Physics 140
The Greenhouse Effect
1/22/2020
Course Website

http://www.physics.rutgers.edu/ugrad/140/

- Syllabus
- Course Notes & Homework Assignments
- Breakdown of Grades
- View Your Grades

- You should expect changes and updates throughout the semester.
Course Website

http://www.physics.rutgers.edu/ugrad/140/
# Course Website - Syllabus

## Physics 140 - The Greenhouse Effect

**Spring 2020**

Note: Expect small changes throughout the term.

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday Lecture</th>
<th>Wednesday Lecture</th>
<th>Lecture Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 20</td>
<td>Martin Luther King Jr. Day: No Lecture</td>
<td>Introduction/Overview</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Jan 27</td>
<td>Scientific Notation</td>
<td>Heat, Temperature</td>
<td>Monday Wednesday</td>
</tr>
<tr>
<td>Feb 3</td>
<td>Energy, Blackbody Radiation</td>
<td>Blackbody Spectra</td>
<td>Monday Wednesday</td>
</tr>
<tr>
<td>Feb 10</td>
<td>Chasing Ice?</td>
<td>Greenhouse Gases</td>
<td>Monday Wednesday</td>
</tr>
<tr>
<td>Feb 17</td>
<td>Molecular Bonds</td>
<td>Carbon Cycle</td>
<td>Monday Wednesday</td>
</tr>
</tbody>
</table>
## Grading Scheme

<table>
<thead>
<tr>
<th>Required Assignments</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>16</td>
</tr>
<tr>
<td>Exam 2</td>
<td>16</td>
</tr>
<tr>
<td>Final Exam</td>
<td>32</td>
</tr>
<tr>
<td>In-Class Activities</td>
<td>12</td>
</tr>
<tr>
<td>Homework</td>
<td>12</td>
</tr>
<tr>
<td>iClicker Questions</td>
<td>12</td>
</tr>
</tbody>
</table>
Grading Scheme (Homework 12%)

- There will be approximately 6 homework assignments.
- HW will be posted on the course website.
- Each homework will be weighed equally.
- Late HW carries a penalty of 10% per calendar day.
Grading Scheme (In-Class Activities 12%)

• In-class assignments will be given almost every lecture.
• They involve calculations so always bring a calculator with you.
• Each assignment will be weighed equally.
• In-Class assignments are due at the end of the lecture time. No late assignments will be accepted.
Grading Scheme (Clicker Questions 12%)

- Multiple choice clicker questions will be asked during each lecture.
- Questions could be based on material being discussed in lecture or reading assignments.
- Reading assignment questions will be labeled “Clicker Quiz”.
- Clicker Quiz questions will assign credit only if correct while regular lecture questions will give ½ credit if wrong and 1 full point if correct.
- You are responsible for your clicker to be in working order, using the right frequency (AA) and being registered correctly.
Grading Scheme (Exams)

- Exams will be multiple-choice.
- During exams, you will be allowed to use:
  - Pencil, eraser and a scientific calculator. No other materials are allowed.
Grading Scheme
Assignment Drops

➢ iClicker: 3 will be dropped
➢ In-Class Assignments: 2 will be dropped
➢ No homework assignments or exams are dropped

• Assignment drops (if any) are to account for illness, religious holidays or any other type of excusable absence.
• These WILL NOT be dropped in addition to an excusable absence.
The Greenhouse Effect

Transparent Roof lets Sunlight in and Traps Heat that would otherwise Escape
Global Warming Controversy

• Is the earth warming?

• What is responsible for this warming?

• What should we do about it?
Basic Plots
Temperature and CO2 vs time

NASA Goddard Institute for Space Studies

Mauna Loa Monthly Mean Carbon Dioxide

Are these correlated?
Is the right one causing the left one?
Course Description

• In this class, we'll discuss the basics of the greenhouse effect.

• A key goal of the course is that the students develop the energy literacy and quantitative dexterity necessary to evaluate for themselves arguments presented in public policy discussions of global warming and climate change.
2019 was 2nd hottest year on record for Earth say NOAA, NASA

NOAA finds ocean heat content was the highest in recorded history
2019 Was the Second Warmest Year on Record

The past five years have been the warmest of the past 140 years.

Instruments:
In situ Measurements:
Model

View more Images of the Day:
More Glaciers in East Antarctica Are Waking Up
SAMPLE I-CLICKER QUESTION

What is the main difference between climate and weather?

a) There is no difference.
b) Weather is measured more carefully.
c) We rely on weather forecast to know if we need an umbrella but we can ignore changes in climate.
d) The main difference is a measure of time.
Climate vs Weather

- **Weather** pertains to state of the atmosphere at a place and time (heat, pressure, dryness, sunshine, wind, humidity, rain, etc.)

- **Climate** refers to atmospheric behavior over relatively long periods of time.

- The main difference is a measure of time.

Some scientists define climate as the average weather over a period of 30-years.
What is the main difference between climate and weather?

a) There is no difference.
b) Weather is measured more carefully.
c) We rely on weather forecast to know if we need an umbrella but we can ignore changes in climate.
d) The main difference is a measure of time (a few days vs 30 years).
Next Monday:

• 1\textsuperscript{st} in-class activity. Bring a calculator

• Will start collecting iClicker data. Bring an iClicker Remote