



DIGITAL MEDIA

WORKBOOK

Instructor's Guide



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Pedagogical Approach

This workbook provides interactive questions and supplemental material to support an undergraduate course in the fundamentals of Digital Media. A few notes regarding the course:

The Digital Media Workbook provides media rich review questions for each topic. It's recommended that students use the Interactive Workbook to review concepts from lectures or readings and assess their mastery.

Accessing The Digital Media Workbook

To access *The Digital Media Workbook*, students will need a Canvas account (free). The homepage for the workbook is located at:

<https://www.digital-research.org/digital-media-workbook.html>

Canvas is a learning management system used to organize the content within the workbook. After creating an Canvas account, students will be able to enroll in the course. The modules are sequential and presented in the order outlined below.

Course Structure

Below are suggested topics for an introduction to the fundamentals of digital media

1. Ethics
2. Foundations
3. Images
4. Animation
5. Sound
6. Video
7. Web Site Basics

Recommended Minimum Hardware Requirements

Windows or Mac computer, min 4GB RAM. Recent version of MacOS or Windows. Avoid Chromebooks.

Alternatively, many compatible software is available in cloud-based format reducing the computational burden.

Compatible Software

- iMovie
- GIMP

- Audacity
- Inkscape
- Adobe Flash Professional
- Adobe Photoshop
- Adobe Illustrator
- Adobe Audition
- Adobe Premier
- Other Adobe Creative Suite Software
- Quicktime
- Animaker
- Marionette Studio
- Blender

Digital Media Foundation Concepts

- What are some properties of digital media that make it different from traditional/analog media?
- Define Digital Media

Legal/Ethical Concepts

- Define copyright
- What are the four criteria for fair use?
- What is Creative Commons licensing?
- What some options for licensing under Creative Commons?
- Privacy vs. Public Doman
- Ownership of content

Number Systems and Representation

- What are number systems?
- Why do computers use numbers?
- Which is the numbering system used by computers? Why?
- How do you count in different number systems?
- How many values can you represent in a given number system with a given number of digits? (example how many colors can you represent with 3 binary digits or how many quantization levels are present in 16-bit sound?)
- How do you convert between number systems?
- How are colors represented numerically?
- How are characters represented numerically?

Sampling and Quantization Concepts

- How would you describe the process by which the real world become digital?
- Define Sampling.
- What is the effect of too few samples in video, audio, or images?
- Define Quantization Levels (also known as bit depth).
- What is the effect of too few quantization levels in video, audio and images?

Digital Images – Concepts

- How are bitmapped images stored in the computer?
- How are vector graphics stored in the computer?
- What are the advantages to working with bitmapped graphics?
- What are the disadvantages to working with bitmapped graphics?
- What are the advantages to working with vector graphics?
- What are some disadvantages to working with vector graphics?
- Gimp/Photoshop is application software better-suited for working with which type of images.
- Inkscape/illustrator is application software better-suited for working with which type of images.
- Describe lossless compression and when it would be used.
- Describe lossy compression and when it might be used.
- What factors affect bitmapped graphic file size?
- How can applying compression affect the quality of an image
- What are color modes?
- What does each component of the RGB color mode describe?
- What factors affect vector graphic file size?
- Calculate a raw/uncompressed bitmap image file size based on pixel dimensions and color depth

Digital Images - Skills

- Set up your workspace
- Tools and various Settings
- Magnification Tool

- Move Tool
- Paint bucket Tool
- Eye dropper Tool
- Bucket fill
- Text Tool
- Bezier Tool
- Color Picker
- Crop tool
- Various File Formats
- Pencil and paintbrush tools
- Shear perspective and rotate
- Selection Techniques
- Selection tools and techniques (free select (lasso), magic wand, invert selection, scissor select, select none)
- Selection Menu
- Filters
- Layers
- Paths
- Masks
- Adjusting Colors
- Sharpen
- Fill and Stroke
- How to apply compression to reduce an image size

