

A STUDENT HANDBOOK FOR WRITING IN BIOLOGY

THIRD EDITION

Karin Knisely
Bucknell University

DONATED BY



The Asia Foundation
BOOKS FOR ASIA
NOT FOR SALE



SINAUER ASSOCIATES, INC.



W.H. FREEMAN AND COMPANY

CONTENTS

Preface xiii

CHAPTER 1 *The Scientific Method* 1

- An Introduction to the Scientific Method 1
 - Ask a question* 2
 - Look for answers to your question* 2
 - Turn your question into a hypothesis* 2
 - Design an experiment to test your hypothesis* 3
 - Record data* 5
 - Summarize numerical data* 6
 - Analyze the data* 7
 - Try to explain the results* 7
 - Revise original hypotheses to take new findings into account* 8
 - Share findings with other scientists* 8

CHAPTER 2 *Developing a Literature Search Strategy* 9

- Databases and Search Engines for Scientific Information 10
 - Comparison of databases* 10
- Database Search Strategies 13
 - Understand your topic* 13
 - Define your research goals* 16
 - Subdivide your topic into concepts* 16
 - Choose effective keywords* 18
 - Connect keywords with the operators and, or, or not* 18
 - Use truncation symbols for multiple word endings* 20
 - Search exact phrase* 20
 - Use the same keywords in a different database or search engine* 20
- Evaluating Search Results 20
 - Finding related articles* 23
 - Obtaining full-text articles* 23
- Managing References (Citations) 26
 - RefWorks* 26

CHAPTER 3 *Reading and Writing Scientific Papers* 35

- Types of Scientific Writing 35
- Hallmarks of Scientific Writing 35
- Scientific Paper Format 36
- Styles for Documenting References 38
- Strategies for Reading Journal Articles 39
- Strategies for Reading your Textbook 40
- Study Groups 42
- Plagiarism 43
 - Information that does not have to be acknowledged* 43
 - Information that has to be acknowledged* 43
 - Paraphrasing the source text* 44
- The Benefits of Learning to Write Scientific Papers 46
- Credibility and Reputation 46
- Model Papers 46

CHAPTER 4 *Step-by-Step Instructions for Preparing a Laboratory Report or Scientific Paper* 47

- Timetable 47
 - Format your report correctly* 48
 - Computer savvy* 49
- Getting Started 51
 - Reread the laboratory exercise* 51
 - Audience and tone* 51
- Start with the Materials and Methods Section 52
 - Writing style* 52
 - Details: To include or not to include?* 53
- Do the Results Section Next 55
 - Writing the body of the results section* 56
 - Preparing visuals* 59
 - Organizing your data* 69
 - Think ahead to the discussion* 72
 - Equations* 73
- Make Connections 74
 - Write the discussion* 74
 - Write the introduction* 74
- Effective Advertising 75
 - Write the abstract* 75
 - Write the title* 76
- Documenting Sources 77
 - The Name-Year system* 77

<i>The Citation-Sequence system</i>	82
<i>Unpublished laboratory exercise</i>	82
<i>Personal communication</i>	83
<i>Internet sources</i>	83
<i>Journal articles</i>	84
<i>Databases</i>	85
<i>Homepages</i>	88
<i>E-mails and discussion lists</i>	89

CHAPTER 5 Revision 91

Getting Ready to Revise	91
<i>Take a break</i>	91
<i>Look at the big picture</i>	91
<i>Get feedback</i>	92
Revise Again	94
<i>Conventions in biology</i>	94
<i>Numbers</i>	97
<i>Standard abbreviations</i>	98
<i>Punctuation</i>	98
<i>Clarity</i>	105
<i>Grammar</i>	109
<i>Word usage</i>	112
<i>Spelling</i>	117
<i>Global revision</i>	118
The Biology Lab Report Checklist	120



CHAPTER 6 A "Good" Sample Student Laboratory Report 123

Laboratory Report Mistakes	132
-----------------------------------	-----

CHAPTER 7 Poster Presentations 137

Why Posters?	137
Poster Format	137
<i>Layout</i>	138
<i>Appearance</i>	138
<i>Font (type size and appearance)</i>	138
<i>Nuts and bolts</i>	139
Making a Poster in Microsoft PowerPoint 2007	139
<i>Page setup</i>	140
<i>Adding text, images, and graphs</i>	140
<i>Aligning objects</i>	141
<i>Proofread your work</i>	142
<i>Final printing</i>	142

x Contents

Poster Content	142
<i>Title banner</i>	143
<i>Introduction</i>	143
<i>Materials and methods</i>	143
<i>Results</i>	143
<i>Discussion or conclusions</i>	144
<i>Literature citations</i>	145
<i>Acknowledgments</i>	145
Presenting Your Poster	145
Evaluation Form for Poster Presentations	146
Sample Posters	146

