SCI103: Waves of Reality: Color and Music

West Chester University

Spring 2022

MWF 10-10:50

Room: Brandywine 031

Instructor Office Hours

|  |  |
| --- | --- |
| Day | Time |
| Monday | 11:30 – 12:30 PM |
| Wednesday | 11:30 – 1:30 PM |
| Friday | 11:30 – 1:00 PM |

**Dr. Brandon Mitchell**

Office: SECC - 357

Email: Bmitchell@wcupa.edu

Please sign up for office hours at my [online scheduler](https://calendly.com/prof-mitchell)

**Recommended Reading:** Physics in the Arts (3rd Ed.) by P.U.P.A Gilbert, Academic Press (2021).

**Course Web Page:** [D2L](http://www.wcupa.edu)

Course information can be found here throughout the semester. The syllabus, lecture notes, projects and homework will be found here. Check it regularly!!

**Lecture Notes:** The lecture notes are a critical tool for your learning experience.  They contain a summary of the relevant information and provide an outline for the content. They will also contain several examples. The notes will only be partially filled in, which coming to class is necessary. **The lecture notes will be provided via D2L**, so be sure to download them.

**Worksheets:** At least once a week there will be a worksheet, which goes along with the current subject matter. We will go over these in class.

**Content:**  This class will be geared towards how physics shows up in art and music. We will initially study what will seem like basic physics: force and motion, electric and magnetic fields, periodic oscillations, and wave properties. We will then begin to focus on light, optics and color and the human eye. Next, we will focus on sound, sound production, sound perception and the organization of sound into musical scales such that “music” can be constructed.

**West Chester University General Education Goals:** SCI103 is an approved course in the WCU General Education program. As such, it is designed to help students meet the following general education goals:

General Education Goal #2: Employ quantitative concepts and mathematical methods (secondary course objection)

General Education Goal #3: Think critically and analytically (primary course objective)

More specifically, after successfully completing this course a student will be able to:

* Mathematically describe mechanical systems.
* Recognize concepts of physics in action in mechanical systems, including force and wave phenomena. This includes the propagation of light and sound and how it can be manipulated.
* Analyze mechanical systems through visualization, modeling, algebra, as well as diagrammatic and graphical techniques.
* Combine the above elements in order to solve multi-part problems as well as formulate quantitative predictions for physical experiments and the design of physical musical instruments.

These General Education Goals will be accomplished through in-class exercises, suggested homework problems, review exercises, written assessments, a project, and several exams. These items will involve qualitative and quantitative aspects.

**Course Goals:**  This course introduces basic concepts in physics and then uses them to examine light, color, perception, sound, music and acoustics. This includes what light is and how we perceive it, how sound is produced and how it is perceived, as well as, the creation and interpretation of music. We will end by discussing the influence of room design on its acoustics, and how musical instruments work. Throughout the semester, you will be examining these concepts from a scientific and aesthetic perspective integrating your own personal experiences with ideas from several disciplines including, physics, music, anatomy & physiology and psychology. The lecture videos will include lectures with demonstrations, worked out examples and embedded concept questions to check your understanding.

**Expectations:**  I expect you to engage in the course material and activities and reach out to me as necessary. I do not expect you to love math in all of its intricacies but do expect you to have a very basic understanding of algebra and some basic geometry. When problems with math arise, I expect you to seek. I am happy to assist/review with you. You may find this course challenging and fast paced, but as long as you work diligently, you will succeed.

**Guidelines for Office Hours:** You set the agenda for office hours. Come with questions about the lecture, reading, homework, exams, grading, or anything else of concern or interest. Note: You must demonstrate some effort/thought process towards an answer on homework problems before coming to see me. “I have no idea where to begin” is not an acceptable opening statement.

**Attendance:**  Students must attend at least 80% of the Friday classes. Students will sign in on a sheet at the beginning of class. Students will be held responsible for all course materials missed due to class absences. All efforts will be made on my behalf to ensure that class time is productive and beneficial for your learning. We will go through several examples and conceptual questions meant to build and challenge your understanding of the material.