Animation Concepts

- What are some of the basic animation techniques?
- How have computers impacted the field of animation
- Key Terms
 - Frame-by-Frame
 - Tweening
 - Scripting
 - Key frames
 - Interpolation
 - Motion Paths
 - Sequence
 - Timing
 - Frame Rate
 - Frame Size

Animation Skills

- Frame-by-Frame Animation
- Motion Tweening
- Shape Tweening
- Changing Frame Rate
- Changing Frame Size
- Working with Layers
- Importing graphics
- Saving and Exporting Animations

Digital Audio Concepts

- How is sound created (the physics of sound)?
- What is the difference between sound intensity and loudness?
- How is sound digitized?
- What do the horizontal and vertical axis of the waveform display tell us?
- What is compression?
- What are the two basic microphone types?
- What are some ways to prevent clipping?
- How do you determine an optimal recording level?
- How does changing the sampling frequency affect audio?
- How does bit depth affect audio?
- What factors affect audio file size?
- Key Terms
 - Frequency
 - Tone
 - Pitch
 - Hertz
 - Decibels
 - Sampling
 - Nyquist Theorem
 - Bit depth
 - Clipping
 - Sound Card
 - Microphone Types
 - MIDI format
 - Tracks

Digital Audio Skills

- Be familiar with the basic layout of audio editing software
- Import Audio files
- Record live audio
- Select a portion of an audio track
- Cut a portion of a track
- Paste a portion of a track
- Create and name multiple tracks
- Adjust magnification (Zoom in/out) a Waveform
- Examine the sampling rate and bit depth
- Change the sampling rate
- Change the bit depth
- Apply a filter to that portion of a track
- Mix down
- Save/Export audio in different file formats
- Calculate an uncompressed audio file size based on sampling rate, bit depth, number of channels.

Digital Video Concepts

- How is motion captured?
- How is motion digitized
- What is a frame?
- What is the frame size?
- What is a frame rate and what is the unit of measurement?
- What are some components of broadcast standards?
- What is the difference between interlaced and progressive scan capture and display?
- What are the components of color format for video?
- What are spatial compression and temporal compression?
- How does high definition video differ from standard definition video?
- What is frame aspect ratio?
- What is timecode?
- What factors affect the file size of a video?

Video Skills

- Capturing live video
- Importing existing video
- Working with different file formats
- Video image adjustments
- Adjusting and removing audio
- Importing audio

- Importing graphics and images
- Adding Transitions
- Adding Text/Credits
- Exporting video
- Video file format and frame rate adjustments
- Working with different video formats
- Calculate an uncompressed video file size based on frame size, color depth, frame rate, duration, audio sampling rate, audio bit depth, number of audio channels)

Web Site Basic Concepts

- What is HTML?
- How are web pages stored and retrieved?
- What are tags?
- What are HTML editors? What are some advantages to using HTML editors?
- What is a hyperlink

Web Page Creation/Publishing Skills

- Build a web page using basic HTML tags
- Adding media files to a web page
- Adding a hyperlink to a web page
- Publish web site files locally
- Publish web files remotely (on a server)
- Using a web site editor to create a web page

Free Digital Media Resources

Images

Pexels.com (attribution encouraged, but not required)

Pixabay.com (attribution not required)

flickr.com/creativecommons (licensing according to category)

Archive.org (public domain)

Infographics

Canva.com (free account option)

Visme.co (free account option)

Creating Animations and Explainer Videos

Powtoon.com (explainer video, motion graphics - free account option)

Animaker.com (explainer videos, lip-syncing -free account option)

Vyond.com (14-day trial)

Voki (free account)

Video

Archive.org (public domain)

Pexels.com/videos (attribution encouraged, but not required)

Pixabay.com (attribution not required)

Audio

Archive.org (public domain)

Freemusicarchive.org

www.looperman.com/loops

Adding Dynamic Charts to Web Pages Using Google Sheets and Google Charts

<https://developers.google.com/chart/interactive/docs/spreadsheets>