PHYS 1240: Sound and Music

Spring 2023

Instructor: Tyler McMaken (he/him/his)
Email: tyler.mcmaken@colorado.edu
Time: TuTh 5:00–6:15pm MT
Location: Duane Physics G1B20
Course Webpage: https://canvas.colorado.edu/courses/89081

Course Overview:

Physics 1240, Sound and Music, is a 3-credit course designed for non-science students to explore the interrelation between art and science in a way that is both informative and enjoyable. The goals of the course are as follows:

1. Gain a physical intuition for how **sound** works, including how it can be *generated* (instruments, speaking, synthesizers, etc.), *transmitted* (wave dynamics, room acoustics, etc.), and *received* (human ears, microphones, psychoacoustics, etc.)
2. Explore how individual sounds can combine to form what we call **music**
3. Discover the **joy** in using science to understand how the world works (a.k.a. have fun learning!)

The course is taught by Tyler McMaken ("mick-MACK-en"), a PhD Candidate and lecturer in the Department of Physics with past degrees in both physics and music. The course most days will follow the schedule below:

- 5:00–5:40pm: Content-based lecture (often including scientific or musical demos)
- 5:40–5:45pm: Break
- 5:45–6:15pm: In-class group tutorial worksheets

Office Hours:

One-on-one interactions with the instructor or another member of the learning team are essential to learning well. For this course, all office hours will take place in the Physics Help Room, an open room in the Duane Physics building basement (DUAN G2B90) where any student can work on physics assignments with peers, TAs, or professors. Help room hours from this course's learning team will be posted on the home page of Canvas. I am also more than happy to answer any questions over email or set up an impromptu meeting over Zoom or in-person.

Textbook & Course Materials:

The recommended (not required) text for this course is *Principles of Musical Acoustics* by William Hartmann. The textbook is available online for free via the campus network (if you're not on campus, you can set up a VPN connection). Readings corresponding to each lecture are posted on the course schedule. Additional online learning resources are posted on Canvas.
Necessary materials for this course include a calculator capable of computing logarithms, sines, and cosines (most phones nowadays can do this, or if nothing else, Google can), a portable sound recording device (phones or laptop microphones do just fine), and access to sound-analyzing software, which can be downloaded for free.

Prerequisites:

Though no prior college courses are required for enrollment in this course, all students must have two units of high school algebra and one of geometry (in other words, you may not have a math MAPS deficiency). High school math will be used regularly, but the course will not use or develop any higher mathematics.

Grading:

- 30% of your total grade will be determined by participation in **tutorial assignments** completed during the second half of each class in small groups with your peers. These assignments will be graded for participation only, not for accuracy. The lowest 2 assignment grades will be dropped.
- 30% of your total grade will come from **biweekly homelabs** due every other Thursday at the beginning of class. These hands-on mini-projects will allow you to get more practice with the topics we cover in class by using sound-analyzing freeware and materials you can find around your house. Any additional materials needed will be provided to you in class.
- The remaining 40% will come from a **midterm exam** and a **final project**. More information about these will be posted on Canvas.

Assignment	Percentage of final grade	Date
Tutorials	30%	every class
Homelabs	30%	due every other Thurs.
Midterm exam	20%	Thurs. March 9 (in-class)
Final project	20%	due finals week

Final letter grades will be assigned using the standard CU grading scheme, though this scheme may be slightly shifted at the instructor's discretion (but such a shift would only make final letter grades more favorable to students, never less favorable).

Late policy:

All participation assignments and written homeworks may be submitted at any point after their due dates until the last day of class. In the case of a late submission, 10% will be deducted for each day that the assignment is late, until 5 days have passed. After 5 days, the maximum score you may receive will remain at 50%. Exceptions may be granted if extenuating circumstances are brought to the instructor ***before the assignment is due*** (full credit is rarely given for after-the-fact excuses).

Absences:

Attendance will not be graded except indirectly through your participation in the in-class tutorials. If you are (or anticipate being) absent from class for any reason, you are not required to notify the instructor (though you may still choose to do so as a common courtesy), except in the case of a missed exam or homelab turn-in date. It is recommended that you visit the Help Room to review any missed material with the instructor, and you may still obtain credit for any tutorials missed due to absences by completing them on your own (they will all be posted on Canvas) and emailing your work to the instructor.

University policies:

A list of syllabus statements regarding general university policies can be found here.