

# **PHYS1406: Physics of Sound and Music**

**Spring 2021**

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# Topics we'll cover this semester

- Preliminaries: Basic math, music, and physics terminology
- Physics of oscillations and waves
- Production of sound (instruments and voice)
- Perception of sound (hearing, loudness, pitch & timbre)
- Auditorium and room acoustics; electrical reproduction of sound
- Musical scales and tuning systems (standardization of musical notes)

**Why are you in this class?**

**What questions about sound & music would you like answered?**

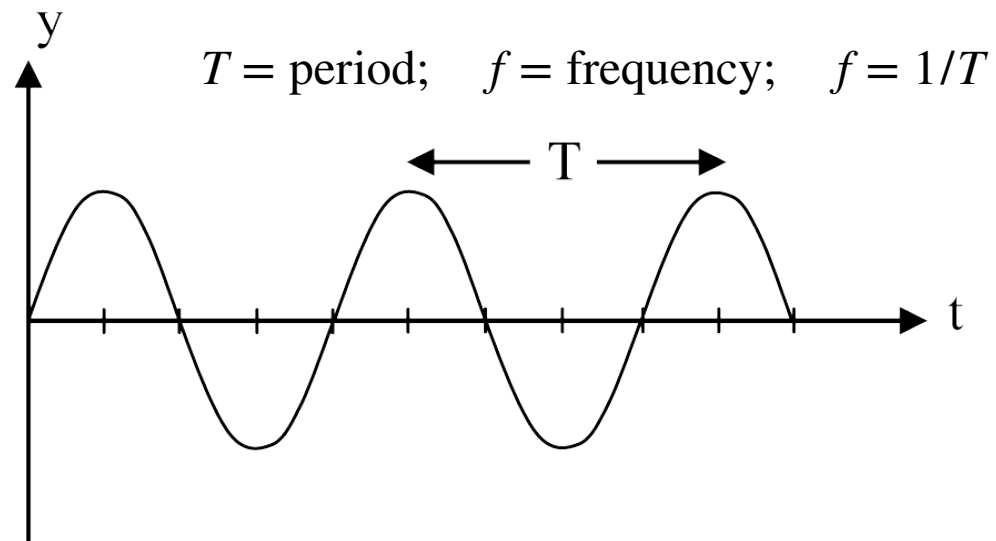
**What is sound? What differentiates speech, music, & noise?**

# **Demos: sound measuring devices & musical instruments**

# Range of human hearing

<https://www.szynalski.com/tone-generator/>

- Normal range: 20 Hz - 20,000 Hz
- Hertz (Hz): 1 Hz = 1 cycle/sec



# 1. Preliminaries



# Basic math review

- Entering numbers on a calculator: What's the value of  $1/2\pi$ ?
- Fractions: What's the value of 2 divided by  $3/2$ ?
- Powers (exponential notation): What's the value of  $2^4$ ?  $10^3$ ?  $10^{-2}$ ?

- Prefixes:

|           |           |           |           |        |        |        |           |
|-----------|-----------|-----------|-----------|--------|--------|--------|-----------|
| nano      | micro     | milli     | centi     | kilo   | mega   | giga   | tera      |
| $10^{-9}$ | $10^{-6}$ | $10^{-3}$ | $10^{-2}$ | $10^3$ | $10^6$ | $10^9$ | $10^{12}$ |

- Comparing two numbers: Compare the heights of two people, one who is 5.5 ft tall versus another who is 72 inches all.
- Converting units: The speed of sound in air at room temperature (25 celsius) is 346 m/s. What is its value in ft/s? miles/s?

# Linear vs logarithmic scales

