Challenges and rewards of teaching an online color science course

ISCC Online Seminar
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Introductions

Mike Murdoch

Susan Farnand
We Want Questions & Discussion

To avoid audio issues…

Please stay muted

Please post questions using the Questions/Chat window

If necessary, we can unmute to discuss further
RIT is Online

8,426 online enrollments
10% of all course sections
6% of all credit hours
27% of students take an online course
16% of faculty teach an online course
https://www.rit.edu/ritonline/
Colleges must have online presence, but teaching – and learning – online is not always easy.
MCSL is Online

http://mcsl.rit.edu
In Summer Term 2017, PoCS/MCSL will be offering a 3-credit, online, graduate course, CLRS-600 Fundamentals of Color Science. This course is an asynchronous online course providing a technical introduction to color and the CIE system of colorimetry. The topics covered are listed below. The course is intended for students with a technical background who are interested in adding an elective course in color science to their graduate program and for practitioners in the field interested in a more thorough understanding of the science behind color. This course cannot be taken for program credit by Color Science MS and PhD students. (Prerequisite: Bachelor’s degree in a STEM discipline).

Fundamentals of Color Science
- Color ‘triangle’ - Light sources, sensors, objects
- Color order systems
- Vision
- Light
- Photometry
- Spectroscopy
- Measurements
- Spectra
Course Structure

10 weeks, each including:

• 2 readings
• Quiz per reading
• Online discussion
• Mini-project or online activity
• Deliverable: 3-5 page project report

Week 10 project is student’s choice
# Reading List

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<tr>
<th>Week</th>
<th>Reading</th>
<th>Due Date</th>
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<tr>
<td>1</td>
<td>Newton</td>
<td>6/3</td>
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<td></td>
<td>Fairchild – Color Order Systems</td>
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<td>2</td>
<td>Fairchild – Vision</td>
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<td></td>
<td>Hunt – Light sources</td>
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<td>3</td>
<td>Berns – Color Measurement</td>
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<td>Berns – Precision and Accuracy</td>
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<td>4</td>
<td>Reinhard - Colorimetry</td>
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<td></td>
<td>Wright – 1931 observer</td>
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<td>5</td>
<td>Berns – uniform color spaces</td>
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<td></td>
<td>Luo – CIEDE2000</td>
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<tr>
<td>6</td>
<td>von Kries – Chromatic Adaptation</td>
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<td></td>
<td>Reinhard – Color Appearance vocabulary</td>
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<td>7</td>
<td>Reinhard – Color Appearance phenomena</td>
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<td>Fairchild – CIECAM02</td>
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<td>8</td>
<td>McCamy – Macbeth ColorChecker</td>
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<td>Fairchild &amp; Wyble – Display Characterization</td>
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<td>9</td>
<td>Johnson – color management</td>
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<td>Reinhard - HDR</td>
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<td>10</td>
<td>Hunter – gloss</td>
<td>8/5</td>
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<td></td>
<td>Fleming - translucency</td>
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Quiz Example

**Question 3 (1 point)**

Why are cones important for visual acuity?

- a) The ganglion-to-cone ratio is higher than the ganglion-to-rod ratio
- b) There are many more cones than rods
- c) The cones are more sensitive than the rods
- d) The cones are densely packed in the retina
Some Interesting Discussions...

Regarding Color Differences:
“… the amount of difference, it is not specified in which direction, towards which color/hue.”

Regarding Macbeth Color Checker:
“40-year-old color checker patches are designed for color film response… should we design a new color checker corresponding to our current digital camera or display?”
Color Order Systems Project

Due June 6 at 11:00 AM

Please complete the activity below. Click on the link. Further instructions are included in the activity.

Download  Send to Binder

100% 2 of 2 topics complete

Color Order Online Activity

Color Order Systems (video)

R·I·T
Program of Color Science
Munsell Color Science Laboratory
Color Order Systems Mini-Project

Drag and drop the colors to arrange them in any way that makes sense to you. You need not retain the row and column structure.

Right click and select "Save Image As..." to download. Then upload saved image to dropbox.
5 Students’ Color Orderings
Color Vision Project: F-M 100 Hue Test

http://www.color-blindness.com/farnsworth-munsell-100-hue-color-vision-test
Colorimetry & Lab Overview

COLOREYE 7000 SPECTROPHOTOMETER
Colorimetry & Lab Overview
Color Measurement Project

No hands-on lab experience!

Spectral reflectance data file provided
(as if students had measured them with the spectrophotometer)
Color Measurement

Development of a virtual spectrophotometer underway

- Calibration
- Drag-and-drop “Sample shelf”
- Spectral data plot
- Download data files with pre-computed variability
Colorimetry and more...

• With the color measurement data, students calculated tristimulus values, chromaticities, CIELAB values, and, using these, the impacts of changing light sources and observers.
CIELAB example results
Chromatic Adaptation & Color Appearance
Color Systems

- Color display characterization
- Color management
Questions or Comments?

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http://www.drawing-factory.com/feedback/