



## California Open Online Library for Education & Accessibility

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COOL4Ed (the California Open Online Library for Education) was created so that faculty can easily find, adopt, utilize, review and/or modify free and open etextbooks for little or no cost. The COOL4Ed accessibility open textbook evaluations can inform faculty, staff, and students how the free and open etextbooks meet 15 accessibility “checkpoints” that could impact the learning of learners with a range of disabilities.

### SUMMARY OF ACCESSIBILITY EVALUATION:

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**Textbook:**                    **Radically Modern Approach to Introductory Physics**  
**Format of Textbook:**    **PDF**

<b>Assistive Technology (AT) Evaluation Score: Overall</b>	<b>5.0 (Maximum score = 10)</b>
<p><b>Assistive Technologies (AT) Evaluations</b> applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, see list below, are typically not used or available by the general public into the accessibility evaluation process.</p> <ul style="list-style-type: none"> <li>• Accessibility features of desktop operating systems (e.g. high-contrast display themes, settings from the Keyboard and Mouse control panels)</li> <li>• Accessibility-related software included with desktop operating systems (e.g. VoiceOver, Microsoft Narrator)</li> <li>• Third-party accessibility software and hardware:</li> <li>• Screen readers (e.g. JAWS, Window Eyes)</li> <li>• Magnification software (e.g. ZoomText Magnifier/Reader, MAGIC Pro with Speech)</li> <li>• Reading software for users with learning disabilities (e.g. Read and Write Gold, Kurzweil 3000)</li> <li>• Refreshable Braille displays</li> </ul>	
<b>Non- Assistive Technology (NAT) Evaluation Score: Overall</b>	<b>6.8 (Maximum score =10)</b>
<p><b>Non-Assistive Technologies (NAT) Evaluations</b> applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.</p>	



## **COOL4Ed Accessibility Evaluation Methods:**

The California State University [Accessible Technology Initiative](#) and [MERLOT](#) (Multimedia Educational Resources for Learning and Online Teaching) developed the rubric or “checkpoints” for the accessibility evaluation. [CAST](#), a nationally recognized organization with expertise in accessibility and UDL, reviewed and affirmed the appropriateness and value of the accessibility evaluation rubric and contributed the references and support resources to help people learn how best to design, evaluate, and remediate the learning materials to maximize the accessibility of the learning resources for all. The “checkpoints” have been built upon the Section 508 technical standards and has been organized and tailored to the typical characteristics of digital resources used in higher education courses.

The accessibility evaluations were performed by the [Center for Usability in Design and Accessibility](#) at California State University, Long Beach; faculty and graduate students with expertise in human factors, usability, and accessibility performed the evaluations of over 150 free and open etextbooks. COOL4ed.org has published the accessibility evaluation rubric and provides a detailed description of the methodology used to evaluate the accessibility of the etextbooks in COOL4ed.

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## **LOOKING FOR DETAILED ACCESSIBILITY REPORTS?**

[See Detailed Accessibility Evaluation Report using Assistive Technologies](#)

[See Detailed Accessibility Evaluation Report using Non-Assistive Technologies](#)



## DETAILED ACCESSIBILITY EVALUATION REPORT using Assistive Technologies

**Assistive Technologies (AT) Evaluations** applies specialized tools and software in the accessibility evaluation process. These specialized assistive technologies, such as Kurzweil and NVDA, are typically not used or available by the general public into the accessibility evaluation process.

### 1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	<b>Fail</b>
Additional Information:	<b>URL not found.</b>
B. The organization providing the online materials has an accessibility statement.	<b>Fail</b>
Additional Information:	<b>URL not found.</b>
C. An Accessibility Evaluation Report is available from an external organization.	<b>Fail</b>
Additional Information:	<b>URL not found.</b>

### 2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	<b>Pass</b>
Additional Information:	<b>10/10 pages passed. Pages 1-10 checked.</b>

### 3. Text Adjustment

A. Text is compatible with assistive technology.	<b>Pass</b>
Additional Information:	<b>5/5 pages passed. Pages 1-3, 21, and 27 checked.</b>
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	<b>Pass</b>



