

# Contents

<i>Preface</i>	page vii
<i>Prerequisites</i>	1
1 Foliations	4
1.1 Definition and first examples	5
1.2 Alternative definitions of foliations	9
1.3 Constructions of foliations	14
2 Holonomy and stability	19
2.1 Holonomy	20
2.2 Riemannian foliations	25
2.3 Local Reeb stability	30
2.4 Orbifolds	34
2.5 Global Reeb stability in codimension 1	44
2.6 Thurston's stability theorem	49
3 Two classical theorems	56
3.1 Haefliger's theorem	57
3.1.1 Review of Morse functions	58
3.1.2 Morse functions into codimension 1 foliations	60
3.1.3 Proof of Haefliger's theorem	62
3.2 Novikov's theorem	65
3.2.1 Vanishing cycles	66
3.2.2 Existence of a compact leaf	71
3.2.3 Existence of a Reeb component	77
4 Molino's theory	81
4.1 Transverse parallelizability	82
4.1.1 Homogeneous foliations	82
4.1.2 Transversely parallelizable foliations	86

4.2	Principal bundles	92
4.2.1	Connections on principal bundles	93
4.2.2	Transverse principal bundles	98
4.3	Lie foliations and Molino's theorem	101
4.3.1	Lie foliations	102
4.3.2	The Darboux cover	103
4.3.3	Molino's structure theorem	108
5	Lie groupoids	110
5.1	Definition and first examples	111
5.2	The monodromy and holonomy groupoids	117
5.3	Some general constructions	121
5.4	Equivalence of Lie groupoids	127
5.5	Etale groupoids	134
5.6	Proper groupoids and orbifolds	140
5.7	Principal bundles over Lie groupoids	144
6	Lie algebroids	149
6.1	The Lie algebroid of a Lie groupoid	150
6.2	Definition and examples of Lie algebroids	153
6.3	Lie theory for Lie groupoids	157
6.4	Integrability and developable foliations	160
	<i>References and further reading</i>	166
	<i>Index</i>	170