



# Modern Methods in the Calculus of Variations: $L^p$ Spaces (Springer Monographs in Mathematics)

*Irene Fonseca, Giovanni Leoni*

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This is the first of two books on methods and techniques in the calculus of variations. Contemporary arguments are used throughout the text to streamline and present in a unified way classical results, and to provide novel contributions at the forefront of the theory.

This book addresses fundamental questions related to lower semicontinuity and relaxation of functionals within the unconstrained setting, mainly in  $L^p$  spaces. It prepares the ground for the second volume where the variational treatment of functionals involving fields and their derivatives will be undertaken within the framework of Sobolev spaces.

This book is self-contained. All the statements are fully justified and proved, with the exception of basic results in measure theory, which may be found in any good textbook on the subject. It also contains several exercises. Therefore, it may be used both as a graduate textbook as well as a reference text for researchers in the field.

Irene Fonseca is the Mellon College of Science Professor of Mathematics and is currently the Director of the Center for Nonlinear Analysis in the Department of Mathematical Sciences at Carnegie Mellon University.

Her research interests lie in the areas of continuum mechanics, calculus of variations, geometric measure theory and partial differential equations.

Giovanni Leoni is also a professor in the Department of Mathematical Sciences at Carnegie Mellon University. He focuses his research on calculus of variations, partial differential equations and geometric measure theory with special emphasis on applications to problems in continuum mechanics and in materials science.

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