Additional Information:	<b>46/46 pages passed. Pages 15-60 checked. Text and background generally adjusted accordingly. Images did not adjust in color (ex: pages 17, 55, 59, and 65) black and white graphs were reduced to their unit markers, which were isolated in text boxes.--the graphs themselves did not change color, blending into the black background (ex: pages 18, 20, 21, and 54, 59). Graphs/images were in 15 out of the 46 pages checked. Rating is based on text adjustment only.</b>
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#### **4. Reading Layout**

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>Fail</b>
Additional Information:	<b>0/25 pages passed. Pages 1-25 checked. All spaces in the text are removed, producing long strings of letters/words. Some words/equations even become displaced (ex: formulas on pages 16, 19, and labels on the graph on page 22).</b>
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	<b>N/A</b>
Additional Information:	<b>No printed material available.</b>

#### **5. Reading Order**

A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.	<b>Pass</b>
Additional Information:	<b>5/6 pages passed. Pages 1, 3, 9, 15, 73, and 74 checked.</b>



## 6. Structural Markup/Navigation

<p>A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).</p>	<p><b>Fail</b></p>
<p>Additional Information:</p>	<p><b>0/15 pages passed. Pages 70-84 checked.</b></p>
<p>B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).</p>	<p><b>Fail</b></p>
<p>Additional Information:</p>	<p><b>0/11 lists passed. Pages 112-114, 127-129, and 144-146 checked.</b></p>
<p>C. If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.</p>	<p><b>N/A</b></p>
<p>Additional Information:</p>	<p><b>eReader application not used.</b></p>

## 7. Tables

<p>A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).</p>	<p><b>Fail</b></p>
<p>Additional Information:</p>	<p><b>1/6 tables passed. All pages checked (tables on pages 38, 132, and 225-226).</b></p>



## 8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	N/A
Additional Information:	<b>No within-book hyperlinks found. All pages checked.</b>
B. Live hyperlinks take you to any website or webpages external to the book.	N/A
Additional Information:	<b>No live hyperlinks found.</b>
C. Live links take you to the correct webpage that is functioning properly.	N/A
Additional Information:	<b>No live hyperlinks found.</b>
D. Live links are descriptive enough for the users to know where it should take them.	N/A
Additional Information:	<b>No live hyperlinks found.</b>

## 9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	Pass
Additional Information:	<b>47/47 pages passed. Pages 13-59 checked. Though most all figures utilize colors other than black and/or white, each component within the figure is either well-labeled or described and specified in the figure caption, making the coloration a redundancy.</b>
B. Information is conveyed from the sub-categories for contrast.	Pass
Additional Information:	<b>Averaged score.</b>
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	Pass



Additional Information:	<b>16/16 pages passed. Pages 131-146 checked. Headers are black on white (21.0:1).</b>
D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	<b>Pass</b>
Additional Information:	<b>16/16 pages passed. Pages 131-146 checked. Text is black on white (21.0:1).</b>
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	<b>Fail</b>
Additional Information:	<b>0/7 images passed. Pages 103-114 checked. Images used pink on white (3.14:1, ex: page 104), red on white (4.0:1, ex: page 111), yellow against red (3.74:1, ex: page 113), and light red against red (2.56:1, ex: page 114).</b>

### 10. Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	<b>Fail</b>
Additional Information:	<b>Failed Primary language Accessibility Checker checkpoint.</b>
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	<b>N/A</b>
Additional Information:	<b>No foreign language passages found.</b>

### 11. Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>N/A</b>
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Additional Information:	<b>No non-decorative images found.</b>
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	<b>N/A</b>
Additional Information:	<b>No decorative images found.</b>
C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	<b>N/A</b>
Additional Information:	<b>No complex images found.</b>

### **12.Multimedia**

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	<b>N/A</b>
Additional Information:	<b>No multimedia found.</b>
B. A transcript is provided with all audio content.	<b>N/A</b>
Additional Information:	<b>No multimedia found.</b>
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	<b>N/A</b>
Additional Information:	<b>No multimedia found.</b>

### **13.Flickering**

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	<b>Pass</b>
Additional Information:	<b>115/115 pages passed. Pages 1-115 checked. No flickering found.</b>





