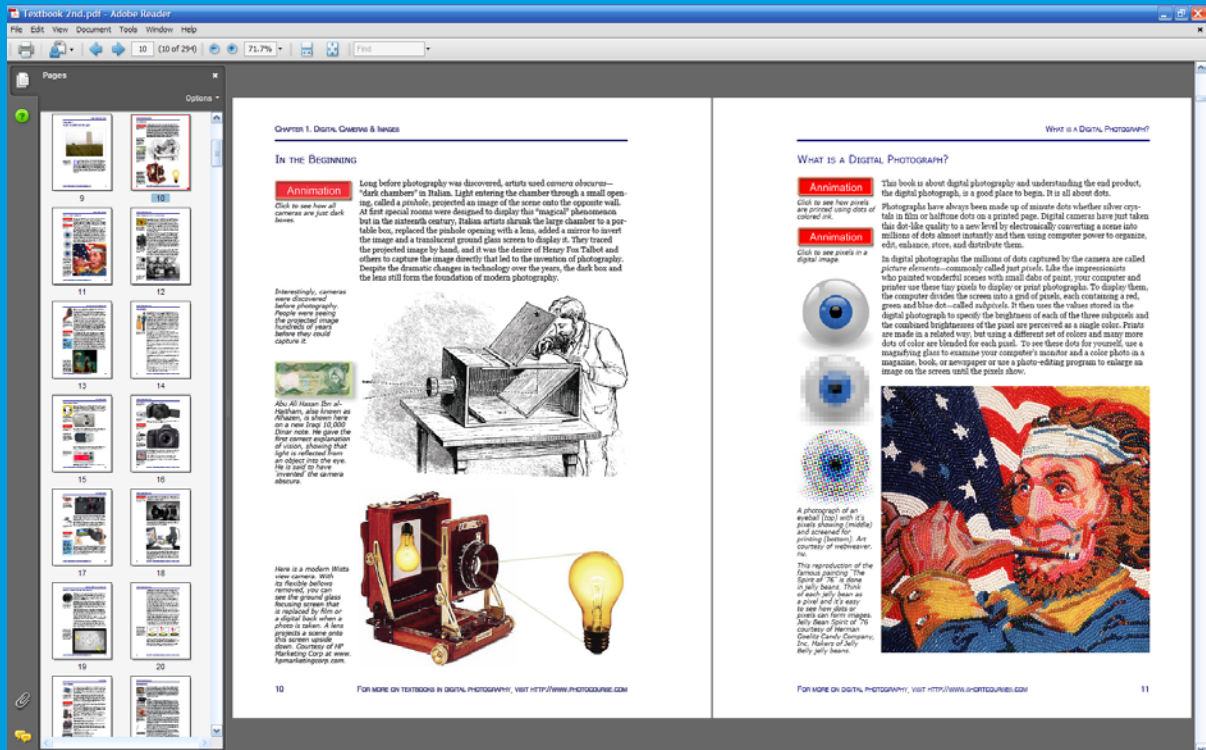


An Extension to The Textbook of Digital Photography

Using eTexts & Animations

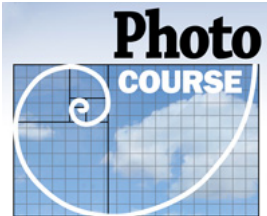


DENNIS P. CURTIN
HTTP://WWW.SHORTCOURSES.COM
HTTP://WWW.PHOTOGRAPHY.COM

SHORTCOURSES AND PHOTOCOURSE PUBLISHING PROGRAMS



Short Courses, the parent site of PhotoCourse.com, is the leading publisher of digital photography books, textbooks, and guides to specific cameras. Be sure to visit the Short Courses bookstore at <http://www.shortcourses.com/bookstore/book.htm>. One of our specialities is high-quality, easy to follow, camera guides so be sure to visit the store to see if there is a guide to your camera. If you find any errors in this book, would like to make suggestions for improvements, or just want to let me know what you think—I welcome your feedback, even though I can't always respond personally.



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Extension

Click to view a PDF document on how copyright law protects photographers and other artists.

WEB SITES

To learn more about digital photography visit our two Web sites:

- <http://www.photocourse.com>
- <http://www.shortcourses.com>

THIS GUIDE

A PDF version of this guide is available at:

<http://www.photocourse.com/itext/pdf/pdf.pdf>



EDUCATORS

PhotoCourse and Short Courses books are used by hundreds of schools, major camera companies, police and military training programs. If you are an instructor, you should know that special pricing is available for classroom use.

For details on using this and other texts in the classroom, please call us at 781-631-8520, Boston Massachusetts USA time.

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USING eTEXTS—A QUICK REFERENCE

eTexts published by PhotoCourse.com are in Adobe’s popular PDF format and work just like any other PDF documents. Here are a few of the things about working with PDF books that you may or may not already know.

USING READER 8 OR LATER

The instructions that follow are for Adobe Reader 8. If you are not sure which version of Adobe Reader you are using, select *Help>About Adobe Reader 8* to display the full version number (the first release was 8.0.0). If it is not Version 8 or later, go to the following Adobe link to download and install a free copy of the latest version.

<http://www.adobe.com/>

Animation

Animation buttons that you can click look like this. Click this one to see if your system plays the linked Flash animation. If not, you have to install the Flash Player at www.adobe.com.

Extension

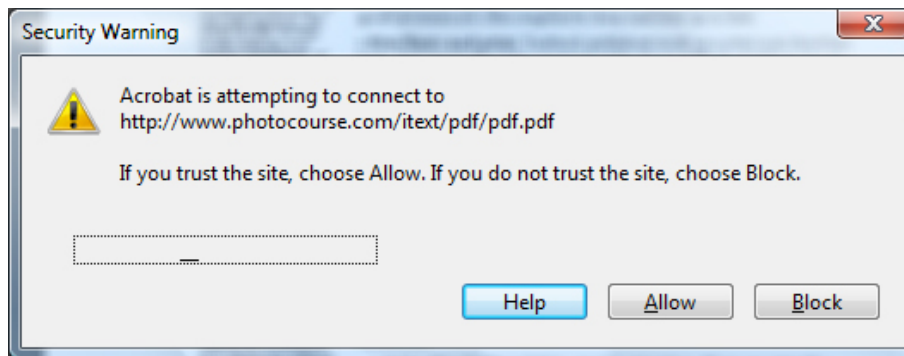
Extension buttons that you can click look like this. Click this one to see if your system opens the linked PDF document. If not, you have to install the Adobe Reader at www.adobe.com.

Excel

Excel buttons that you can click look like this. Click this one to see if it opens the linked Excel work sheet. If not, you will have to install an application that supports Excel work sheets.

PLAYING ANIMATIONS

Animations and other resources are integrated throughout the book and are indicated by buttons like those to the left. When you click one of these buttons, a resource is retrieved from our Web site and displayed on your screen. When you click one of the buttons, a security warning dialog box like the one below may be displayed on PCs. Click the *Allow* button (you can first click the check box to turn it on so you don’t see this warning every time you click a button in this Extension or in the eText).



