NIU Course Syllabus for Physics 180

ACOUSTICS, MUSIC AND HEARING

Fall Semester, 2020, 100% online Tuesdays and Thursdays, 9:30 am-10:45 am

Course Description:

Elementary study of acoustics designed especially for students with an interest in music, speech and hearing, the theatre, or sound recording. Topics include the waves and vibrations, perception and measurement of sound, acoustics of musical instruments, speech and singing, and the acoustics of rooms. No pre- or co-requisites required. Credit hours: 3 credits. Contact hours: 3.0. Lecture hours: 3.0.(There are 3 lab activities, 1 hour 15 minutes each, as a part of engagement components). Method of delivery: 100% online.

Course Goals:

1. Develop logical, objective, and critical thinking with scientific method using physical science topics.
2. Develop the awareness of relationship between physics and everyday life.
3. Develop basic quantitative analysis skills and methods.

Student Learning Outcomes: Upon successful completion of the course, students will be able to explain, analyze and/or predict:

- A basic, working knowledge of the physics of force, velocity, energy, vibration, elasticity and simple harmonic motion and how they apply to the properties of sound waves.
- The mechanics of various types of sound waves - what they look like, how they are produced by instruments, interact with other sound waves, and propagate through various materials. The physics of waves - interference, refraction, diffraction, dispersion, standing waves, frequency spectrum
- How sound is detected and perceived by the human ear and brain beginning with pressure variations
- The basics of sound making and detection equipment and room acoustics.

The *most **Essential*** in this class is ***COMMUNICATION & PARTICIPATION*!**

Class room: Online. Blackboard Collaborate.

Instructor: Yasuo Ito. La Tourette 218
email: yito@niu.edu
TA: William Emark, email: wemark1@niu.edu
Office Hours: By an appointment through email.

COMMUNICATION IS ESSENTIAL!!!

Blackboard web course is the main media and information source of this course. Online lectures, announcements, lecture viewgraphs (Power Point files), homework assignments and two midterm exams and final exams will be given through the Blackboard web.

How to access to the Blackboard online Live class session.

1. First, access to your Blackboard https://webcourses.niu.edu, and open PHYS 180 course.
2. Click "**Blackboard Collaborate**" on the left tab above the "Course Materials".
3. Click "LIVE PHYS 180 Blackboard Collaborate online class".
4. Click a session for the day.

The site opens at 9:00 am. The lecture starts the class from 9:30 am and ends at 10:45 am on Tuesdays and Thursdays. Each class session will be recorded and accessible though Blackboard Collaborate. Please get familiar with Blackboard Collaborate as much as you can.

*We may also use **Zoom.** I will inform you prior to the lecture when I use.*

Textbook/Materials:

Recommended textbooks:

"Why You Hear What You Hear", by Eric J. Heller, (Princeton**).**

"***The Science of Sound****, 3rd edition*", by T. Rossing, F.R. Moore & P.A. Wheeler (Addison-Wesley2002).

Other helpful reference textbooks:

"Physics in the Arts", 2nd edition P.U.P.A. Gilbert, W. Haeberli

Comments: This is very concise textbook while "Science of Sound" is very informative and can be used as a reference book. I used both of these textbooks in my past classes. Information of lecture slides is mostly coming from these textbooks.

Userful Web pages:

https://www.acs.psu.edu/drussell/demos.html
https://phet.colorado.edu/en/simulations/filter?subjects=physics&sort=alpha&view=grid
https://newt.phys.unsw.edu.au/jw/basics.html

Tests and Grading (tentative)**:**

5% Attendance. Attendance is ***MANDATORY***. Since this is a CTP course, it is ***critical*** for you to attend ***all of*** the ***small group*** activity classes. Your absence is directly impacting the effectiveness of learning of your team member.

Students **must** attend at least 85% of required classes. *Attendance will be taken in a form of attendance sheets every class.*

A student will receive attendance points if the student attends more than or equal to 84% of the course (about 25 out of 30 classes), according to the attendance rate. No attendance points if he/she attendes less than 84%. Students will receive ***negative*** attendance points ***if he/she attends less than 80% of small group session*** (about -1/class). **This rule will be applied to only "Unexcused absences" except for the small group sessions, all of which you are expected to attend.**

If you know your absence prior to the class, please let me know at that point. Otherwise, please email me within 2 days from your absent day(s). In case of medical absence, it is the best for you to present me a doctor's note when you contact me even though it is required.

Attendance points scale:

+5 (100%), +4 (96-99.9%), +3 (92-95.9%), +2 (88-91.9%), +1 (84-87.9%), 0 (80-83.9%), -1 (76-79.9%), -2 (72-75.9%), an extra negative point for every 4% of absences. *Exception: Attendance of the first week will not be counted although it will be recorded*.

50% Homework ***ESSENTIAL!!*** Assigned problems, essays, and other forms of assignments. Submit electronically all of the given assignments online unless I/TA instruct you in other ways.

25% Midterm Exams (comprehensive) **October 1st and October 29th, during the class hour**.

20% Final Exam (comprehensive) **December 3rd, 9:30 – 10:45 am**, during the class hour.

Extra credits:

Extra credit assignments may also be given such as essays, problem solving etc.. *These Extra credit points are directly added to the raw scores of the final grading points described above.*

To pass this course, you must score at least **50%** on the homework **AND** at least **50%** overall.