### 14. Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	<b>Pass</b>
Additional Information:	<b>8/10 figures passed. Pages 70-130 checked.</b>
B. STEM graphs have appropriate markup that indicates that the image is a graph.	<b>N/A</b>
Additional Information:	<b>See Markup (figures) above.</b>
C. STEM equations have appropriate markup that indicates that the image is an equation.	<b>Fail</b>
Additional Information:	<b>0/10 equations passed. Pages 70-120 checked.</b>
D. STEM tables have appropriate markup that indicates the image is a table.	<b>N/A</b>
Additional Information:	<b>See checkpoint 7 - Table Markup.</b>
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	<b>Fail</b>
Additional Information:	<b>0/10 figures passed. Pages 70-130 checked.</b>
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	<b>N/A</b>
Additional Information:	<b>See Markup (figures) above.</b>
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	<b>Fail</b>
Additional Information:	<b>0/10 equations passed. Pages 70-120 checked.</b>
H. Assistive technology used can access the content from the STEM tables.	<b>Fail</b>
Additional Information:	<b>1/6 tables passed. All pages checked (tables on pages 38, 132, and 225-226).</b>



### 15. Interactive Elements

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	N/A
Additional Information:	No interactive elements found.
B. Each interactive element conveys information to assistive technology regarding the element’s name, type, and status (e.g. “Play, button, selected”).	N/A
Additional Information:	No interactive elements found.
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	N/A
Additional Information:	No interactive elements found.

## DETAILED ACCESSIBILITY EVALUATION REPORT using Non-Assistive Technologies

**Non-Assistive Technologies (NAT) Evaluations** applies only native or basic tools and software such as the keyboard and Narrator in the accessibility evaluation process. These non-assistive technologies are readily available and used by the general public.

### 1. Accessibility Documentation

A. The organization providing the online materials has a formal accessibility policy.	Fail
Additional Information:	No Content Found.
B. The organization providing the online materials has an accessibility statement.	Fail



Additional Information:	<b>No Content Found.</b>
C. An Accessibility Evaluation Report is available from an external organization.	<b>Fail</b>
Additional Information:	<b>No Content Found.</b>

## 2. Text Access

A. The text of the digital resource is available to assistive technology that allows the user to enable text-to-speech (TTS) functionality.	<b>Pass</b>
Additional Information:	<b>Pgs 30-35 were checked. The text is available to assistive technology that allows user to enable text-to-speech functionality.</b>

## 3. Text Adjustment

A. Text is compatible with assistive technology.	<b>Fail</b>
Additional Information:	<b>Pgs 10-15 were checked. When the window page chaged in size, but a horizontal bar appeared. The font size of all pages checked could be adjusted.</b>
B. The resource allows the user to adjust the font size and font/background color (or is rendered by an application such as a browser, media player, or reader) that offers this functionality).	<b>Pass</b>
Additional Information:	<b>Pgs 10-15 were checked. When changing the font/background color to green text on black, the background color changed to black, and the font color did change to green.</b>

## 4. Reading Layout

A. Text of the digital resource is compatible with assistive technology that allows the user to reflow the text by specifying the margins and line spacing (or is rendered by an application	<b>Fail</b>
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such as a browser, media player, or reader that offers this functionality).	
Additional Information:	<b>Pgs 10-15 were checked. I was able to reflow the text, however, when reflowing the text, the text to speech function said "warning empty page." This was consistent on all pages checked.</b>
B. If the digital resource is an electronic alternative to printed materials, the page numbers correspond to the printed material.	<b>N/A</b>
Additional Information:	<b>Need additional information. We do not have printed material to compare it too.</b>

### 5. Reading Order

A. The reading order for digital resource content logically corresponds to the visual layout of the page when rendered by assistive technology.	<b>Pass</b>
Additional Information:	<b>Pgs 30-35 were checked. The reading order was logical on all five pages.</b>