The types of on-line resources you can access include the following:

- **Animations** and short video clips are in the Flash format and open in their own window. The opening screen has two basic controls—a *Play* button and a copyright symbol. If you wait a few moments the animation appears automatically, or you can click the *Play* button to play it immediately. Most animations are interactive so move the mouse around to point at and click elements to see what effect you have. Clicking the copyright symbol returns you to the opening screen. To return to the book after using an animation, click your browser’s *Back* button. You can also close an animation window by clicking the Close (X) button in its upperright corner.
- **Extensions** are PDF documents that open in your browser or Adobe Reader so you can read, save, or print them.
- **Excel worksheets** are accessed from some extensions so you can explore concepts such as pixels and images, and flash guide numbers. When you click one of these buttons, it opens the Microsoft Excel application (if it is on your system) and Excel in turn opens the worksheet.

• **Miscellaneous resources** vary but may include movies, animated GIFS, Web pages, or interactive VR panoramas you can scroll around.

DISPLAYING HELP

For help when using Adobe Reader, press F1 or select *Help>Adobe Reader 8 Help* to display the help window. Use the *Contents*, *Search*, and *Index* tabs to locate the information you are seeking. The *Print the current page* button prints the currently displayed help.

OPENING THE eTEXT

You can open the eText in Adobe Reader, or in your browser as follows:

• **To open the book in Adobe Reader** on a PC running Windows XP, use My Computer or Windows Explorer to display the contents of the CD. On a Windows Vista system you can do so by clicking the *Start* button, clicking *Computer*, and then double-clicking the CD. On a Mac, insert the CD into the drive and it will appear on the desktop so you can display its contents. Double-click the file named *Read This First.pdf* to open it. You can also open Adobe Reader first and then use its *File>Open* command to locate and open the eText. After you have opened the eText once, the next time you start Adobe Reader the eText may be listed at the bottom of the *File* menu in the section just above the *Exit* command.

• **To open the eText in your browser**, find the letter of the CD drive into which you put the disk. It will be something like D:, E:, or F:. Type this letter, followed by a colon, on the browser's address line (the line where you type Web addresses) and press Enter or click *Go* to display the contents of the disc. Double-click the file named *Read This First.pdf* to open it.

CLOSING THE eTEXT

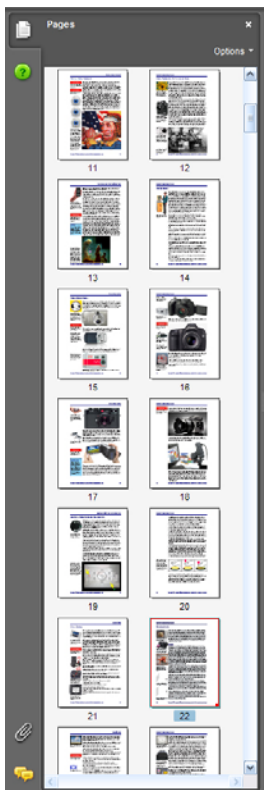
When ending a session, do one of the following:

- **If you are displaying the eText in Adobe Reader**, select *File>Close* to close the eText but leave Adobe Reader open. Select *File>Exit* to close Adobe Reader.
- **If you are displaying the eText in a browser**, use its commands to go to a new Web site, close the tab, or close the browser.

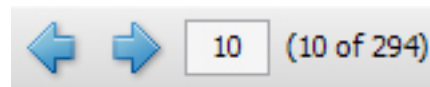
NAVIGATING THE eTEXT

When an eText is displayed on your screen there are a number of ways to navigate through its pages.

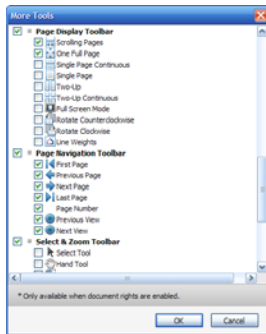
- **The Contents** entries on pages vi–vii of the eText following the preface are linked to pages in the eText. Click any entry to jump directly to that page.
- **Navigation buttons on the toolbar**. Initially the toolbar displays blue previous and next page arrow buttons, a box that indicates which page you are on, and the eText's total number of pages. You can click the arrow buttons or click in the box, type a page number and press Enter to jump to the page.



The Navigation Panel.

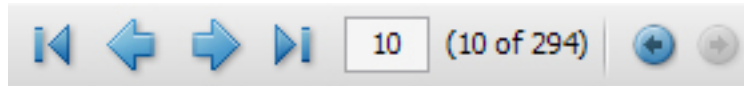


The default navigation buttons on the toolbar.



The Tools>Customize Toolbars menu.

Using the *Tools>Customize Toolbars* command, you can add other navigation buttons to the toolbar. These include the round *Next View* and *Previous View* Path Navigation buttons that move you back and forth along the path you have previously taken through the work using any of the other navigation techniques. For example, if you use thumbnails on the Navigation Panel to jump from page 1 to 10 to 20, clicking the *Previous View* button first jumps you back to page 10, then to page 1. In a classroom situation, you might prepare by clicking through the pages you want to display, in the order you want to display them, and then use these buttons to actually navigate those pages as you present the material. All of these navigation commands are also listed on the *View>Go To* menu.

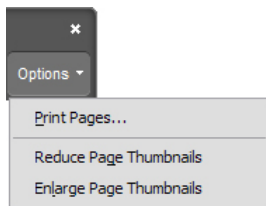


All of the available navigation buttons displayed on the toolbar.



The Pages and Bookmarks icons.

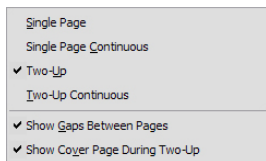
- **A Navigation Panel** along the left side of the page can display bookmarks (basically a table of contents) or thumbnails of every page in the book (basically a visual index). Click any bookmark or thumbnail to jump directly to its page. To display the navigation panel (or close it) press F4 or select *View>Navigation Panels* to cascade the menu, then select *Bookmarks* or *Pages*. To switch between displaying thumbnails and bookmarks, click the *Pages* or *Bookmarks* icons in the upper left corner of the panel. To change the size of thumbnails click the *Options* drop-down arrow at the top of the panel. To close the Navigation Panel click the Close (X) button above the *Options* drop-down arrow.



The Navigation panel's Options menu.

PAGE DISPLAY

You can specify how pages are displayed on the screen and enlarge the viewable area by hiding elements of Adobe Reader. You can access these commands using the menu as described below, or by adding buttons to the toolbar with the *Tools>Customize Toolbars* commands.



The View>Page Display menu.

- **The way pages are displayed** is specified using the *View>Page Display* commands that list choices including *Single Page* (perhaps the best for our eTexts), *Single Page Continuous*, *Two-Up*, and *Two-Up Continuous*. The *Single Page* and *Single Page Continuous* displays can also be set by clicking buttons on the toolbar. You can also add page display buttons to the toolbar by selecting *Tools>Customize Toolbars* and then scrolling down to the section on *Page Display Toolbar*.



The Single Page Continuous and Single Page buttons on the toolbar

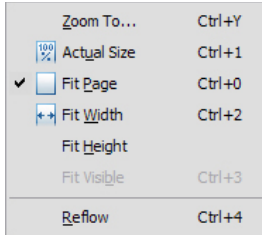
- **Pages can be zoomed** with zoom in (+) and zoom out (-) buttons on the toolbar or click the drop-down arrow to the right of the listed zoom percentage to display a menu of sizes from which you can choose. You can also use the *View>Zoom* command that lists choices, or the *Tools>Select and Zoom* to select zoom tools. You can also add zoom buttons to the toolbar by selecting *Tools>Customize Toolbars* and then scrolling down to the section on *Select & Zoom Toolbar*. One of the more interesting is the *Dynamic Zoom* tool that zooms the document just by dragging the mouse on the screen.



