Table of Contents

Introduction

1

Chapter 1: Manifolds and Maps

- 0. Submanifolds of \mathbb{R}^{n+k} 8
- 1. Differential Structures 11
- 2. Differentiable Maps and the Tangent Bundle 15
- 3. Embeddings and Immersions 21
- 4. Manifolds with Boundary 29
- 5. A Convention 32

Chapter 2: Function Spaces

- 1. The Weak and Strong Topologies on C'(M,N) 34
- 2. Approximations 41
- 3. Approximations on ∂-Manifolds and Manifold Pairs 56
- 4. Jets and the Baire Property 58
- 5. Analytic Approximations 65

Chapter 3: Transversality

- 1. The Morse-Sard Theorem 68
- 2. Transversality 74

Chapter 4: Vector Bundles and Tubular Neighborhoods

- 1. Vector Bundles 86
- 2. Constructions with Vector Bundles 92
- 3. The Classification of Vector Bundles 99
- 4. Oriented Vector Bundles 103
- 5. Tubular Neighborhoods 109
- 6. Collars and Tubular Neighborhoods of Neat Submanifolds 113
- 7. Analytic Differential Structures 118

Chapter 5: Degrees, Intersection Numbers, and the Euler Characteristic

- 1. Degrees of Maps 121
- 2. Intersection Numbers and the Euler Characteristic 131
- 3. Historical Remarks 140

Chapter 6: Morse Theory

- 1. Morse Functions 143
- 2. Differential Equations and Regular Level Surfaces 149
- 3. Passing Critical Levels and Attaching Cells 156
- 4. CW-Complexes 166

Chapter 7: Cobordism

- 1. Cobordism and Transversality 169
- 2. The Thom Homomorphism 172

Chapter 8: Isotopy

- 1. Extending Isotopies 177
- 2. Gluing Manifolds Together 184
- 3. Isotopies of Disks 185

Chapter 9: Surfaces

- 1. Models of Surfaces 189
- 2. Characterization of the Disk 194
- 3. The Classification of Compact Surfaces 200

Bibliography

209

Appendix

213

Index

217