**Late Work Policy:** I understand that many of you have other obligations and things come up. Please email be **BEFORE** the due date and I will try to accommodate your situation. Each student will have a total of 2 late-day points available to use when things get too busy to meet a deadline. An assignment that is two days late uses two late-day points. A weekend count for two late-days. After you have used your late-day points, late assignments will lose 5% (of total possible points) per day.

**Homework:** There are ten homework assignments in this class, and each will be due on Friday. These can be found on D2L. The homework assignments will contain 10-20 problems. I will drop your lowest homework grade, and extra credit **may** be assigned throughout the semester.

**Exams:**  There will be one in-class exam and one online exam during the semester, as well as a **comprehensive** in-class third exam, which will be taken on the last day of class. All exams will be closed book, but you can use the provided equation sheet. In the event a student is unable to take an exam as scheduled, discussion of the exam with those that have taken the exam is forbidden. If you will be unable to make it to an exam, you must contact me before the exam, and we will discuss how to proceed.

**Midsemester Project:** You will have a short midsemester project which involves a short 5-10 minute experiment and a one paragraph write-up.

**Final Project and Written Assignment:** You will have one written assignment due at the end of the semester. This will be on the music portion of this class. It will involve a wind instrument made of PVC pipe. The final project will be the construction of several PVC pipes, the tuning of the pipes and playing a song with them. Details on these assessments will be provided later

**Grading:**Your course grade is based on your Attendance (5%), Homework (30%), Midsemester project (5%), Final Project Written Assignment (10%), Exams (40%), and Final Project Performance (10%). **The final project and final paper are mandatory; your overall grade will depend on them.**

Your total homework grade will be the average grade (minus the grade) for all assignments.

Your total exam grade will be 10% for Exam I, 10% for Exam II and 20% for the Exam III.

**A NOTE ON “CURVING” AND THINGS TO KEEP IN MIND:** THERE IS NO CURVE ON THE EXAMS OR ANY OTHER ASSESSMENT ALONE. THE TOTAL GRADES IN THE END WILL BE “CURVED” AS DEEMED NECESSARY. **The homework assignments and project TOGETHER are weighted more heavily than the three exams. You must do well on all components of this course to do well in the course as a whole.**

A letter grade will be assigned based on performance in the course according to the following scale:

|  |  |  |  |
| --- | --- | --- | --- |
| **Grade** | **Quality Points** | **Percentage Equivalents** | **Interpretation** |
| A | 4.00 | 93-100 | Excellent |
| A- | 3.67 | 90-92 |  |
| B+ | 3.33 | 87-89 | Superior |
| B | 3.00 | 83-86 |  |
| B- | 2.67 | 80-82 |  |
| C+ | 2.33 | 77-79 | Average |
| C | 2.00 | 73-76 |  |
| C- | 1.67 | 70-72 |  |
| D+ | 1.33 | 67-69 | Below Average |
| D | 1.00 | 63-66 |  |
| D- | 0.67 | 60-62 |  |
| F | 0 | < 60% | Failure |

Refer to the Undergraduate Catalog for description of NG (No Grade), W, Z, and other grades.

Straight percentages will be given for all work, with the mid-semester and final grade based on overall class performance. Other considerations will influence your final grade including, class participation, class and laboratory attendance, and seeking timely guidance during office hours.  Any student achieving at a level of 'C-' or below will be given an estimated grade on their mid-term deficiency grade report.

**E-Mail and Communication:** The best way to contact me is via e-mail. But, be aware that I will only read and respond to e-mails written in proper English, with correct grammar, spelling, and etiquette. Do not send me any e-mails addressed to “hey” or “yo,” like you would text a buddy or close friend.

“It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.”

**ACADEMIC & PERSONAL INTEGRITY:** It is the responsibility of each student to adhere to the university’s standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another’s work and/or using ideas of another and presenting them as one’s own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the *Ram’s Eye View*, and the University website at www.wcupa.edu.

**STUDENTS WITH DISABILITIES:** If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University’s Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at www.wcupa.edu/ussss/ossd.

