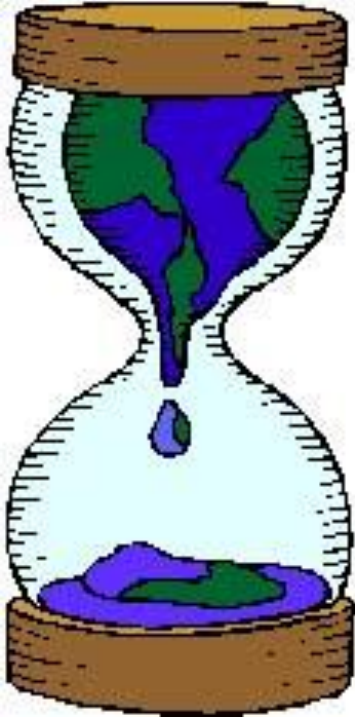


Welcome to

GC 170A1

INTRODUCTION TO

GLOBAL CHANGE



**Your should have obtained a
Course Information Sheet
& Short Background Form
when you entered the classroom.
Please get them from one of the Graduate
Teaching Assistants if you missed it.**

Your Professor:

Dr. Katie Hirschboeck *

**Associate Professor of Climatology
Laboratory of Tree-Ring Research**

*** (pronounced: "hersh-beck")
but you may call me "Dr H"**

Objectives for today's class:

- 1 – Introduction to your Teaching Team
(and how you can be a part of it)
- 2 – Overview of the course and how
you will benefit from it
- 3 – Explanation of the course logistics
- 4 – About SCIENCE & Global Change

This is a General Education / Teaching Team Course



Your Teaching Team:

Professor: Dr. Katie Hirschboeck

(Laboratory of Tree-Ring Research, LTRR)

Office: Bannister Tree-Ring Building, room 319



Your Graduate Teaching Assistants (GTA's)



Diana Zamora-Reyes
Hydrology & Water Resources
PhD Student



Scott Jones
Arid Lands
PhD Student

**GTA Office Hours
will begin next week**

and Undergraduate Preceptors

THIS COULD BE YOU!!

YOUR GC 170A I FALL 2014 PRECEPTORS



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!



This could be you!

**WHAT IS THIS COURSE
ALL ABOUT?**

**SCIENCE
& PHYSICAL SCIENCE CONCEPTS**

THE EARTH

**HOW & WHY
GLOBAL CHANGES OCCUR**

**YOUR ROLE AS
A CITIZEN OF OUR PLANET**

Why study the Earth

Western Wildfire Part of New Climate Reality: Scientist

July 5, 2013



Scientists warn that catastrophic wildfires, like the one that killed 19 firefighters in Arizona, are part of a new "normal" for the environment of the American West.

Arizona has warmed faster than any other state since 1970, with temperatures rising at a rate of 0.72 degree Fahrenheit per decade.

Climate expert Gregg Garfin of the University of Arizona points to a decade from 2001 to 2010 when his state was the hottest on record in both spring and summer.

He says warmer winters have caused that season's precipitation to fall as rain rather than snow, allowing streams and the soil to dry out more quickly when spring's arid heat arrives.

This is leaving more dry vegetation to burst into flames when struck by lightning or ignited by other factors.

A policy of putting out all fires that was established about 1900 has also disrupted the natural rhythm of the landscape, leaving vast amounts of flammable material piled up and ready to catch fire under the hotter and warmer conditions of the 21st century.



One of the most deadly Arizona firestorms in a generation killed 19 firefighters as it blackened nearly 10,000 acres northwest of Phoenix.

Photo: File

fails to meet minimum...
future demands for water will not be met,

Journal Bioscience, they write that a flower

<http://www.earthweek.com>

Life forms that are not native to Nunavut's Arctic environment have started showing up over the past few years, including a wasp-like insect.

July 16, 2010

May 27, 2011

IMAGE

2003 2004

15, 2011

cent

g daily

Questions GLOBAL CHANGE SCIENTISTS are asking and studying:

- **How and why are these changes occurring?**
- **What are the impacts? Who will be most vulnerable? Where will impacts be greatest?**
- **Can human beings do anything to stop or mitigate these changes?**
- **. . . or are they part of “natural variability” that will happen no matter what we do?**
- **How can humanity adapt to global changes?**

THESE ISSUES ARE NOT WITHOUT CONTROVERSY!! We'll address this too!



