

PHYS 101 The Physics of Sound and Music

Sections 1-4 (RRO 125): MW: 2-3:15 pm.

The Combination *PHYS 101/121* has no prerequisites.

You can use this combination either as a lab science or science perspective. Pick One.

Instructor: James Perkins, Ph.D.; jperkins@unca.edu

Text: Online. **You need Internet access with Google Chrome.**

The textbook is free and at our website (a \$250+ Savings).

Website: <http://www.opus.unca.edu/light/>

UNC Asheville Professor Emeritus Dr. Michael Ruiz authored both the online course website and textbook. The online course was a top science/technology news story on *CNN* in 2002.

January 2023

MON 2	TUE 3	WED 4	THU 5	FRI 6
9 A. Reflection	10 L01. Powers of Ten	11 B. Refraction	12	13
16 No Class, MLK	17 L02. The EM Spectrum	18 C. E&M Waves	19	20
23 D. Light and Matter	24 L03. Spectroscopy	25 E. EM Spectrum	26	27
30 F. Light and Life	31 L04. Color Addition	Feb 1 G. Color	2	3



February 2023

MON 30	TUE 31	WED Feb 1	THU 2	FRI 3
F. Light and Life	L04. Color Addition	G. Color		
6	7	8	9	10
H. Color Mixing	L05. Color Subtraction	I. Shadows		
13	14	15	16	17
J. Plane Mirrors	E1 Exam 1 A-G	K. Spherical Mirrors		
20	21	22	23	24
L. Lenses	L06. Color Wheels	M. Dispersion and Aberrations		
27	28	Mar 1	2	3
N. Atmospheric Effects	LE1 Lab Exam 1 Labs 1-5	O. Cameras		Web Project 1 Due

Class Responsibilities and Resources

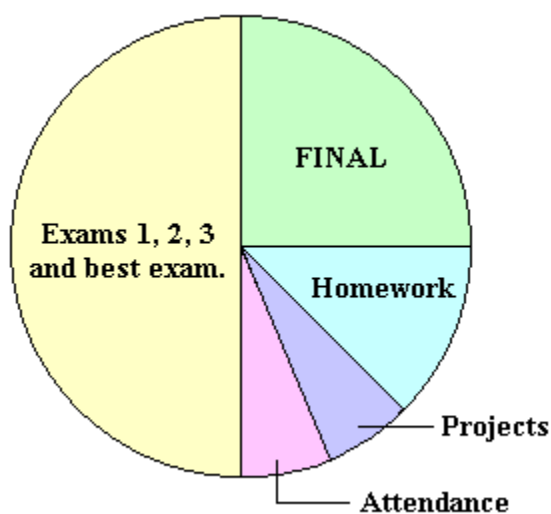
- 1. Online Text:** <http://www.opus.unca.edu/light/> Assignments are done online.
- 2. Clickers:** In class we'll respond to questions through tppoll.com or with PointSolutions app.
- 3. Homework:** Due 11:59 pm Friday night. Instructor support is limited after 12 pm Friday.
- 4. Projects:** There are two projects you work on over a period of weeks. Due 3/3 and 4/21.
- 5. Office Hours:** I am in RRO 114 or 124D: M 10-11, T 1:30-2:30, R 10-11
- 6. Attendance (50):** You can miss 2 classes, but there is a bonus (10) for attending all classes.
You may see me to make up the bonus classes.
- 7. Foreseeable Absences:** See me 2 weeks prior to make arrangements for missing a class.
- 8. Unforeseeable Absences:** See me within a week to make up a missed class.
- 9. Peers:** You are encouraged to work together on homework, start a Discord or a study group.
All work should be (1) in your own words and (2) representative of your own understanding.
- 10. Tutorials:** See the tutorial section in the etext for helpful tutorials made by Doc.
- 11. Extra Credit:** Do questions in the text up until April 25. See Bonus on page October.

March 2023

MON 27	TUE 28	WED Mar 1	THU 2	FRI 3
N. Atmospheric Effects	LE1 Lab Exam 1 Labs 1-5	O. Cameras		Web Project 1 Due
6	7	8	9	10
Spring Break				
13	14	15	16	17
P. Stops and Exposures	L07. Camera Lenses	Q. Camera Lenses		
20	21	22	23	24
R1. Film	E2 Exam 2 H-N	R2. Film and Sensors		
27	28	29	30	31
S1. The Eye	L08. Eye Lenses	S2. Eye Glasses		

Last day to withdraw from a full semester class is Friday, March 17, 2023.

Grading (This course typically has a class grade point average in the 2.6 to 2.8 range).