**Inclusive Learning Environment and Anti-Racist Statement:** Diversity, equity, and inclusion are central to West Chester University’s mission as reflected in our [Mission Statement](https://protect-us.mimecast.com/s/Kh8QCrk6x5SDqM24CQRU_b?domain=wcupa.edu),[Values Statement](https://protect-us.mimecast.com/s/XD1FCv2kB5Ty91Arswntb5?domain=wcupa.edu),[Vision Statement](https://protect-us.mimecast.com/s/XD1FCv2kB5Ty91Arswntb5?domain=wcupa.edu) and[Strategic Plan: Pathways to Student Success](https://protect-us.mimecast.com/s/ovVXCwplD5TRj6yghld0bL?domain=wcupa.edu). We disavow racism and all actions that silence, threaten, or degrade historically marginalized groups in the U.S. We acknowledge that all members of this learning community may experience harm stemming from forms of oppression including but not limited to classism, ableism, heterosexism, sexism, Islamophobia, anti-Semitism, and xenophobia, and recognize that these forms of oppression are compounded by racism.

Our core commitment as an institution of higher education shapes our expectation for behavior within this learning community, which represents diverse individual beliefs, backgrounds, and experiences. Courteous and respectful behavior, interactions, and responses are expected from all members of the University. We must work together to make this a safe and productive learning environment for everyone. Part of this work is recognizing how race and other aspects of who we are shape our beliefs and our experiences as individuals. It is not enough to condemn acts of racism. For real, sustainable change, we must stand together as a diverse coalition against racism and oppression of any form, anywhere, at any time.

Resources for education and action are available through WCU’s [Office for Diversity, Equity, and Inclusion](https://www.wcupa.edu/_admin/diversityEquityInclusion/changeBeginsHere.aspx) (ODEI), DEI committees within departments or colleges, the student [ombudsperson](https://www.wcupa.edu/_services/STU/studentOmbuds/), and centers on campus committed to doing this work (e.g., [Dowdy Multicultural Center](https://www.wcupa.edu/_services/multicultural/), [Center for Women and Gender Equity](https://www.wcupa.edu/_services/stu.wce/), and the [Center for Trans and Queer Advocacy](https://www.wcupa.edu/_services/transAndQueer/)).

Guidance on how to report incidents of discrimination and harassment is available at the University’s [Office of Diversity, Equity and Inclusion](https://www.wcupa.edu/_admin/diversityEquityInclusion/).

**EXCUSED ABSENCES POLICY FOR UNIVERSITY-SANCTIONED EVENTS:** Students are advised to carefully read and comply with the excused absences policy for university-sanctioned events contained in the WCU Undergraduate Catalog. In particular, please note that the “responsibility for meeting academic requirements rests with the student,” that this policy does not excuse students from completing required academic work, and that professors can require a “fair alternative” to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

**REPORTING INCIDENTS OF SEXUAL VIOLENCE:** West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy.  Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at <http://www.wcupa.edu/_admin/social.equity/>.

**EMERGENCY PREPAREDNESS:** All students are encouraged to sign up for the University’s free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

**ELECTRONIC MAIL POLICY:** It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

**West Chester University’s COVID-19 Classroom Protection Requirements:** We, as a community of educators and learners, should work together to create a culture that protects our most precious resource: each other. As such, it is the expectation of all members of the University community to continue to do their part to protect the health and safety of others. In our classrooms where the university’s primary function is carried out, the following protocols are being implemented:

* Unless otherwise directed by the faculty member, students must wear a cloth or disposable face mask that covers both the nose and mouth the entire time they are in class.
	+ Face shields and gaiters do ***not*** meet the university’s mask requirement.
* Eating and drinking in the classroom are only permitted if they are medically necessary.
	+ Please work with the Office of Services for Students with Disabilities to notify the university and your professors of this necessity.

**We want you to succeed in this class, but we will have to ask you to leave if you do not follow these guidelines, so please – make the most of this opportunity and help keep our campus safe**.