CHAPTER 8 *Oral Presentations* 147

Organization	147
Plan Ahead	148
Write the Text	149
Prepare the Visuals	149
Rehearsal	152
Delivery	153
<i>Presentation style</i>	153
<i>Integrating visuals</i>	153
<i>Interacting with the audience</i>	154
<i>Group presentations</i>	155
<i>Fielding listener questions</i>	155
Feedback	155

APPENDIX 1 *Word Processing in Microsoft Word 2007* 157

Introduction	157
Good Housekeeping	160
<i>Organizing your files in folders</i>	160
<i>Naming your files</i>	161
<i>Saving your documents</i>	162
<i>Backing up your files</i>	162
<i>Working with previous versions of MS Word</i>	163
Increasing your Word Processing Efficiency	164
<i>Text selection</i>	164
<i>AutoCorrect</i>	164
Commands in Word 2007	165
Unfurling the Ribbon	170
<i>The Home tab</i>	170

<i>The Insert tab</i>	175
<i>The Page Layout tab</i>	182
<i>The References Tab</i>	183
<i>The Review tab</i>	186
<i>The View tab</i>	188
Proofreading your Documents	189
<i>Spelling and grammar</i>	189
<i>Format</i>	191
<i>Document inspector</i>	192
<i>Finally, print a hard copy</i>	192

APPENDIX 2 Making Graphs in Microsoft Excel 2007 193

Introduction	193
<i>Handling computer files</i>	195
Commands in Excel 2007	195
Formulas in Excel 2007	199
<i>Writing formulas</i>	200
<i>Copying formulas using the fill handle</i>	202
<i>Copying cell values, but not the formula</i>	202
Unfurling the Ribbon	204
<i>The Home tab</i>	204
Other Ribbon Tabs	205
<i>More tabs below</i>	206
Excel Terminology	207
Goodbye Chart Wizard, Hello Insert Charts	207
Plotting XY Graphs (Scatter Charts)	208
<i>Entering data in worksheet</i>	208
<i>Creating the scatter chart</i>	209
Adding Data after Graph has been Made	216
<i>To incorporate additional data points in the same series</i>	217
<i>To incorporate additional lines on the same graph</i>	217
Multiple Lines on an XY Graph	217
<i>Entering data in worksheet</i>	218
<i>Creating the scatter chart</i>	218
Trendlines	221
<i>Assess the strength of a linear relationship</i>	221
<i>Make predictions</i>	221
<i>Sample trendline—A standard curve for a protein assay</i>	222
Plotting Bar Graphs	225
<i>Column charts</i>	225
<i>Clustered column charts</i>	228
<i>Bar charts</i>	233

- Pie Graphs 235
 - Entering data in worksheet* 235
 - Creating the pie chart* 236
- Error Bars and Variability 237
 - Adding error bars about the means* 239
 - Data analysis with error bars* 242

APPENDIX 3 *Preparing Oral Presentations with Microsoft PowerPoint 2007* 243

- Introduction* 243
- Handling Computer Files* 246
- Commands in PowerPoint 2007* 246
- Views for Organizing and Writing your Presentation 251
- Designs for New Presentations 252
- Slide Layouts 253
 - Title Slide* 253
 - Adding slides* 254
 - Deleting a slide* 255
 - The last slide* 255
- Formatting Text 256
- Sample Presentation 256
- Illustrations 258
 - Tables* 258
 - Graphs* 261
 - SmartArt Graphics* 261
 - Line drawings* 263
- Navigating Among Slides in Normal View 265
- Saving and Printing Presentations 266
- Revising and Polishing Presentations 268
 - Moving slides* 269
 - Adding and deleting slides* 269
 - Copying slides* 269
 - Spell check* 269
 - Special effects* 270
- Delivering Presentations 277
 - Navigating among slides during a slide show* 278

Bibliography 281

Index 285