

1. College: **Science and Mathematics**
2. Department: **Physics and Astronomy**
3. Course Status: **Existing; requires modification**
4. Course Prefix and Number: **PHY 118**
5. Course Title: **Acoustical Physics**
6. Course catalog description:

Topics covered include: waves, resonance, frequency, pitch, waveform, hearing, intervals, scales, strings, air columns, rods, plates, vocal apparatus, and instruments. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory.

7. Number of semester credit hours: **3, two hour lecture and one hour lab**
8. Estimated enrollment per year: **25**
9. Course prerequisites: **TSI complete. Corequisite: PHY 118 Lab**
10. Lecture course **is** available online
11. Foundational Component Area: **Life and Physical Sciences**

12. Explain why this course fits into this foundation component area: Acoustics is the physics of sound. Sound is a wave phenomenon, necessitating the study of the properties of waves (amplitude, velocity, frequency, wavelength, beats, etc.). It is also a perceived phenomenon, requiring an understanding of hearing, room acoustics, and the action of the brain on sound. We tend to use music in examples because music is almost universal to human life and experience. The course was originally targeted to music majors (particularly those in Sound Recording Technology), but we are changing the emphasis to make it of broad appeal.

13. Core Objectives

- **Critical Thinking-** This objective is at the very core of the scientific process through which we seek to understand the world around us. Critical thinking skills are taught in lecture, when the scientific process is first introduced, through readings and YouTube videos. In laboratory, students will apply critical thinking when given observational data sets to analyze and evaluate and draw conclusions. Mastery of critical thinking skills will be demonstrated in the Complex Waves Experiment.
- **Communication Skills-** In the lecture portion of this course, students will be taught communication skills which will include effective development, interpretation, and expression of ideas through written and visual communications. Lectures and instructor

led class discussions will be used to accomplish this. In laboratory, students will analyze data sets by the construction of graphs and charts. They will present their findings of each laboratory exercise in the form of written lab reports that include measurements and graphs, computations and discussion questions. Students will demonstrate their communication skills in the Complex Waves Experiment. The formal lab write-up associated with this experiment will require each student to write results and draw conclusions (written communications) based on data tables and graphs (visual) produced in the exercise. To assess oral skills there will be a video requirement that describes the experiment and results.

- Empirical and Quantitative Skills- Data analysis is a crucial part of the scientific method. In the lecture portion of this course students will be taught how to correctly collect and analyze scientific data. They will practice empirical and quantitative skills in the lab portion of this course where their skills will improve with each experiment. They will learn how to make accurate measurements, do necessary calculations, and perform error analyses. Mastery of empirical and quantitative skills will be demonstrated in the Human Hearing Response lab where students will be required to submit a formal write-up of the experiment. This write-up will include manipulation and analysis of numerical data and informed conclusions.
- Teamwork- Students commonly work in teams of 3-4 in the laboratory and monitoring by the instructor ensures that the teams work together. Early in the lecture portion of the course students will be instructed on the elements of good teamwork through assigned reviews of YouTube video segments and through Power Point slides in the pre-lab discussion. Mastery of teamwork will be demonstrated in the Complex Waves Experiment.