SHOULD THE UNITED STATES ADOPT A TAX ON CARBON?

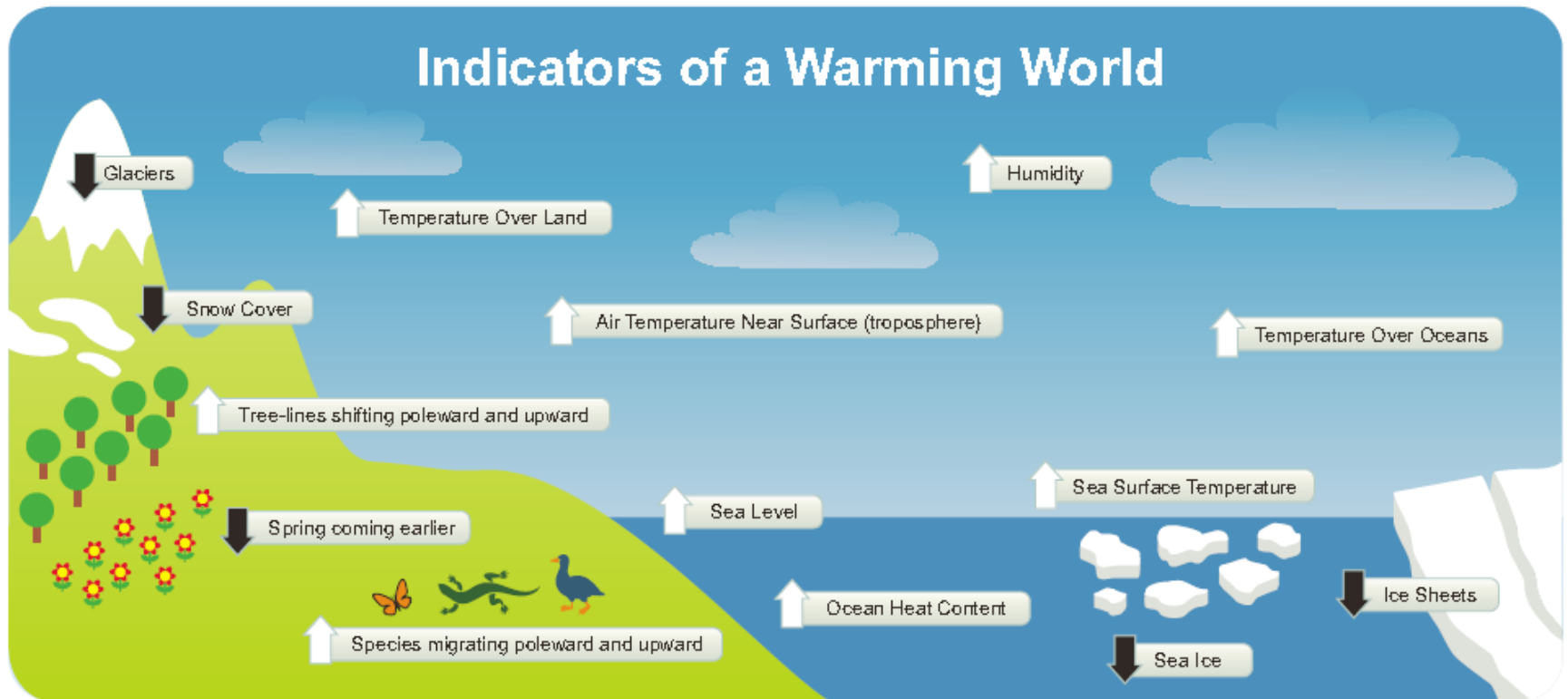
Should the United States adopt a tax on carbon? Yes: It would spur growth, innovation

SHOULD THE UNITED STATES ADOPT A TAX ON CARBON?

