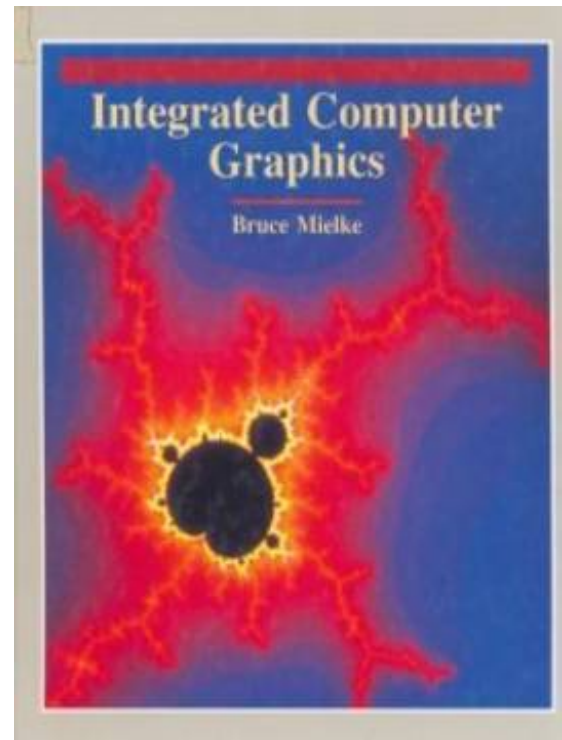




INTEGRATED COMPUTER GRAPHICS BRUCE MIELKE SUMMARY



Bruce Mielke has combined extensive teaching experience with thorough coverage of graphics programming techniques to produce this distinctive text. He leads students through the development of a simple graphics package and a paint/draw-type program, while providing detailed discussions of Bitmap graphics, spline curves and 3-D graphics, among other important topics. The book emphasizes the computer/human interface, while presenting the principles of software development for both PC and workstation environments.

Other elements that make this a valuable book for the growing, diverse audience interested in learning how to use computer graphics as tools of personal expression include:

- Full-color graphic images contributed by artists, scientists, mathematicians, graphic designers and others are found in Chapters 1, 2, 3, and 11.
- All programs are presented in standard Pascal.
- Frequent comparative references to GKS, GKS-3D, PHIGS, Turbo Pascal, and Macintosh Toolbox standard graphics packages..
- Extensive exercise sets and programming projects encourage students to apply the techniques presented.
- Directions at the beginning of the chapters survey computer graphics applications. .

For instructors there is a complete ancillary package available with an instructor's manual, transparency masters for major text figures, slides of full-color award-winning computer graphics art, and a disk with code examples from the book.

TABLE OF CONTENTS

Chapter 1	Introduction to Computer Graphics	1
	Section1.1 The Changing Role of Computer Graphics in Computing	1
	1.2 A Sampling of Computer Graphics Applications	2
Chapter 2	Graphics Hardware and Software	15
	Section2.1 Display Devices	18
	2.2 Hard-Copy Devices	30
	2.3 Interactive Graphics Input Devices	35
	2.4 The Hardware /Software Interface	40
	2.5 Computer Graphics Interface Standards	43
Chapter 3	Developing a Simple Graphics Package	53
	Section3.1 Line.Drawing Algorithms	56
	3.2 Windows and Viewports	67
	3.3 Clipping Lines	75
	3.4 The Simple Graphics Package	84
	3.5 Representation of Graphic Objects and Their Rotation	89
	3.6 Matrix Algebra and Its Application in Two-Dimensional Transformations	103
	3.7 Fractals and Related Curves	113

Chapter 4	Bitmap Graphics	131
	Section4.1 Introduction to Bitmap Graphics	132
	4.2 Implementation of the Procedure Bitblt	137
	4.3 Using Bitblt to Draw Objects	153
	4.4 Using Bitblt to Write Text to the Graphics Screen	157
	4.5 Creating and Using Menus	161
	4.6 Rotations of Bitmaps	168
Chapter 5	Interactive Graphics	176
	Section5.1 A Logical Classification of Input Devices	177
	5.2 Implementing a Locator Device	181
	5.3 Constructing and Using a Sketching Program	185
	5.4 Using Bitblt to Save Pictures on the Screen	188
	5.5 Simple Animation Using Bitblt	191
	5.6 Constructing Icons with the Sketch and Save	5.7
	Procedures	195
	5.7 Creating a Main-Event Loop Program	198
Chapter 6	Integrated Graphics Applications	204
	Section6.1 Drawing Tools	206
	6.2 Segments and Object-Oriented Graphics	214
	6.3 Inserting Objects into Segmented Pictures	218
	6.4 Selecting Objects in a Segmented Picture	222
	6.5 Deleting, Moving, and Rotating Selected Objects	6.6
	in a Segmented Picture	225
	6.7 Object-Oriented Graphics Using Object-Oriented	6.8
	Programming	229
	6.7 Zooming	233
	6.8 Filling Regions	241
	6.9 Summary of the Main-Event Line Graphics Program	258
Chapter 7	Spline Curves	263
	Section7.1 Cubic Splines	264
	7.2 Uniform B-Splines	266
	7.3 Bézier Curves	271
	7.4 Catmull-Rom Curves and Splines under Tension	276
Chapter 8	Matrix Representations and Three-Dimensional Graphics	281
	Section8.1 Three-Dimensional Graphics	282
	8.2 Representing Graphics Objects in Three Dimensions	282
	8.3 Matrix Representations of Translation and	8.4
	Scaling	292
	8.4 Review of Vector Operations	296
	8.5 Rotations	300
	8.6 Reflections and Shears	306
	8.7 Transformation of Coordinate Systems	307
Chapter 9	Projecting Solids onto a Plane	312
	Section9.1 Historical Perspective	313
	9.2 Projections	316
	9.3 Clipping in Three Dimensions	324
	9.4 Implementing a Three-Dimensional Graphics Package	329
Chapter 10	Hidden-Line and Hidden-Surface Removal	335
	Section10.1 Overview of Hidden Line and Surface Removal	336
	10.2 Back-Face Removal	336
	10.3 Depth-Sorting Method	340
	10.4 Depth-Buffer Methods	344
	10.5 Hidden-Line Algorithms	348
Chapter 11	Shading and Color Methods	352

Section 11.1	Reflected Light	353
11.2	Refraction, Transparency, and Scattering	364
11.3	Shading Surfaces	366
11.4	Ray Tracing and Radiosity	372
11.5	Depicting Light Intensities and Halftoning	380
11.6	Color Models	382
11.7	Compositing and Antialiasing	395
11.8	Volume Visualization	399

Appendix		409
----------	--	-----

Glossary		412
----------	--	-----

Index		416
-------	--	-----

[TOP](#)

Computer graphics is branch of computer science that deals with generating images with the aid of computers. Today, computer graphics is a core technology in digital photography, film, video games, cell phone and computer displays, and many specialized applications. A great deal of specialized hardware and software has been developed, with the displays of most devices being driven by computer graphics hardware. It is a vast and recently developed area of computer science. The phrase was coined in 1960