- 100 Exam 1 aka E1
- 100 Exam 2 aka E2
- 100 Exam 3 aka E3
- 200 Final aka FN
- 100 Best Exam Percentage
- 100 Web Homework (Due Weekly)
- 50 Two Web Projects (25 points each)
- 50 Minus 5 per miss after 2 free misses
- 800 **Total** (No ± Grades, See Below)

- A (740-800) - apply knowledge in new areas
- B (660-739) - apply knowledge in familiar areas
- C (580-659) - apply knowledge in easy areas
- D (500-579) - misconceptions in principles
- F (0-499) - serious gaps in understanding

PHYS 101: E1, E2, E3 are 50 multiple choice (75 minutes); FN is 100 multiple choice (150 min).

PHYS 121: LE1 and LE2 are 50 multiple choice (75 minutes). LE2 is taken during Finals Week.

Bonus and Borderline: If you attend all classes you get a 10-point bonus. If your grade is borderline, I will consider helping you if you come to class, pay attention, put in effort with homework and extra credit. For very close cases I will also look for a strong Final.

Though errors rarely occur, check your grades weekly and report anything you believe to be inaccurate **within the following week**.

Student Learning Objectives: Students should be able to explain the production of light/visual phenomena by a variety of media/instruments/computers, light and visual phenomena to the underlying physical principles, use graphs to visually describe light phenomena, and recall important light/art/photography innovations, experiments.

April 2023

MON 27	TUE 28	WED 29	THU 30	FRI 31
S1. The Eye	L08. Eye Lenses	S2. Eye Glasses		
3	4	5	6	7
T. Perception (Remote)	L09. Color Perception (Remote)	U. Color Perception (Remote)		
10	11	12	13	14
V. Cognitive Illusions	L10. Optical Illusions	W. Optical Instruments		
17	18	19	20	21
X. Luminescence	E3 Exam 3 O-U	Y. Einstein and Light		Web Project 2 Due
24	25	26	27	28
Z. Quantum Optics				<ul style="list-style-type: none"> ● 11:30am Drop in Exams ● 3pm Drop in Exams

How to Succeed in Light Class

1. Time. Reserve at least 2 hours (reading, study, web apps, multimedia, assignments, etc.) for every hour of class. This time is at least 6 hours per week in addition to class time. If you are a full-time student and have a job, you should NOT work more than 15-20 hours per week.

2. Instructor. Drop by weekly during office hours. If you have any problems, come talk to me.

3. Peers. Ask your classmates for help, e.g., before and after class or lab are good times to meet with a study group. Ask me if you'd like help scheduling a study group! You master the material when you are challenged to explain it to someone else.

Come to every class and take notes. Do not fall behind! Science classes build on previous classes. Use our "Exam Practice", where you see actual exam questions. If you spend lots of time with "Exam Practice" you will virtually see all the possible questions that can be on your exams. But the best advice is to first carefully study the solutions to old exams.

UNCA is committed to making courses accessible to persons with documented special learning needs. To apply, register with the Office of Academic Accessibility and then see me ASAP.

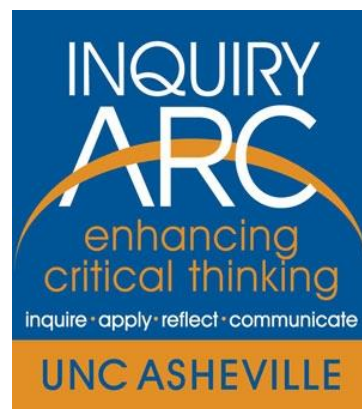
The Friday Rule: If you wait until the due date (Friday), there is no guarantee that the instructor will be available for support, no matter what problems arise, including computer difficulties. However, there will be at least one Grace Period near the end of the semester in order to make up some missed assignments.

Art in PHYS 101, I-ARC, and CNN



The course features an artist this semester: Élisabeth Louise Vigée Le Brun (1755-1842). Our website includes a special gallery of 60 of her portraits. I encourage you to bring your own favorite art, viral videos, or photographs to this course. We will have extra credit opportunities to view them and analyze them using the language and techniques

of this class.



The objective of **Light and Visual Phenomena** is a liberal-arts science course for non-majors. It includes the biology of the eye, medical prescription of eyeglasses, psychology of perception, optical illusions, photography, magic, color in art, and inventions. You will appreciate light and its many applications and expressions in the world.

We follow the UNCA I-ARC model: Inquiry (understanding the question or problem at hand), Apply (using the appropriate principle, law, or formula), Reflect (reflecting on the answer to verify its validity), and Communicate (finally giving the answer with confidence with proper units and significant figures).

Our course was a top science/technology news story on [CNN: E-Book Learning](#), which aired on *NEXT@CNN*, August 31, 2002.