Should the United States adopt a tax on carbon? No: It would hobble economic recovery

CAGLE CARTOONS.COM
FITZSIMMONS/STRAZ DAILY STAR 2012

GOAL #1: By the end of the semester, you will be able to explain how and why each of these indicators are changing and what it means for the planet – and you!

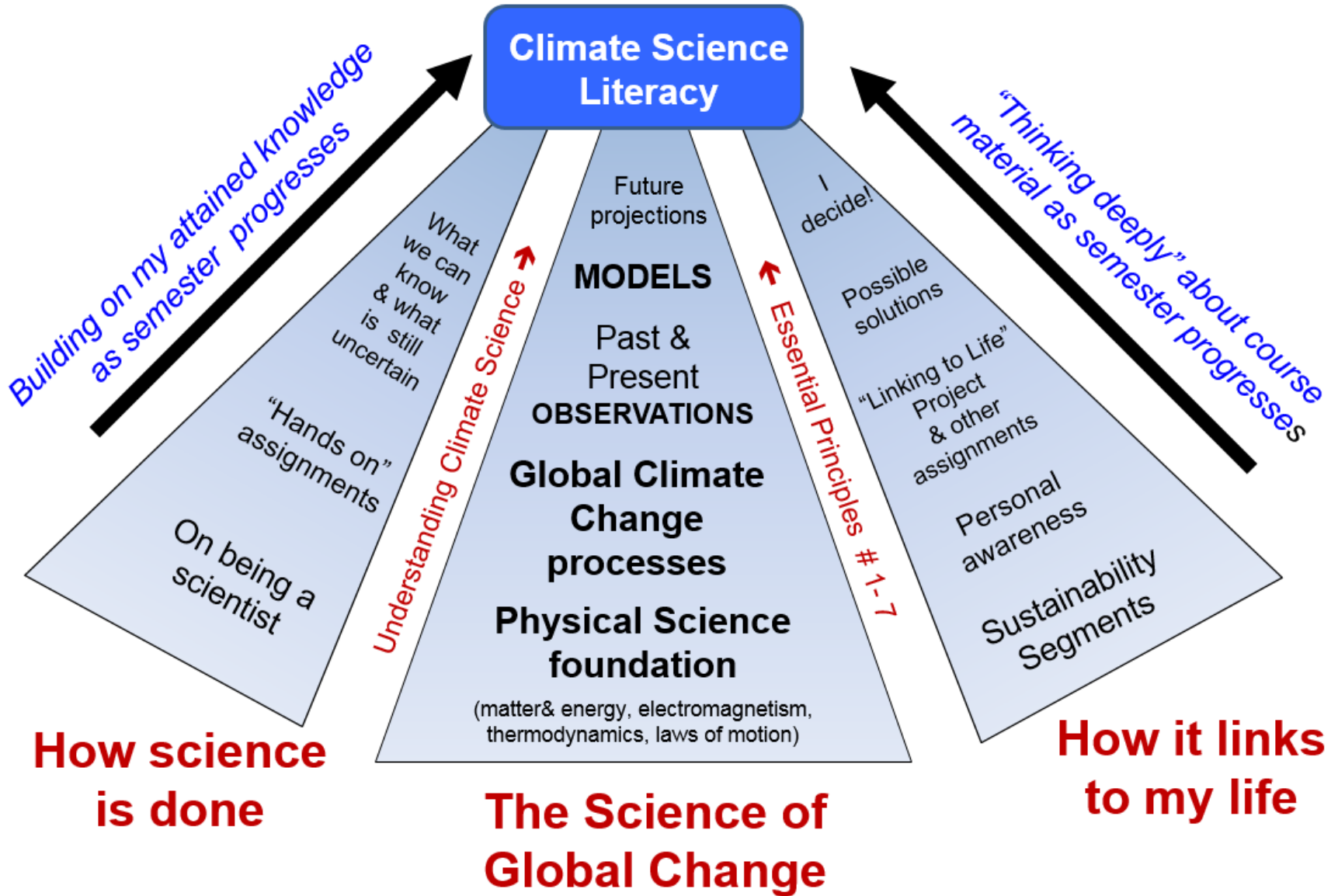


GOAL #2: By the end of the semester, you will be able to critically evaluate and knowledgeably discuss the indicators that point to a “human” fingerprint in what’s driving climate change:



