

Contents

List of figures and tables		page xii
P	Preface	
1	Introduction and overview	1
	Setting the stage: the Manhattan Project	1
	Relations between ethics and science	4
	Responses: professional, industrial, governmental	10
	Course of the argument	13
	Extending reflection: scientific controversies and the Nobel Prize	19
	Questions for research and discussion	21
	Further reading about the cases	22
2	Ethical concepts and theories	23
	Setting the stage: the miracle drug thalidomide	23
	Distinctions and definitions	26
	Ethics and science: a brief relational history	30
	From moral knowledge to ethical reasoning	36
	The role of theory	39
	Virtue ethics	41
	Consequentialism	46
	Deontology	51
	Strengths, weaknesses, and alternatives	57
	Summary	61
	Extending reflection: codes of conduct for computer scientists	
	and software engineers	62
	Questions for research and discussion	64
	Further reading about the cases	65

vii



viii Contents

3	Science and its norms	66
	Setting the stage: Galileo and the church	66
	Emergence of natural philosophy	69
	The social institutionalization of science	73
	Scientific methods and epistemological norms	76
	Social norms in science	78
	Summary	82
	Extending reflection: anthropologists and the military	83
	Questions for research and discussion	85
	Further reading about the cases	86
4	Research ethics I: responsible conduct	87
	Setting the stage: a cloning scandal	88
	From norms to realities	90
	Influential cases	94
	A spectrum of conduct	100
	The flow 1: anticipating research	103
	The flow 2: doing research	106
	The flow 3: disseminating research	112
	Research ethics in a global context	118
	Summary	120
	Extending reflection: Victor Ninov and Jan Hendrik Schön	123
	Questions for research and discussion	123
	Further reading about the cases	123
	Video and online resources for teaching about	
	research misconduct	124
5	Research ethics II: science involving humans	125
	Setting the stage: clinical trials in developing countries	125
	How clinical trials work	128
	How humans became research subjects	132
	From subjects to participants: free and informed consent	134
	The US case: autonomy, beneficence, and justice	140
	The flow of human participants research: anticipating and practicing	145
	The flow of human participants research: disseminating	150
	Summary	153
	Extending reflection: using immorally acquired data	151



	Contents	ix
Questions for research and discussion	154	
Further reading about the cases	155	
6 Research ethics III: science involving animals	156	
Setting the stage: war over animal research	156	
Farms, zoos, pets, wildlife preserves, and laboratories	159	
Animal welfare and animal rights: a brief history	162	
The animals issue: an analysis	166	
Summary	170	
Extending reflection: Temple Grandin	170	
Questions for research and discussion	172	
Further reading about the cases	173	
7 The science of ethics	174	
Setting the stage: sexual harassment among scientists	174	
What can science tell us about ethics?	176	
Evolutionary ethics	178	
Decision science	181	
Psychology of moral development	182	
The naturalistic fallacy	185	
Options for a science of ethics	186	
Why attempt a strong science of normative ethics?	190	
Methodological naturalism informing ethics: neuroscience	192	
Summary	193	
Extending reflection: space colonization	194	
Questions for research and discussion	195	
Further reading about the cases	196	
8 Transition: from ethics to politics and policy	197	
Setting the stage: developing a course	197	
The goals of teaching and learning	199	
Science and ethics or ethics and science?	201	
For interdisciplinary ethics	203	
Effective education	204	
Ethics: from doing things right to doing the right things	205	
Extending reflection: Einstein on ethics and science	207	
Questions for research and discussion	209	
Further reading about the cases	209	



x Contents

9	Science and politics I: policy for science	210
	Setting the stage: government funding of embryonic stem	
	cell research	210
	Science in context	212
	The social contract for science: the linear model	215
	Questioning the social contract: governing science	217
	Policies for science budgets	219
	Science outcomes	223
	R&D, the market, and well-being	225
	Scientists' responsibilities for knowledge and its consequences	228
	Distributing responsibility	230
	Summary	233
	Extending reflection: dual use and publishing a deadly blueprint	234
	Questions for research and discussion	235
	Further reading about the cases	236
10	Science and politics II: science for policy	237
	Setting the stage: climate change and an inconvenient heretic	237
	Science and decision-making	240
	The social contract for science revisited	245
	Questioning the social contract again: science governing	248
	Science in the military	254
	Science in the courtroom	256
	Science in the media	258
	Summary	261
	Extending reflection: premature science? Predicting earthquakes	
	and linking autism with vaccinations	263
	Questions for research and discussion	265
	Further reading about the cases	266
11	Science and ideational culture	268
	Setting the stage: the Templeton Foundation	268
	Science and personal experience	270
	Science and culture	273
	Independence: separating science from culture	275
	Conflict: science and culture in opposition	276
	Dialogue: science and culture in conversation	281
	Integration: bringing science and culture together	283



	Contents	xi
Summary	286	
Extending reflection: intelligent design in public schools	286	
Questions for research and discussion	288	
Further reading about the cases	289	
12 Science applied: ethics and engineering	290	
Setting the stage: the Challenger and Columbia disasters	290	
Overview, definitions, and contrasts	293	
A history of ideals in engineering ethics	296	
Perspectives from different countries	300	
Confidence and doubt in engineering	306	
Toward a duty plus respicere in engineering - and in science	307	
Summary	312	
Extending reflection: sustainability and geoengineering	313	
Questions for research and discussion	317	
Further reading about the cases	318	
Epilogue: Looking back, leaning forward: the moral character of scientists	319	
Appendix: Ethics codes	324	
Bibliography	328	
Index	347	



Figures and tables

Figures

2.1	World map sized to represent land areas of the various	
	countries (as of 2000)	page 24
2.2	World map sized to represent populations of the various	
	countries (as of 2002)	24
2.3	Graphic illustration of relations among three normative	
	ethical theories	29
12.1	Eight values for engineering	302
Tal	bles	
2.1	Strengths and weaknesses of three major ethical theories	58
5.1	Summary of key characteristics of clinical trials	131
6.1	Three ways to think about the moral status of animals	168
7.1	A prisoner's dilemma analysis	182
7.2	Summary of Kohlberg's stages of moral development	184
7.3	Possibilities for a science of ethics	189
12.1	Ethics related to science and engineering	296

xii