



Calculus of Variations and Optimal Control Theory: A Concise Introduction

By Daniel Liberzon

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This textbook offers a concise yet rigorous introduction to calculus of variations and optimal control theory, and is a self-contained resource for graduate students in engineering, applied mathematics, and related subjects. Designed specifically for a one-semester course, the book begins with calculus of variations, preparing the ground for optimal control. It then gives a complete proof of the maximum principle and covers key topics such as the Hamilton-Jacobi-Bellman theory of dynamic programming and linear-quadratic optimal control.

Calculus of Variations and Optimal Control Theory also traces the historical development of the subject and features numerous exercises, notes and references at the end of each chapter, and suggestions for further study.

- Offers a concise yet rigorous introduction
- Requires limited background in control theory or advanced mathematics
- Provides a complete proof of the maximum principle
- Uses consistent notation in the exposition of classical and modern topics
- Traces the historical development of the subject
- Solutions manual (available only to teachers)

Leading universities that have adopted this book include:

- University of Illinois at Urbana-Champaign ECE 553: Optimum Control Systems
- Georgia Institute of Technology ECE 6553: Optimal Control and Optimization
- University of Pennsylvania ESE 680: Optimal Control Theory
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Review

"Each chapter ends with a rich and useful section of notes and references. The exercises are merely problems or even theorems. The author of the book presents a large list of references and a detailed index of notions, names, and symbols. The graphical presentation of the book is pleasant. . . . [T]his book is well written, it fully deserves all its goals mentioned at the beginning of the review, and is a pleasure to read it."--**Marian Muresan, *Mathematica***

"This is an extremely well-crafted textbook. If you plan to teach a first course to advanced students on the calculus of variations and optimal control and you like the selection of topics that the author has chosen to present (and I do), it is the text you need. What impresses me most is the careful balance between the formal derivations and the explanations that precede or accompany the statements and proofs. . . . All in all, it is a first-rate, enjoyable text."--**Zvi Artstein, *Mathematical Reviews Clippings***

From the Back Cover

"A very scholarly and concise introduction to optimal control theory. Liberzon nicely balances rigor and accessibility, and provides fascinating historical perspectives and thought-provoking exercises. A course based on this book will be a pleasure to take."--**Andrew R. Teel, University of California, Santa Barbara**

About the Author

Daniel Liberzon is associate professor of electrical and computer engineering at the University of Illinois, Urbana-Champaign. He is the author of "Switching in Systems and Control".

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