The Zoom buttons and drop-down arrow on the toolbar.

- **Reading Mode**, turned on and off with the *View>Reading Mode* commands, hides everything in the work area except the document and the menu bar.

- **Full Screen mode**, turned on and off with the *View>Full Screen Mode* commands hide everything on the screen except the document. Page through



The *View > Zoom* menu.

the document with the arrow or PgUp and PgDn keys. To exit from Full Screen mode, press **Esc**. You can also toggle in and out of full screen mode by pressing Command+L (Macs) or Ctrl+L (PCs).

- **Automatic scrolling**, turned on and off with the *View > Automatically Scroll* commands, scrolls you down the document.

PRINTING PAGES

eTexts are designed to be read on the screen, but that doesn't mean there are times when you'll want to print pages. You'll never have to carry a heavy textbook again when you want to read in a bus, car or subway. You'll never have to worry about highlighting an expensive textbook. Just print the pages you need when you need them—a concept called print on demand. To print pages, just click the *Print* icon on the Reader's toolbar, click the *Options* drop-down arrow on the Navigation panel, or select *File > Print*. In the Print dialog box that appears, specify the pages to be printed.

You can also print the book on both sides of the page to save paper and make it look more like books you buy in the store. If your printer doesn't have a duplex mode that prints on both sides of the paper, you may have to experiment a little:

1. Open the eText on your screen.
2. Use Adobe Reader's *File > Print* command to print just the odd pages.
3. Put the paper back into the printer upside down and print even pages. On my printer I flip its long axis but not its short. On your printer you may have to experiment.
4. Organize the pages so they are in order, three-hole punch them, and put them in a 3-ring binder.

DISPLAYING THE eTEXT AS A SLIDE SHOW

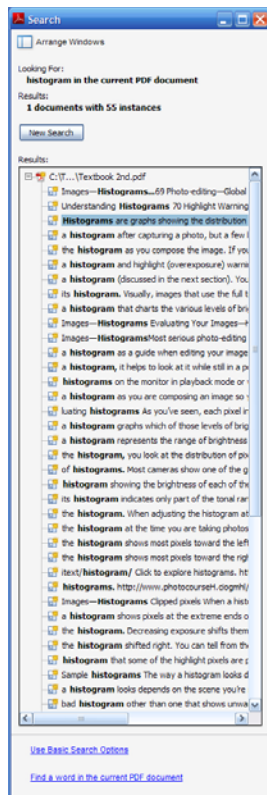
You can turn full screen mode into a slide show by changing settings in the Preferences dialog box. To begin:

- **When the eText is displayed in Adobe Reader**, select *Edit > Preferences*.
- **With the eText displayed in the browser**, right-click a page, then select *Page Display > Preferences*.

With the Preferences dialog box displayed, click the *Full Screen* tab to display your options. For a slide show, turn on the check box for *Advance every 5 seconds*. When on, when you switch into full screen mode, the pages are displayed as a slide show. Other settings in this section of the Preferences dialog box control navigation and page appearance in full screen mode.

LISTENING TO THE BOOK

Although the eText has not been designed as an audio book, Adobe Reader does a surprisingly good job of it (if your computer has speakers and the volume is turned up.) To turn this feature on select *View > Read Out Loud > Activate Read Out Loud* and turn it on. Once activated you can then select *View > Read Out Loud* to display a menu of choices that include *Deactivate Read Out Loud*, *Read This Page Only*, *Read to End of Document*, *Pause* and *Stop*.



The Search window opens as its own window and may be hidden under other open windows.

SEARCHING THE ETEXT

eTexts don't need indexes because they have much more powerful tools—finding and searching.

- The *Edit>Find* command displays a small dialog box on the toolbar where you enter the word or phrase you are looking for and then click the *Find Next* button repeatedly to find each occurrence of the word or phrase. The drop down arrow next to the box lists commands that can narrow or broaden your search.



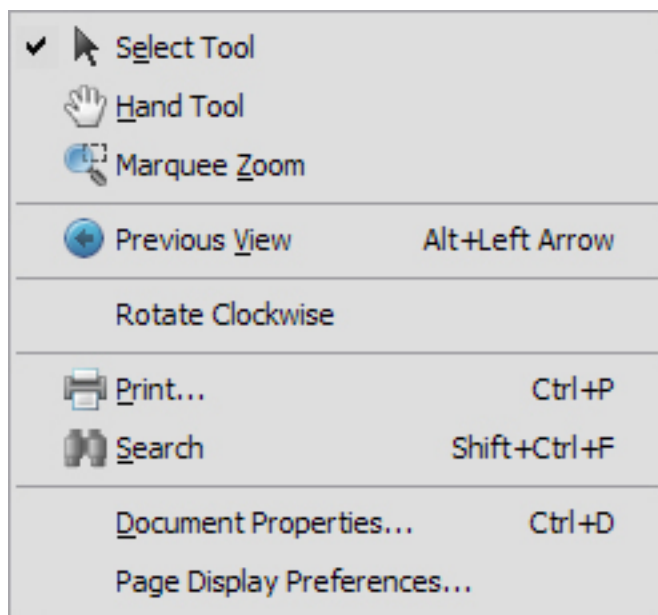
You enter text you want to find in the text box and press Enter to find the first occurrence. At that point the Find Previous and Find Next buttons are displayed.

- The *Edit>Search* command opens a search window where you can enter the word or phrase you want to find and click the window's *Search* button. All occurrences of the word or phrase are listed in the order in which they appear in the document. (The Search window is actually a separate window so it may get hidden under other windows and lost. To use the results of your search you may have to move it back on top of the pile of other open windows.) Click through the listed occurrences. Each is given in context, so you can quickly review a long list to locate the occurrences in which you are most likely to be interested. When finished, click the *New Search* button to search for something else or the window's Close (X) button to close the search window.

For a complete guide to Adobe Reader 8.0, click the link that follows. This will open a 140 page guide that tells you much more about this free program than this short quick reference guide. To save a copy of the guide on your own system, use Adobe Reader's *File>Save a Copy* command.

http://www.adobe.com/products/reader/pdfs/reader_user_guide.pdf

On a PC you can right-click an open PDF and access a number of commands. This is especially useful when a PDF is displayed in a browser and the Adobe Reader menu bar isn't displayed.



USING ANIMATIONS OFF-LINE

The animations and other resources linked to from the eText are stored on the photocourse.com Web site and to play them you need an Internet connection. However, you can play them in a classroom without an internet connection using your Web browser to work off-line.

The basic idea is that before class you go online to play the animations you want to run later so they are cached on the computer's hard drive. When you then go to the classroom, you switch your browser to work offline, and the animations can then be played from the cache.

On the following pages you will find instructions on caching animations for the latest browsers—Internet Explorer 7 and Firefox 2. Although not yet covered step-by-step, the same approach should work on Macs and other browsers. (Don't open the eText in Adobe Reader or this approach won't work as described.)

