

# PHYS 181 SYLLABUS Spring 2017

## COURSE:           Acoustics Lab PHYS 181

**TEXT/Materials:**   **ALL course information is posted on BlackBoard,**  
And, can be referred to “*Why You Hear What You Hear*”, Eric J. Heller,  
Princeton

### Course Description:

An experimental lab designed to be taken concurrently with the lecture course (PHYS 180), which is an 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.  
Credits: 1

### 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 through practical experimental activities.

**Student Learning Outcomes:** Upon successful completion of this practical experimental 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
- The basics of sound making and detection equipment and room acoustics.
- Students will learn how to use a specialized computer based software (Virtin's multimeter) to detect, generate and analyze sound signals both in time and frequency domain.
- Students will learn how to **make your own simple musical instrument and test it!**

**Remarks:** *PHYS 181 Lab course is not required to pass this PHYS 180 course, which is independent of this course in terms of credits. However, some programs/departments may elect PHYS 181 as required. Please check with your own department. And, PHYS 181 requires PHYS 180 to register.*

The *most* **ESSENTIAL** in this class is: **COMMUNICATION!**

**CLASS MEETINGS:**     Lab   Fridays 10:00 – 11:50, Faraday Hall 105

**Instructor:**           Yasuo Ito, La Tourette (former FW) 218; 815-753-6477  
**TA:**                     Mason Hayward (Z1679758@students.niu.edu)  
**Office Hours:**        Tuesdays and Thursdays, 2.00 - 3:00; or by appointment  
**Email:**                 [yito@niu.edu](mailto:yito@niu.edu)

## **GRADING:**

**Course grades** will be **based on Attendance and Lab Reports** completed by each student. **Reports for all labs, including full reports for 2 selected labs (TBA).** Most experiments will be done in small groups, where lab partners will have the same data, but each student will prepare their own lab report.

*At the end of each lab session, each group has to show their results to Dr. Ito or TA, and has a short discussion.*

Lab schedules will be updated throughout the semester. See the "P181 Lab Information" document for more information on lab experiments and lab reports.

*From this semester, a new grading system with “-“ and “+” will be introduced\*.*

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

### Scale:

A	$90 \leq x \leq 100$
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	$60 \leq x < 65$
D	$50 \leq x < 60$
F	$x < 50$

*If you know your absence prior to the class, please let me know at that point. Otherwise, please let me know by email 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.*

***Make up lab time can be arranged up to 3 sessions during no lab Fridays by appointment.***

## **COURSE POLICIES INCLUDE:**

1. Be respectful of each other (this applies to Instructors, TA's and students).
2. Be aware of the policies and procedures regarding your rights as well as responsibilities that are published in the NIU Student Code of Conduct. It is available on line at [http://www.stuaff.niu.edu/judicial/24430jo\(body\).pdf](http://www.stuaff.niu.edu/judicial/24430jo(body).pdf) .
3. If you feel there was an error in the grading of a lab report, submit a written request within 48 hours to the Instructor's mail box in Faraday West 202. Your entire lab report will be re-graded and returned to you.

**(Tentative schedule) to be finalized**

<b>Week</b>	<b>Dates (Fridays)</b>
<b>1</b>	<b>1/20 Orientation. Lab#1 assignment: Graph problem solving lab. Given on-line through Blackboard</b>
<b>2</b>	<b>1/27 Lab #2 Analyzing Sound Waves I</b>
<b>3</b>	<b>2/3 Lab #3 Analyzing Sound Waves II</b>
<b>4</b>	<b>2/10 Lab #4 Simple Harmonic Motion</b>
<b>5</b>	<b>2/17 Report writing day</b>
<b>6</b>	<b>2/24 Lab #5 Analyzing Sound Waves III</b>
<b>7</b>	<b>3/3 Lab #6 Interference and Sound Waves I</b>
<b>8</b>	<b>3/10 TBA (<i>Makeup labs&amp;Report Q&amp;A</i>)</b>
<b>9</b>	<b>3/17 Spring break</b>
<b>10</b>	<b>3/24 Lab #7 Speed of Sound - Resonance</b>
<b>11</b>	<b>3/31 Lab #8a Make and test your musical instrument</b>
<b>12</b>	<b>4/7 Lab #8b Make and test your musical instrument.</b>
<b>13</b>	<b>4/14 Lab #9 Reflection of Sound Waves</b>
<b>14</b>	<b>4/21 Acoustic chamber tour</b>
<b>15</b>	<b>4/28 <i>Makeup labs</i></b>