

## Contents

	<i>page</i>
<i>Preface</i>	ix
<i>Acknowledgements</i>	xii
1 Introduction	1
1.1 Using SI units in astronomy	1
1.2 Layout and structure of the book	2
1.3 Definitions of terms (lexicological, mathematical and statistical)	3
1.4 A brief history of the standardization of units in general	7
1.5 A brief history of the standardization of scientific units	8
1.6 The future of SI units	11
1.7 Summary and recommendations	11
2 An introduction to SI units	12
2.1 The set of SI base units	12
2.2 The set of SI derived units	12
2.3 Non-SI units currently accepted for use with SI units	13
2.4 Other non-SI units	14
2.5 Prefixes to SI units	14
2.6 IAU recommendations regarding SI units	20
2.7 Summary and recommendations	23
3 Dimensional analysis	24
3.1 Definition of dimensional analysis	24
3.2 Dimensional equations	25
3.3 Summary and recommendations	29
4 Unit of angular measure (radian)	30
4.1 SI definition of the radian	30
4.2 Commonly used non-SI units of angular measure	30

4.3	Spherical astronomy	36
4.4	Angular distances and diameters	46
4.5	Steradian	48
4.6	Summary and recommendations	53
5	Unit of time (second)	54
5.1	SI definition of the second	54
5.2	Definition of time	54
5.3	Systems of time or time scales	54
5.4	The hertz: unit of frequency	60
5.5	Angular motion	60
5.6	The determination of the ages of celestial bodies	66
5.7	Summary and recommendations	70
6	Unit of length (metre)	72
6.1	SI definition of the metre	72
6.2	Linear astronomical distances and diameters	72
6.3	Linear motion	83
6.4	Acceleration	88
6.5	Area	89
6.6	Volume	89
6.7	Summary and recommendations	91
7	Unit of mass (kilogram)	92
7.1	SI definition of the kilogram	92
7.2	The constant of gravitation	94
7.3	Masses of astronomical bodies	97
7.4	Density	106
7.5	Force	108
7.6	Moments of inertia and angular momentum	109
7.7	Summary and recommendations	111
8	Unit of luminous intensity (candela)	113
8.1	SI definition of the candela	113
8.2	Radiometry and photometry	113
8.3	Magnitudes	137
8.4	Summary and recommendations	142
9	Unit of thermodynamic temperature (kelvin)	146
9.1	SI definition of the kelvin	146
9.2	Temperature scales	147
9.3	Some examples of the temperatures of astronomical objects	149

<i>Contents</i>	vii
9.4 Blackbody radiation	151
9.5 Spectral classification as a temperature sequence	154
9.6 Model stellar atmospheres	165
9.7 Summary and recommendations	172
10 Unit of electric current (ampere)	174
10.1 SI definition of the ampere	174
10.2 SI and non-SI electrical and magnetic unit relationships	175
10.3 Magnetic fields in astronomy	183
10.4 Electric fields in astronomy	194
10.5 Summary and recommendations	195
11 Unit of amount of substance (mole)	197
11.1 SI definition of the mole	197
11.2 Avogadro's constant and atomic masses	197
11.3 Astrochemistry and cosmochemistry	202
11.4 Summary and recommendations	204
12 Astronomical taxonomy	206
12.1 Definition of taxonomy	206
12.2 Classification in astronomy	206
12.3 Classification of stellar objects	207
12.4 Classification of Solar System objects	215
12.5 Astronomical databases and virtual observatories	216
12.6 Summary and recommendations	218
<i>References</i>	219
<i>Index</i>	226