Firefox is the most popular browser after Internet Explorer. It's easy to install and you can have both it and Internet Explorer on the same system. If it's not on your system you can download and install it from www.mozilla.com.

A WORD ABOUT PDF EXTENSIONS

Firefox and Internet Explorer will cache animations for offline use, but for some reason won't cache PDF files. If you want to display PDF extensions in class you can open them while connected to the Internet and save them to your hard disk. Clicking the button for them in the eText won't open these saved versions, but you can open them directly using Adobe Reader or your browser.

FEEDBACK NEEDED

Caching animations is not the optimal solution to using an interactive eText in a room without internet availability. However, at the moment it is the easiest solution since there is not enough room for the eText and all resource files on the same disk. I would appreciate your feedback on how these suggestions work for you. If you have any better ideas we'd all benefit if you'd share them with me so I can share them with others—just e-mail me at denny@shortcourses.com. I think there is some promise in offline browsers that can download an entire page and all of the files linked to it. However, the few I have tried are complex and links from the eText get broken.

CACHING ANIMATIONS—STEP-BY-STEP

To begin, open this guide or the eText in your browser. You cannot cache animations if you open one of these PDFs in Adobe reader.

1. **Open the document** you want to work from:

- **To open this guide**, enter or copy this link to the address line on your browser and press Enter or click the Go button.
- **To open the eText**, insert the eText CD in the drive, display its contents by typing *file:///D:/* (or just *d:*) substituting your own CD drive letter in place of "D" and press Enter. Two files should be listed. Double-click *textbook2.pdf* to open the eText in the browser.

2. **Cache animations** by paging through the sections of the document you want to present in class and click the button for each *Animation* you plan on displaying. (As you click links on some systems, a new tab opens so you can easily jump between the text and animations in the classroom.)

3. **After playing all of the needed animations**, set browser to work off line:

- **On IE 7**, click the browser's *Tools* drop-down arrow, or pull down the *File* menu and click *Work Offline* to turn it on. (When set to work offline, there is a check mark in front of the command.) When you want to return to working online, use the same commands to remove the check mark.

- **On Firefox**, pull down the *File* menu and click *Work Offline* to turn it on. (When on it has a check mark in front of it.)

4. **Shut down**. At this point you can leave the computer on and play the animations in the classroom. However, if you want to turn the computer off and restart it later you can do so as follows:

- **On IE7** pull down the *File* menu and click *Exit* to display a dialog box that asks *Do you want to close all tabs*. Click the *Show Options* drop-down arrow to display choices and turn on the check box for *Open these the next time I use Internet Explorer*. Click the *Close Tabs* button to close the dialog box and Internet Explorer.

- **On Firefox** pull down the *File* menu and click *Exit*.

5. **In the classroom**, get restarted as follows:

- **On IE7**, if you turned off the computer or closed Internet Explorer, restart it and all of the original tabs should be listed. Pull down the *File* menu or click the *Tools* drop-down arrow and check that *Work Offline* has a check mark in front of it indicating you are working offline. Click any of the tabs to display animations or page through the eText to click animation buttons. Tabs used to display PDFs are named *Navigation Cancelled* and contain no content.

- **On Firefox** reopen the PDF you used to cache animations. Pull down the *File* menu and check that *Work Offline* has a check mark in front of it indicating you are still working offline. Page through the PDF as you did when you cached the animations and play them by clicking the appropriate link. When finished, pull down the *File* menu and click *Work Offline* to remove the check mark and return to working online.

ANIMATION DESCRIPTIONS AND LINKS

The animations and extensions listed in this section illustrate the concepts of digital photography. They are accessible from links embedded in “The Textbook of Digital Photography” published by ShortCourses.com and PhotoCourse.com.

Use the links in this section to play and cache the animations you want to display in a classroom that lacks an Internet connection. The process is described step-by-step in the section on *Using Animations Off-line* on page 9.

The number before each title indicates the page in the eText on which you will find a button.

FRONT MATTER

ii. Copyright Booklet, straight from the US Copyright Office, introduces you to a photographer’s rights and responsibilities in this important area.

<http://www.photocourse.com/itext/copyright/circ01.pdf>

iii. Using eTexts and Animations covers some of the basic commands you use to view and print this eText. You’ll see how you can cache animations for playback in a classroom lacking internet connections and find a list with links to all of the animations and extensions in this eText.

<http://www.photocourse.com/itext/pdf/pdf.pdf>

V. Glossary contains definitions of some of the terms you are likely to encounter in digital photography.

<http://www.photocourse.com/itext/glossary/glossary.pdf>

CHAPTER 1. DIGITAL CAMERA AND IMAGES

10. Cameras are dark boxes animation shows light reflecting off the subject entering the lens that focuses it (upside down) on the ground glass of a camera obscura or view camera, on the film of a film camera, or on the image sensor in a digital camera. Wista camera photos courtesy of HP Marketing Corp (www.hpmarketingcorp.com).

<http://www.photocourse.com/itext/boxcamera/>

11. Dots on an Inkjet Print animation zooms in on a part of an inkjet print to show you increasing levels of detail. Courtesy of Trevor Anderson.

<http://www.photocourse.com/itext/dots/>

13. Manual for DC 40 is a PDF copy of the original manual that came with this historic digital camera. See what features it had and which it didn’t.

<http://www.photocourse.com/itext/dc40/DC40.pdf>

15. Buying a Digital Camera discusses some of the things you should consider and where you can find information when buying a new camera.

<http://www.photocourse.com/itext/buying/buying.pdf>

16. Canon Lenses is a PDF brochure discussing Canon EF lenses, and is included to demonstrate the variety of choices you have when using a digital camera from a major camera company.

<http://www.photocourse.com/itext/canonlenses/canoneflenses.pdf>

17. Camera Straps and Bags is a PDF extension that introduces the straps and bags you need to carry your camera with you in the field and on trips.

<http://www.photocourse.com/itext/cases/cases.pdf>

18. Caring for your Camera is a PDF extension describing how you care for your digital camera.

<http://www.photocourse.com/itext/care/care.pdf>

21. Camera Icons is a printable PDF poster illustrating many of the icons used to identify controls on digital cameras.

<http://www.photocourse.com/itext/icons/iconography.pdf>

23. The Light Path Through an SLR shows how light coming through an SLR's lens bounces off a mirror, up into a prism, and out through the viewfinder eyepiece so you can compose a picture through the lens. When you then press the shutter button you'll see how the mirror rises and the shutter opens to expose the image sensor. Illustration courtesy of Nikon Imaging at www.nikon.com.

<http://www.photocourse.com/itext/SLR/>

23. Parallax in an Optical Viewfinder demonstrates how your view through a camera's optical viewfinder is different than the view the CCD has through the lens unless the camera is an SLR or it has an electronic viewfinder. The differences between the two views are most noticeable when photographing close-ups. You are actually shooting from a slightly different angle than you see and including or excluding areas at the edge of the frame.

<http://www.photocourse.com/itext/parallax/>

26. Continuous displays links to animations on continuous and movie modes.

<http://www.photocourse.com/itext/G-continuous/>

26a. Continuous Mode shows a series of four images captured in continuous mode and used to create an animated GIF showing motion.

