthusiasm and hard work and for uncovering interesting applications of the calculus of variations. I owe special thanks to William K. Smith for supervising my undergraduate thesis in the calculus of variations (35 years ago) and to Hanno Rund for teaching a fine series of courses on the calculus of variations during my graduate years. Sadly, these two wonderful teachers are now both deceased. I thank the fine editors and reviewers of the American Mathematical Society for their helpful comments. Finally, I thank my family for their encouragement and for putting up with the writing of another book.

Mark Kot