### 6. Structural Markup/Navigation

A. The text of the digital resource includes markup (e.g. tags or styles) that allows for navigation by key structural elements (chapters, headings, pages) using assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>Fail</b>
Additional Information:	<b>The tagged PDF, Title, Bookmarks, and Headings all failed using the accessibility checker.</b>
B. The text of the digital resource includes markup for bullets and numbered lists that is compatible with assistive technology (or is rendered by an application such as a browser,	<b>Fail</b>



media player, or reader that offers this functionality).	
Additional Information:	<b>There were no list structural markups. The tagged PDF, Title, Bookmarks, and Headings all failed using the accessibility checker.</b>
C. If the text of the digital resource is delivered within an ebook reader application, a method is provided that allows users to bypass the reader interface and move directly to the text content that is compatible with assistive technology.	<b>N/A</b>
Additional Information:	<b>No additional eReader used.</b>

## 7. Tables

A. Data tables include markup (e.g. tags or styles) that identifies row and column headers in a manner that is compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>Fail</b>
Additional Information:	<b>Tables on page 132 were checked manually. Only one table was found throughout the book. The text to speech function separated and read the tables by row. Using the accessibility checker, the rows TH and TD, headers and regularity all failed.</b>

## 8. Hyperlinks

A. In-book links take you to a location within the textbook. For example, the table of contents would be considered in-book links and embedded links take you to the correct location in the book.	<b>N/A</b>
Additional Information:	<b>No within hyperlinks found.</b>
B. Live hyperlinks take you to any website or webpages external to the book.	<b>Fail</b>



Additional Information:	<b>1/1 live links worked. Pg 235 was checked. Only 1 live links was found throughout the entire book. However this link did not have a good description.</b>
C. Live links take you to the correct webpage that is functioning properly.	<b>Pass</b>
Additional Information:	<b>1/1 live links worked. Pg 235 was checked. Only 1 live links was found throughout the entire book.</b>
D. Live links are descriptive enough for the users to know where it should take them.	<b>Fail</b>
Additional Information:	<b>0/1 live links had a description. Pg 235 was checked. 1 out of 1 links were in html (URL) form and did not have a description on where the link would take you.</b>

### 9. Color and Contrast

A. All information within the material that is conveyed using color is also available in a manner that is compatible with those that do not perceive color, and information conveyed by color is also conveyed in other ways.	<b>Pass</b>
Additional Information:	<b>Pgs 10-22 were checked. Information not conveyed by color alone. Size of font, and type of font (Bold versus Non-Bold font) were used. The chapter titles were in black font, bold font, and the size was larger than the rest of the text.</b>
B. Information is conveyed from the sub-categories for contrast.	<b>Pass</b>
Additional Information:	<b>Pgs 10-22 were checked. Most pages had the contrast ratio of 4.51:1 and above (8.21:1). The chapter titles were in black font, bold font, and the size was larger than the rest of the text: Had a ratio of 13.02:1</b>
C. Contrast for headers passed WCAG AA standards for large texts (contrast ratio 3:1).	<b>Pass</b>
Additional Information:	<b>Pgs 10-22 were checked. Large chapter headings passed with a ratio of 13.02:1.</b>



D. Contrast for text passed WCAG AA standards for normal texts (contrast ratio of 4.5:1).	<b>Pass</b>
Additional Information:	<b>Pgs 10-22 were checked. Most of the text was above the ratio 4.51:1 (8.21:1). Large text and small text both had a ratio of 8.21:1.</b>
E. Contrast for simple images (for example, images of atoms) passed WCAG AA standards (contrast ratio of 4.5:1).	<b>Pass</b>
Additional Information:	<b>Pgs 10-22 were checked. Simple images passed with a ratio of 4.51:1 and above (21.0:1 page 22).</b>

### 10. Language

A. The text of the digital resource includes markup that declares the language of the content in a manner that is compatible with assistive technology.	<b>Fail</b>
Additional Information:	<b>Using the accessibility checker the primary language failed.</b>
B. If the digital resource includes passages in a foreign language, these passages include markup that declares the language in a manner that is compatible with assistive technology.	<b>Fail</b>
Additional Information:	<b>Using the accessibility checker the primary language failed.</b>

### 11. Images

A. Non-decorative images have alternative text that is compatible with assistive technology (or is rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>Fail</b>
Additional Information:	<b>10/10 non decorative images had descriptions that did convey meaning (descriptions were sufficient to convey meaning). Pgs 14, 15, 17, 27 (2 images), 37,</b>