<http://www.photocourse.com/itext/continuous/>

26b. Continuous Mode was used by Patryk Rebisz to create this entire 4 minute film "Between You and Me". It's an amazing achievement and illustrates the triumph of imagination and creativity over tools. He found that he could record at five frames per second (as opposed to film's 24) and could only shoot in 12 second segments before the camera's memory buffer was filled. You can see and read more about this film and others Patryk has made on his Web site at <http://patrykrebisz.com>.

<http://www.photocourse.com/itext/patryk/>

29. Understanding Exposure illustrates how the amount of light striking the image sensor determines how light or dark the captured image is. As the sensor gathers more light, the image becomes lighter. There is only one point, or perhaps a narrow range, where it is perfectly exposed.

<http://www.photocourse.com/itext/exposure/>

30. Where "Charge-Coupled" Comes From illustrates how the term "charge-coupled" (the CC in CCD) comes from the way the charges are read out a row at a time as if the rows were coupled to one another.

<http://www.photocourse.com/itext/CCD/>

31. Calculating Image Sizes is a PDF extension with a link to an Excel spreadsheet. You read and explore Part 1 on the relationship between pixel dimensions and image sizes in pixels.

<http://www.photocourse.com/itext/pixels/pixels.pdf>

31. Pixels and Curves illustrates how as the number of pixels increases, details become finer. You see this especially clearly in curved and diagonal lines.

<http://www.photocourse.com/itext/pixelresolution/>

32. Pixelization illustrates that when you enlarge a digital image on the screen far enough, the pixels become increasingly more obvious. Eventually you can see them as small squares, each with its own distinct color. You get the same effect if you make larger and larger prints from the same image.

<http://www.photocourse.com/itext/pixelzoom/>

32. Calculating Print Sizes is a PDF extension with a link to an Excel spreadsheet. You read Part 2 on displaying images and Part 3 on printing images.

<http://www.photocourse.com/itext/pixels/pixels.pdf>

33. Output Devices Determine Image Sizes shows three images 1024 x 768, 800 x 600, and 640 x 480 displayed on a 640 x 480 screen. Only the 640 x 480 image fits on the screen. The others are too large to be shown in their entirety and a viewer would have to scroll around them.

<http://www.photocourse.com/itext/imagesize/>

34. The Big Lie humorously spoofs those camera companies that try to confuse you by giving inflated figures for their camera (and scanner) resolutions. They use software to blow the images up and then tell you how many pixels are in the ballooned image rather than the number of photosites on the image sensor. Your only defense against these practices is to check photo forums on the Web and read all advertising claims carefully.

<http://www.photocourse.com/itext/biglie/>

34. Resolution—The Original Meaning illustrates the original meaning of resolution—referred to the ability of a camera system to resolve the difference between pairs of black and white lines. Higher resolution systems can resolve smaller pairs of lines.

<http://www.photocourse.com/itext/resolution/>

35. Image Sensor Sizes vary widely, with larger ones generally being better because they have less noise. The largest common size is the same as a frame of 35mm film (36mm x 24mm) and is referred to as a *full-frame sensor*. There are larger sensors but they are used mainly in professional and special purpose cameras.

<http://www.photocourse.com/itext/sensor/>

35. Calculating Aspect Ratios is a PDF extension with a link to an Excel spreadsheet. You read and explore Part 1 on the relationship between pixel dimensions and aspect ratios.

<http://www.photocourse.com/itext/pixels/pixels.pdf>

37. ISO and Noise illustrates how as the ISO increases, the image sensor needs less light for exposures, but noise increases. Noise appears as random color pixels that make areas of the image discolored and grainy.

<http://www.photocourse.com/itext/ISO/>

37. Noise, Example from Cadillac Ranch is a large and very noisy JPEG image straight from the camera. It was taken just before sunrise at Cadillac Ranch in Amarillo, Texas.

<http://www.photocourse.com/itext/noise/>

38. RGB Color illustrates how digital images are created and displayed on screens using just the three primary colors, red, green, and blue—called *RGB*. When you drag these three images so they are perfectly aligned, the full color image emerges. Since colors are created by mixing various amounts of each of the three colors, this is often called *additive color*.

<http://www.photocourse.com/itext/RGB/>

41. Dust on Your Image Sensor shows three photos of the sky with the camera moved slightly between shots. The images were then opened in Photoshop and their curves were adjusted to expand the tonal range. Those dark spots you see in the same position on each pictures are caused by dust on the sensor.

<http://www.photocourse.com/itext/dust/>

CHAPTER 2. DIGITAL WORKFLOW

43. Scanning is a PDF extension on scanning photos into a digital format. It includes a section on having your old prints and slides bulk scanned into a digital format at reasonable prices.

<http://www.photocourse.com/itext/scan/scan.pdf>

44. RAW vs JPEG Image Quality. In most cases it's hard to tell the differences between images shot in RAW and JPEG formats. However, the differences become most apparent when an image needs serious adjustment to its tonal range as underexposed images do. Since RAW images have 16 bits per pixel, they give you over 65 thousand levels of gray to adjust while JPEGs use only 8 bits per pixel and hence have only 256 levels of gray per pixel.

<http://www.photocourse.com/itext/RAW/>

45. The Effects of Compression illustrates how each time a JPEG image is opened, edited, saved, and closed it is compressed. The effects of this compression build up over time especially in smooth areas of the image.

<http://www.photocourse.com/itext/compression/>

46. Color Depth is a PDF extension with a link to an Excel spreadsheet. You read and explore Part 4 on the relationship between the number of pixels used to capture colors and the number of colors in an image.

<http://www.photocourse.com/itext/pixels/pixels.pdf>

51. Exploring Folders displays links to movies on working with folders.

<http://www.photocourse.com/itext/G-folders/>

51a. Expanding and Collapsing Folders shows how clicking the + sign in front of a folder opens it to display its contents. Clicking the – sign closes a folder.

<http://www.photocourse.com/itext/folders1/>

51b. Selecting Folders and Files shows how clicking a folder or subfolder selects it and displays its contents in the pane to the right and its path on the Address bar.

<http://www.photocourse.com/itext/folders2/>

51c. Creating a New Folder illustrates that when you want to create a new folder you first select the folder in which it nested.

<http://www.photocourse.com/itext/folders3/>

51d. Changing the View shows how Windows files and folders can be displayed in a variety of ways. Just click the Views drop-down arrow and select the view you want to use.

<http://www.photocourse.com/itext/folders4/>

53. Dragging and Dropping Files and Folders shows how you can copy or move files or folders by select them and then dragging and dropping. As you drag the files and folders appear as an outline or ghost image and the destination folder on which you can drop them is highlighted.

<http://www.photocourse.com/itext/folders5/>

62. You Have Asset Management is a movie from Extensis explaining how their Portfolio program is used to manage a collection of photos. Although it's from a commercial firm, it does a good job of explaining the basics students need to know.

<http://www.photocourse.com/itext/assets/>

66. Adjusting an Image's Tonal Range shows how a photo-editing program lets you adjust the tonal range of an image to make the blacks darker, the whites lighter, and the midtones lighter or darker.

<http://www.photocourse.com/itext/tonalrange/>

66. Resizing Images is a PDF extension with Part 5 devoted to a discussion about changing image sizes in Photoshop.

<http://www.photocourse.com/itext/pixels/pixels.pdf>

67. Adjusting Hue, Saturation and Lightness is a movie showing how this is done by dragging sliders in a photo-editing program.