You can bookmark www.opus.unca.edu/light_2023

UNCA-WIDE Important Information

Title IX and Sexual Misconduct. UNC Asheville is dedicated to cultivating and maintaining a safe, respectful, and inclusive environment, free from harassment and discrimination. We strive to ensure that all have equal access to the educational and employment opportunities the University provides. If you or someone you know has been affected by sexual or gender-based harassment, including sexual assault, dating or domestic violence, or stalking, please know that help and support are available. UNC Asheville strongly encourages all members of the community to take action, seek support, and report incidents of sexual harassment to the Title IX Office. You may contact the Title IX Office or Heather Lindkvist, the Title IX Coordinator, directly at 828.232.5658 or at titleix@unca.edu or learn more by visiting titleix.unca.edu.

As a faculty member, I am a “responsible employee” and private resource. This means that if you share any information or discuss an incident with me regarding sexual or gender-based harassment, I must disclose this information to the Title IX Coordinator. Our goal is to ensure you are aware of the range of options available to you and have access to the resources you may need.

If you wish to speak with a confidential resource, contact University Health and Counseling Services at 828.251.6520. Off-campus confidential resources include [Our Voice](#) (24-Hour Hotline at 828.255.7576) and [Helpmate](#) (24-Hour Hotline at 828.254.0516).

Office of Academic Accessibility. UNC-Asheville values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and/or make an appointment to meet with the Office of Academic Accessibility as soon as possible. Learn more about the process of registering, and the services available through the Office of Academic Accessibility here: accessibility.unca.edu Please use this link <https://universityofncasheville.setmore.com/> to schedule an appointment. While students may disclose disability at any point in the semester, students who receive Letters of Accommodation are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student’s responsibility to follow this process each semester.

Early Alerts. Faculty at UNC Asheville are required to use the university's Academic Indicator (AI) system. The purpose of this system is to communicate with students about their progress in courses. Academic Indicators can reflect that a student’s performance is satisfactory at the time the indicator is submitted or they can indicate concerns (e.g., academic difficulty, attendance problems, or other concerns). Professors use the AI system because they are invested in student success and want to encourage open conversations about how students can improve their performance. When a faculty member submits an indicator that expresses a concern, the student receives an email from Academic Advising notifying them of the indicator. If a student receives three or more indicators, they will need to meet with a professional advisor by scheduling an appointment using the online appointment service at advising.unca.edu and select

'Academic Indicator Appointment' as the type of appointment. The instructor may also request to meet with the student to discuss the indicator. It is in the student's best interest to complete the process quickly, as students who do so are more likely to earn credit for the course. Questions about the Academic Indicator system can be directed to Anne Marie Roberts (amrober1@unca.edu) in the [Academic Success Center](#).

Academic Dishonesty. The university's policy on academic honesty states that "As a community of scholars dedicated to learning and the pursuit of knowledge UNC Asheville relies on the honesty and academic integrity of all the members of its community. Any act of plagiarism or cheating is academic dishonesty. A person who knowingly assists another in cheating is likewise guilty of cheating. According to the instructor's view of the gravity of the offense, a student may be punished by a failing grade or a grade of zero for the assignment or test, or a failing grade in the course. If it seems warranted, the instructor may also recommend to the Provost dismissal or other serious university sanction." I expect that you will exercise integrity in all quizzes, exams, and written assignments. Please email me or pop in during student hours if you have additional questions or need clarification on any point. Note that any violations of academic dishonesty (cheating, signing someone else's quiz sheet, etc.) must be reported to the Provost's Office. While I do encourage students to work together on homework assignments and labs. All work submitted must be: 1) in your own words, and 2) representative of your own understanding.

Special Policies. Currently, there is no masking mandate at UNCA with the exception of healthcare settings and University shuttles. Please respect individuals' personal decisions to either wear or not wear a mask in any given circumstance.

When we're meeting in my office and in office hours, I will be glad to wear my mask whenever we need to be in close proximity (for example when we are both looking at the same computer screen). I encourage you to consider at least bringing a mask with you so that you can do the same if you choose.

There is no official policy regarding social distancing in the classroom. Please be sensitive to the fact that everyone's comfort level will vary. Whenever possible, please keep several feet between yourself and a classmate. If a classmate requests more space, please do so kindly and without judgment or question.

The course will be offered this semester in a standard, in-person modality. Fortunately, we have several options in the case that a student needs to miss a class. If you are feeling ill, please stay home and contact me by email to request information on how to make up the class without penalty to your grade (typically by watching a video and completing a short assignment).

This syllabus is subject to change. Any substantive changes will be communicated through email.