	<b>38, 49, 67, 134 had images and were checked. All images did contain descriptions. Using the accessibility checker, figures alternate text failed.</b>
B. Decorative images are marked with null alternate text or contain markup that allows them to be ignored by assistive technology.	<b>N/A</b>
Additional Information:	<b>No Decorative images found.</b>
C. Complex images, charts, and graphs have longer text descriptions that are compatible with assistive technology (or are rendered by an application such as a browser, media player, or reader) that offers this functionality).	<b>Fail</b>
Additional Information:	<b>10/10 image descriptions did convey meaning (descriptions were sufficient to convey meaning). Pgs 18, 20, 21 (2 figures), 22 (2 figures), 23 (2 figures), 24 (2 figures), and 29 had images and were checked. All images did contain descriptions. Using the accessibility checker, figures alternate text failed.</b>

## **12.Multimedia**

A. A synchronized text track (e.g. open or closed captions) is provided with all video content.	<b>N/A</b>
Additional Information:	<b>No content found.</b>
B. A transcript is provided with all audio content.	<b>N/A</b>
Additional Information:	<b>No content found.</b>
C. Audio/video content is delivered via a media player that is compatible with assistive technology. This includes support for all criteria listed in Section 15 below.	<b>N/A</b>
Additional Information:	<b>No content found.</b>





### 13. Flickering

A. The digital resource content does not contain anything that flashes more than three times in any one-second period.	Pass
Additional Information:	<b>Pgs 1-10 were checked. No flickering content was observed. Using the accessibility checker, screen flicker passed.</b>

### 14. Science, Technology, Engineering, and Math (STEM)

A. STEM figures have appropriate markup that indicates that the image is a figure.	Pass
Additional Information:	<b>10/10 figure markups did convey meaning. Pgs 18, 20, 21 (2 figures), 22 (2 figures), 23 (2 figures), 24 (2 figures), and 29 all had images and were checked. Overall the (labels/tags) did convey meaning.</b>
B. STEM graphs have appropriate markup that indicates that the image is a graph.	N/A
Additional Information:	<b>Graphs were under figure markups.</b>
C. STEM equations have appropriate markup that indicates that the image is an equation.	N/A
Additional Information:	<b>No equations were found throughout the book.</b>
D. STEM tables have appropriate markup that indicates the image is a table.	Pass
Additional Information:	<b>1/1 table markups did provide enough information to convey meaning. Pg 132 had a table and were checked. Overall markups did convey meaning.</b>
E. STEM figures have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	Pass
Additional Information:	<b>10/10 notation markups were sufficient to convey meaning. The descriptions of the figures were sufficient enough to describe the figures. Pgs 18, 20, 21 (2 figures), 22 (2 figures), 23 (2 figures), 24 (2 figures), and 29 all had figures and were checked.</b>



	<b>The notation markups were sufficient enough to convey presentation.</b>
F. STEM graphs have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	<b>N/A</b>
Additional Information:	<b>No graphs were found throughout the book.</b>
G. STEM equations have appropriate notation markup that conveys both the notation (presentation) and meaning (semantics) of the STEM content.	<b>N/A</b>
Additional Information:	<b>No equations were found throughout the book.</b>
H. Assistive technology used can access the content from the STEM tables.	<b>Fail</b>
Additional Information:	<b>0/6 notation markups provided good descriptions sufficient enough to convey meaning. Pg 132 had a table and was checked. Notation markups were minimal and did not help to convey presentation.</b>

### ***15. Interactive Elements***

A. Each interactive element (e.g. menu, hyperlink, button) and function (e.g. annotations) allows keyboard-only operation both with and without assistive technology.	<b>N/A</b>
Additional Information:	<b>No Interactive Element Present.</b>
B. Each interactive element conveys information to assistive technology regarding the element's name, type, and status (e.g. "Play, button, selected").	<b>N/A</b>
Additional Information:	<b>No Interactive Element Present.</b>
C. All instructions, prompts, and error messages necessary to complete forms are conveyed as text to assistive technology (or are rendered by an application such as a browser, media player, or reader that offers this functionality).	<b>N/A</b>



Additional Information:

**No Interactive Element Present.**

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