<http://www.photocourse.com/itext/hue/>

68. Sharpening an Image illustrates how the Unsharp Mask filter increases contrast along edges and lines to give the appearance of increased sharpness. On this butterfly wing the effect is most pronounced along the black lines.

<http://www.photocourse.com/itext/sharpen/>

70. Understanding Histograms illustrates how as the exposure increases the photo gets lighter and the pixels in the histogram shift to the right.

<http://www.photocourse.com/itext/histogram/>

70. Highlight Warnings, found on many cameras displays a highlight warning when you review your images. Areas of the image that are pure white, without any detail, blink or are outlined in color. Skies are often pure white but the only areas on an image that should always be like this are spectral highlights such as reflections.

<http://www.photocourse.com/itext/highlight/>

73. Editing can be used to Improve Images makes the point that many images are improved when you adjust their tonal range, color saturation, and sharpness.

<http://www.photocourse.com/itext/editimprove/>

73. Editing Can be Used to Change Pictures illustrates how a photo-editing program with filters, which you can apply with the click of a button, can dramatically change a straight photo into something else.

<http://www.photocourse.com/itext/editreality/>

78. Adjusting Perspective illustrates how shooting up at buildings makes the vertical lines look like they are converging. Using transform commands you can correct this by changing the perspective.

<http://www.photocourse.com/itext/transform/>

80. Changing Color Spaces compares the sRGB color space used by most digital cameras to record images to the larger Adobe RGB color space that lets you capture, display, or print as many colors.

<http://www.photocourse.com/itext/colorspace/>

80. RGB Color (REPEAT—38) illustrates how digital images are created and displayed on screens using just the three primary colors, red, green, and blue—called *RGB*. When you drag these three images so they are perfectly aligned, the full color image emerges. Since colors are created by mixing various amounts of each of the three colors, this is often called *additive color*.

<http://www.photocourse.com/itext/RGB/>

80. CMYK Colors illustrates how digital prints are created with the three secondary colors, cyan, magenta, and yellow—called *CMY*. When you drag these three images so they are perfectly aligned, the full color image emerges. Since colors are created by absorbing *CMY* so only *RGB* is reflected to our eyes, this is often called *subtractive color*.

<http://www.photocourse.com/itext/CMYK/>

CHAPTER 3. CONTROLLING EXPOSURE

86. Understanding Exposure (REPEAT—29) illustrates how the amount of light striking the image sensor determines how light or dark the captured image is. As the sensor gathers more light, the image becomes lighter. There is only one point, or perhaps a narrow range, where it is perfectly exposed.

<http://www.photocourse.com/itext/exposure/>

90. Changing Exposure Modes uses example images to illustrate when you would select a specific exposure mode. It uses a Canon camera mode dial as the example.

<http://www.photocourse.com/itext/modedial/>

92. Shutter Speed Effect on Exposure illustrates how fast shutter speeds let in less light, and if the aperture doesn't change, as the speed gets slower it lets in more light and the picture gets lighter.

<http://www.photocourse.com/itext/speedseries/>

93. Shutter Speed Effect on Motion illustrates how the speed of the subject determines which shutter speeds freeze or blur the action. When trying to freeze action, the faster the subject is moving the faster the shutter speed must be.

<http://www.photocourse.com/itext/shutterspeed/>

94. Types of Shutters introduces the different kinds of shutters used in digital cameras.

<http://www.photocourse.com/itext/G-shutters/>

94a. How a Leaf Shutter Works shows how a leaf shutter has leaves that move to admit or block the light from the sensor. This shutter, often called an *iris shutter*, mimics the action of the iris in your eye that opens wider in dim light and closes down in bright light.

<http://www.photocourse.com/itext/shutterleaf/>

94b. How a Focal Plane Shutter Works at Fast Shutter Speeds illustrates how at fast shutter speeds the focal plane shutter curtains move across the image sensor as a slit “painting” the image as it goes.

<http://www.photocourse.com/itext/focalplane/>

94c. How a Focal Plane Shutter Works at Slow Shutter Speeds illustrates how at slower shutter speeds there is a point at which the entire image sensor is exposed to light. The first curtain opens completely and only then does the second curtain start to close. The fastest shutter speed at which this happens is called the flash sync speed.

<http://www.photocourse.com/itext/sync/>

94d. How an Electronic Shutter Works illustrates how an electronic shutter turns on the image sensor to begin recording the exposure and turns it off to end it. In between those two points the image builds up as light is captured by the sensor. Because these shutters have no moving parts they are less expensive. However, they can also be very precise and accurate in more expensive versions.

<http://www.photocourse.com/itext/shutterelectronic/>

95. Aperture Settings and Exposure displays links to two animations on apertures.

<http://www.photocourse.com/itext/G-apertures/>

95a. The Standard Series of Apertures illustrates that as the aperture gets larger, the f/number gets smaller. For example, $f/2$ is larger than $f/16$. In the aperture series $f/16$, $f/11$, $f/8$, $f/5.6$, $f/4$, $f/2.8$ and $f/2$ each setting lets in twice as much light as the previous aperture and half as much as the next.

<http://www.photocourse.com/itext/aperture/>

95b. Apertures Effect on Exposure illustrates how smaller apertures let in less light, and if the shutter speed doesn't change, as the aperture gets larger it lets in more light and the picture gets lighter.

<http://www.photocourse.com/itext/exposureseries/>

96. Aperture and Depth of Field illustrates that as the aperture gets larger, the depth of field gets shallower and objects in the foreground and background become softer. Here the camera is focused on the gray building so that's where the plane of critical focus is. As the aperture is opened one stop at a time, the depth of field in front and behind that plane gets shallower and shallower.

<http://www.photocourse.com/itext/DOF/>

98. Aperture-Shutter Speed Equivalents shows that there is often more than one aperture-shutter speed combination available that gives the same exposure. As shown here by the pairs connected by the red line as the aperture gets larger to let in more light, the shutter speed gets faster to keep the exposure constant.

<http://www.photocourse.com/itext/seesaw/>

99. How Your Meter Sees makes the point that the exposure meter in your camera doesn't see the same detail you see. It sees only averages, as if you were looking at the scene through a sheet of frosted glass.

<http://www.photocourse.com/itext/frostedglass/>

109. Exposure Compensation is shown to lighten or darken a picture by increasing (+) or decreasing (-) the exposure.

<http://www.photocourse.com/itext/expcomp/>

110. Exposure Lock shows how you can lock exposure (and focus) on any part of a scene just by pointing the camera at it and pressing the shutter button halfway down. Without releasing the shutter button, you then compose the image the way you want it, and press the shutter button the rest of the way down to take the photo.

<http://www.photocourse.com/itext/explock/>

111. Autoexposure Bracketing (AEB) is shown to automate exposure compensation by taking 3 or 5 photos while the camera automatically varies the exposure for you.

<http://www.photocourse.com/itext/AEB/>

CHAPTER 4. CONTROLLING SHARPNESS

113. Tripods is a PDF extension discussing tripods, heads and quick release systems.

<http://www.photocourse.com/itext/tripods/tripods.pdf>

115. Image Stabilization shows three videos side by side to show the effect of image stabilization can have. The movies were shot with the camera on a tripod, then handheld with image stabilization on and off. When off, the scene seems to bounce around the screen. With image stabilization turned on, the scene still moves but does so more slowly and smoothly.