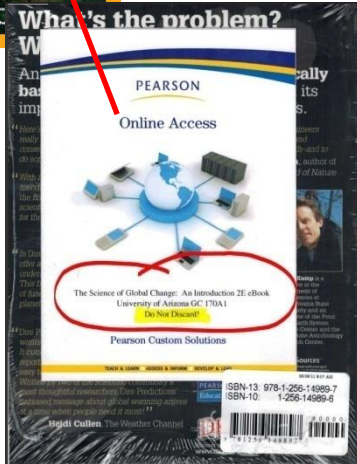
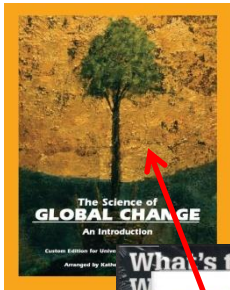
... and then make some informed decisions on what can be done about it!

OVERALL GOAL: Enhanced Understanding Of Global Change Science, How It Operates, & What It Means To Me Personally

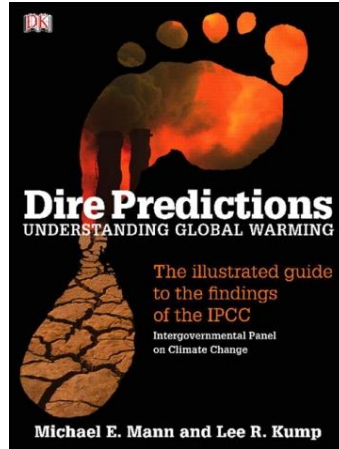


COURSE LOGISTICS

COURSE LOGISTICS



E-text



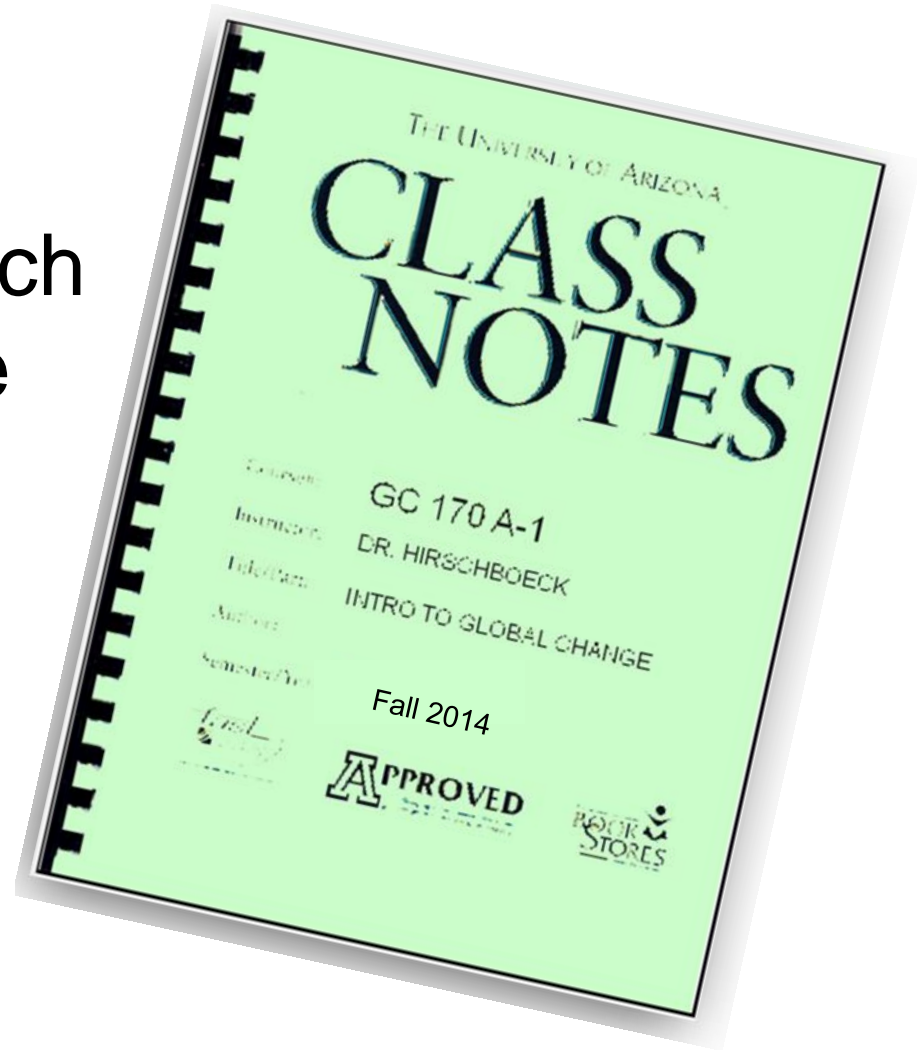
Required:
2 TEXTBOOKS
1 e-book (online)
+ one paperback