Grading scale:

A ($90 \leq x$), A- ($85 \leq x < 90$), B+ ($80 \leq x < 85$), B ($75 \leq x < 80$), B- ($70 \leq x < 75$), C+ ($65 \leq x < 70$), C ($55 \leq x < 65$), D ($50 \leq x < 55$), F ($x < 50$).

Grade points (assigned by University):

A (4.00), A- (3.67), B+ (3.33), B (3.00), B- (2.67), C+ (2.33), C (2.00), D (1.00), F (0.00).

Makeup tests are available if you cannot take an exam due to a time conflict or an unexpected incidents. If you know prior to the exam, please inform me as soon as possible. If you cannot take tests due to your (sudden) medical conditions/illness, please send me a note from Health Services or your physician (doctor). If you cannot take tests due to unexpected incidents, please send me a note to explain the situation ASAP.

COURSE NOTEBOOK: Students are strongly encouraged to keep a Course Notebook of key materials that is brought to all lecture and recitation sessions. Materials include (must be current): Syllabus, lecture notes (printed from Blackboard with room to take notes), student's class notes, tests, class exercises.

WHAT TO BRING TO CLASS: Textbook, notebook, scientific calculator, assignments.

COURSE POLICIES INCLUDE:

1. Be respectful of each other (this applies to Instructors, TA's and students). Some specifics include:
    a. No cell phone/ electronic device usage in class (except clickers, calculators) unless you are instructed to use it. Cell/ smart phones must be turned off or silenced and placed in backpacks, etc. (not in pockets or on desks). Violators may be required to turn in their devices to the Instructor for the remainder of the class period.
    b. Read your newspapers before or after class
    c. No talking during class unless you are instructed to discuss.
    d. If you need to leave class early, let your Instructor know.
2. Laptops/ notebooks may be used for lecture materials and taking notes only.
3. Be aware of the policies and procedures regarding your rights as well as responsibilities that are published in the NIU Student Code of Conduct.
4. If you feel there was an error in the grading of a Test, submit a written request within 48 hours to the Instructor's mailbox in La Tourette 202. Your entire test will be re-graded and returned to you.

Academic Integrity Statement

Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university. https://www.niu.edu/academic-integrity/index.shtml.

Accessibility Statement

If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located at the Campus Life Building, Suite 180, and can be reached at 815-753-1303 or drc@niu.edu.
Also, please contact me privately as soon as possible so we can discuss your accommodations. Please note that you will not be required to disclose your disability, only your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.
https://www.niu.edu/disability/forms/syllabus-statement.shtml

Your Health!

Your health and safety are my No. 1 priority.

We are all members of the Huskie community, and we owe it to each other to protect ourselves and each other. When I come to class, I'll be wearing a face covering. I expect you to do the same. If there is some reason that isn't possible for you, please contact me by email, and we'll see what arrangements can be made. If you come to class in person, you'll need to be wearing a face mask.

I also expect you to monitor your health, and you should stay home if you've been exposed to someone who recently tested positive for COVID-19 or if you develop any symptoms that might be related to COVID-19. I'm going to be using the #CampusClear app to document my symptoms, and I want you to do the same. If you do have symptoms, stay home and contact NIU's COVID helpline (815-753-0444) to report your symptoms and get advice.

All students must comply with the guidelines in NIU's "Protecting the Pack" document. The university will follow all applicable local, state, and federal public health guidelines and orders.

A word about anxiety

These are extremely stressful times. You are not alone in feeling it. We are all living with unsettling uncertainty and it affects the way we perceive the world, ourselves and others. Such feelings may be persistent or may come on suddenly. Let's all promise to be patient with each other and help support a healthy learning environment. If you or somebody you know is struggling with anxiety or other issues, do not hesitate to reach out. Resources available include the DRC, Student Counseling Services or call 815-306-2777. As always, in the event of a crisis call for immediate help via 911 or other general support services listed here.

Nominal schedule: 8/23/2020. This is subject of change.

Week	Tuesdays	Thursdays
1	**8/25 Introduction/ What is sound?**	**8/27 Meet Sir Isaac Newton!** 1
2	**9/1 Meet Sir Isaac Newton! 2**	**9/3 Meet Sir Isaac Newton!** 3
3	**9/8 What is wave?1**	**9/10 What is wave?2**
4	**9/15 What is wave?3**	**9/17 Application of acoustics to Forensic science (Dr. Coutrakon)**
5	**9/22 Harmonic oscillators**	**9/24 Stretched string** (Ch. 8) (ch 15 2D modes)
6	**9/29 Review I**	**10/1** ***1st Midterm test***
7	**10/6 Spectrum and Fourier 1**	**10/8 Spectrum and Fourier 2/Resonance 1**
8	**10/13 Resonance 2** (Ch. 9, **10,** 13)	**10/15 Resonance 3**
9	**10/20 String Instruments** (Ch. 18)	**10/22 Wind Instruments** (ch16), **(voice** (ch17))
10	**10/27 Review II**	**10/29** ***2nd Midterm test***
11	**11/3 Psychoacoustics Prep: Perception**	**11/5 Ear: Origin of Perception1** (Ch.21, 22, 23, 24)
12	**11/10 Ear: Origin of Perception1** (Ch.21, 22, 23, 24)	**11/12 Loudness** (Ch22)
13	**11/17 Loudness (Ch22)**	**11/19 Pitch Perception** (Ch.23)
12	**11/24 Timbre** (Ch.24)	**11/26 Thanksgiving**
14	**12/1 Review III** [All]	**12/3** ***Final Exam***
15	*No class (Finals week)*	*No class (Finals week)*