<http://www.photocourse.com/itext/antishake/>

116. Increasing ISO. (REPEAT—37) illustrates how as the ISO increases, the image sensor needs less light for exposures, but noise increases. Noise appears as random color pixels that make areas of the image discolored and grainy.

<http://www.photocourse.com/itext/iso/>

119. Distance and Sharpness uses a video camera to capture the scene from the window of a car as it passes St Louis. Notice how things in the foreground zip by and are blurred while those in the background move by in a stately fashion and are relatively sharp.

<http://www.photocourse.com/itext/distance/>

119. The Shutter and Sharpness (REPEAT—93) illustrates how the speed of the subject determines which shutter speeds freeze or blur the action. When trying to freeze action, the faster the subject is moving the faster the shutter speed must be.

<http://www.photocourse.com/itext/shutterspeed/>

120. The Plane of Critical Focus shows how a camera is focused plane of critical focus moves up the page a line at a time. As the plane moves, a narrow band of depth of field moves along with it and areas go into and out of focus.

<http://www.photocourse.com/itext/criticalfocus/>

121. Focus Areas illustrates how many cameras divide the screen into focus areas. When you press the shutter button halfway down, the area covering the subject nearest to the camera is used to set focus. Indicators tell you which area is being used and when focus is locked.

<http://www.photocourse.com/itext/focuszone/>

122. Servo AF Focus is shown to keep the subject in focus as it moves toward or away from the camera. Here continuous mode was used to capture a series of images, all of which remain in focus. Had servo focus not been used, only the first image in the series would have been in focus.

<http://www.photocourse.com/itext/servofocus/>

123. Focus Lock illustrates how you can lock focus on any part of a scene even if it isn't covered by one of the camera's focus areas. Just point the camera at the part of the scene where you want the plane of critical focus to fall, and press the shutter button halfway down to lock focus (and exposure). Without releasing the shutter button, compose the image the way you want it and press the shutter button the rest of the way down to take the photo.

<http://www.photocourse.com/itext/focuslock/>

127. The Aperture and Depth of Field (REPEAT—96) illustrates that as the aperture gets larger, the depth of field gets shallower and objects in the foreground and background become softer. Here the camera is focused on the gray building so that's where the plane of critical focus is. As the aperture is opened one stop at a time, the depth of field in front and behind that plane gets shallower and shallower.

<http://www.photocourse.com/itext/DOF/>

130. Selective Focus demonstrates how you can shift the plane of critical focus to any part of the scene. When a large aperture is used to reduce depth of field, only the areas immediately around the plane are sharp while those farther away are soft. Here the plane shifts between the flowers in the foreground and the building in the background.

<http://www.photocourse.com/itext/selectfocus/>

CHAPTER 5. CAPTURING LIGHT AND COLOR

133. The Color of Light is a movie showing how a prism breaks a beam of light into its spectrum of colors. A second prism recombines the spectrum into white light. Movie courtesy of Derek G. Kerslake, artist at aboutcolour.com

<http://www.photocourse.com/itext/color/>

134. Adjusting White Balance uses a white bloodroot flower photographed against a fallen birch tree using a variety of white balance settings. The effects of the settings range from subtle to dramatic.

<http://www.photocourse.com/itext/whitebalance/>

147. Hard and Soft Light illustrates how as a light source gets larger relative to the subject, its light wraps around the subject, reducing contrast and creating a softer light. As the light gets smaller, it becomes harder and the texture on the surface, and the edges of shadows become more distinct. Photos courtesy of Rick Ashley.

<http://www.photocourse.com/itext/lightquality/>

CHAPTER 6. USING LENSES

150. Canon Lenses. (REPEAT—16) is a PDF brochure discussing Canon EF lenses, and is included to demonstrate the variety of choices you have when using a digital camera from a major camera company.

<http://www.photocourse.com/itext/canonlenses/canoneflenses.pdf>

151. Focal Length and Angle of View shows how as the focal length of a lens increases, its angle of view gets smaller. You see this effect most clearly when zooming in with a zoom lens.

<http://www.photocourse.com/itext/focallength/>

152. Focal Length Factors illustrates how on some 35mm SLRs the lens forms an image circle large enough for 35mm film. A camera using a full-frame sensor will capture the same area. However, when the camera uses a smaller sensor, as most do, it captures a smaller area of the image circle, effectively increasing the focal length of the lens.

<http://www.photocourse.com/itext/imagecircle/>

153. Image Stabilization (REPEAT—115) shows three videos side by side to show the effect of image stabilization can have. The movies were shot with the camera on a tripod, then handheld with image stabilization on and off. When off, the scene seems to bounce around the screen. With image stabilization turned on, the scene still moves but does so more slowly and smoothly.

<http://www.photocourse.com/itext/antishake/>

154. Types of Zoom displays links to animations on optical and digital zoom.

<http://www.photocourse.com/itext/G-zoom/>

154a. Optical Zoom is shown changing the image by adjusting the angle of view of the lens. All of the photosites on the image sensor capture unique pixels from the scene.

<http://www.photocourse.com/itext/zoomoptical/>

154b. Digital Zoom is shown taking a section of the image captured by the sensor and uses software to expand it to full-size. The artificial pixels that are added contain no information directly from the scene and introduce noise that looks like grain.

<http://www.photocourse.com/itext/zoomdigital/>

156. 360-Degree VR Panorama captures a gondola tour in Venice August 2005. Interactive 360 degree VR Photo by Hans Nyberg for VRWay.com. You can see more on Han's work at www.panoramas.dk and www.around.com. Credit: Hans Nyberg for VRWay.com.

<http://www.photocourse.com/itext/panorama/>

160. Wide-angle Lens Distortion shows how a short focal length lenses distort a subject when used at close range. When the same subject is photographed from farther away with a longer focal length lens there is no distortion.

<http://www.photocourse.com/itext/distortion/>

161. Macro Magnifications illustrates how the magnification you get with a macro lens is usually specified as a ratio between the size of the image on the image sensor (not in an enlarged print) and the size of the subject. For example, a ratio of 1:1 means the subject and its image are the same size. A ratio of 5:1 means the image is five times larger than the subject.

<http://www.photocourse.com/itext/macromag/>

162. Parallax in an Optical Viewfinder (REPEAT—23) demonstrates how your view through a camera's optical viewfinder is different than the view the CCD has through the lens unless the camera is an SLR or it has an electronic viewfinder. The differences between the two views are most noticeable when photographing close-ups. You are actually shooting from a slightly different angle than you see and including or excluding areas at the edge of the frame.

<http://www.photocourse.com/itext/parallax/>

163. Perspective illustrates how as you move closer to a subject and reduce the focal length of the lens to keep the subject the same size, the background looms larger. This is referred to as perspective.

<http://www.photocourse.com/itext/perspective/>

CHAPTER 7. ON-CAMERA FLASH PHOTOGRAPHY

166. The Inverse Square Law illustrates how as the distance from the flash doubles, the amount of light on a given area falls to one-quarter because the same amount of light has to cover an area four times as large. This is known as the inverse square law.

<http://www.photocourse.com/itext/inverse/>

166. Calculating Guide Numbers is a PDF extension with a link to an Excel spreadsheet used to explore guide numbers.

<http://www.photocourse.com/itext/guidennumbers/guidennumbers.pdf>

167. Flash sync shows how a camera's flash sync speed is the fastest shutter speed at which the entire image sensor is exposed to the light. At faster shutter speeds part of the sensor is blocked by the shutter because it is starting to close.

<http://www.photocourse.com/itext/flashsync/>

169. Red-eye is shown to be caused by light from the flash bouncing off the eye's retina and back out to the camera. The retina's blood vessels give a red cast to the reflected light.

<http://www.photocourse.com/itext/redeye/>

170. Fill Flash illustrates how when a scene is back lit, fill flash can lighten the side of the subject facing the camera.

<http://www.photocourse.com/itext/fillflash/>

172. Flash Sync Timing explores the differences between first and second curtain sync.

<http://www.photocourse.com/itext/G-sync/>

172a. First Curtain Sync shows how this mode fires the flash as soon as the first curtain completely exposes the image sensor.

<http://www.photocourse.com/itext/flashsync1/>

172b. Second Curtain Sync shows how this mode fires the flash just before the second curtain starts to close to cover the image sensor.

<http://www.photocourse.com/itext/flashsync2/>

173. Flash Exposure Compensation illustrates how flash exposure compensation works just like exposure compensation except it controls the exposure of the part of the scene illuminated by the flash.

<http://www.photocourse.com/itext/flashcomp/>

174. High Speed Sync shows how at fast shutter speeds a focal plane shutter is never fully open and forms a slit moving across the image frame. To use flash at these speeds your flash must have what is known as focal plane sync or high speed sync so the flash fires repeatedly as the slit moves, exposing one strip of the image at a time.

<http://www.photocourse.com/itext/fpflash/>

174. High Speed Stroboscopic Photography uses Bryan Mumford's Time Machine with an optical sensor to repeatedly trigger a digital camera so it caught photos of a series of milk drops. One hundred images were captured and combined into this QuickTime movie. The Time Machine is available at <http://www.bmumford.com/photo/camctrl.html>.

<http://www.photocourse.com/itext/strobe/>

176. External Flash shows how one big advantage of an external flash is the ability it gives you to rotate and tilt the flash head so you can bounce flash off walls and ceilings. This makes the light softer and reduces shadows in the image. Photos courtesy of Tim Connor.

<http://www.photocourse.com/itext/tilthead/>

CHAPTER 8. STUDIO PHOTOGRAPHY

183. Hard and Soft Light. (REPEAT-147) illustrates how as a light source gets larger relative to the subject, its light wraps around the subject, reducing contrast and creating a softer light. As the light gets smaller, it becomes harder and the texture on the surface, and the edges of shadows become more distinct. Photos courtesy of Rick Ashley.

<http://www.photocourse.com/itext/lightquality/>

198. The Main Light shows how the main light can be positioned to the left, above, or right of the subject. Photos courtesy of Rick Ashley

<http://www.photocourse.com/itext/main/>

199. The Fill Light shows how as the fill light moves closer to the subject, the shadows cast by the main light get lighter. As the fill light moves farther away, the shadows become darker. Photos courtesy of Rick Ashley

<http://www.photocourse.com/itext/fill/>

200. The Background Light shows how the background light can be varied for different effects. Photos courtesy of Rick Ashley

<http://www.photocourse.com/itext/background/>

201. The Rim Light shows how a rim light behind the subject and facing toward the camera, illuminates the subject's edges so they help visually separate the subject from the background. Photos courtesy of Rick Ashley

<http://www.photocourse.com/itext/rim/>

CHAPTER 9. DISPLAYING & SHARING PHOTOS ON-SCREEN

212. Animated GIF slide show plays on an HTML page.

<http://www.photocourse.com/itext/gif/naturelog.htm>

215. Flash Slide Show is a slide show generated using Photoshop Elements 5.0 and saved as a Flash animation.

<http://www.photocourse.com/itext/flashslideshow/>

215. PDF Slideshow displays a PDF file with instructions you follow to display it as a slide show. You can also refer to the first section of this Extension where displaying an eText as a slide show is discussed.

<http://www.photocourse.com/itext/pdfslideshow/pdfslideshow.pdf>

226. A PDF Coffee Table eBook is a sample from a picture book showing one way to circulate your images as PDFs. The photos look much better when the resolution of the images is increased, which is easy to do when the PDF is created.

<http://www.photocourse.com/itext/ebooks/mewoods.pdf>

226. A PDF eBook on Monarch butterflies is a sample from a picture book showing how you can use your images in a context.

<http://www.photocourse.com/itext/ebooks/monarchs.pdf>

233. Visit a Photo Blog takes you to a photoblog I created to demonstrate the basic idea.

<http://www.shortcourses.com/naturelog/>

240. Mapping Photos demonstrates what happens when you gather images together into a KMZ file and open them in Google Earth.

<http://www.photocourse.com/itext/gps/gps.htm>

CHAPTER 10. DISPLAYING & SHARING PRINTED PHOTOS

242. CMYK Colors (REPEAT—80) illustrates how digital prints are created with the three secondary colors, cyan, magenta, and yellow—called CMY. When you drag these three images so they are perfectly aligned, the full color image emerges. Since colors are created by absorbing CMY so only RGB is reflected to our eyes, this is often called *subtractive color*.

<http://www.photocourse.com/itext/CMYK/>

CHAPTER 10. BEYOND THE STILL IMAGE

276. 360-Degree VR Panorama (REPEAT—156) captures a gondola tour in Venice August 2005. Interactive 360 degree VR Photo by Hans Nyberg for VRWay.com. You can see more on Han's work at www.panoramas.dk and www.around.com. Credit: Hans Nyberg for VRWay.com.

<http://www.photocourse.com/itext/panorama/>

282. Object Photography uses an animated GIF to demonstrate how an object can be made to rotate.

<http://www.photocourse.com/itext/object/object.html>

283. Continuous Mode (REPEAT—26) displays links to animations on continuous and movie modes.

<http://www.photocourse.com/itext/G-continuous/>

26a. Continuous Mode shows a series of four images captured in continuous mode and used to create an animated GIF showing motion.

<http://www.photocourse.com/itext/continuous/>

26b. Continuous Mode was used by Patryk Rebisz to create this entire 4 minute film “Between You and Me”. It’s an amazing achievement and illustrates the triumph of imagination and creativity over tools. He found that he could record at five frames per second (as opposed to film’s 24) and could only shoot in 12 second segments before the camera’s memory buffer was filled. You can see and read more about this film and others Patryk has made on his Web site at <http://patrykrebisz.com>.

<http://www.photocourse.com/itext/patryk/>

283. Time-lapse Photography captures one of the many natural events that lend themselves to time-lapse photography with a digital still camera. Familiar subjects include clouds, flowers opening, and seeds sprouting. Here clouds boiling over the Santa Barbara Mountains are caught by Bryan Mumford’s Time Machine available at www.bmumford.com.

<http://www.photocourse.com/itext/timelapse/>

284. Movie Mode shows a sound movie captured with a point and shoot digital camera’s movie mode.

<http://www.photocourse.com/itext/video/>