Begin reading Chapter 1 now in E-Text. . .

NOTE: assigned readings will be listed in the weekly
D2L Checklist &
on the **Reading Assignments Schedule.**

COURSE LOGISTICS

. . . Plus a **CLASS NOTES PACKET** which will be available in the ASUA Bookstore sometime **next week** (after Labor Day).



COURSE LOGISTICS

... plus a
Turning Tech “CLICKER” Device

OR

a ResponseWare License to use
with your own device (laptop,
smartphone, tablet)

Clickers are available in the ASUA
Bookstore; the Responseware
license is purchased only.

You'll need a registered response device starting
NEXT WEEK ON Thursday.



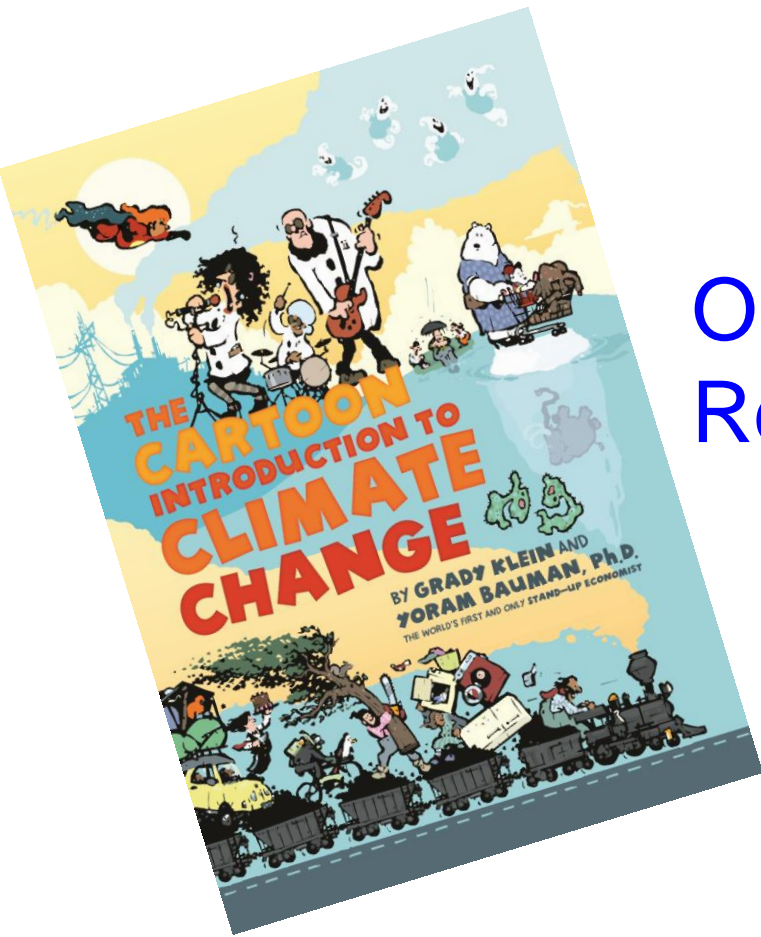
*Turning Technologies
Response Device
(Clicker)*

OR

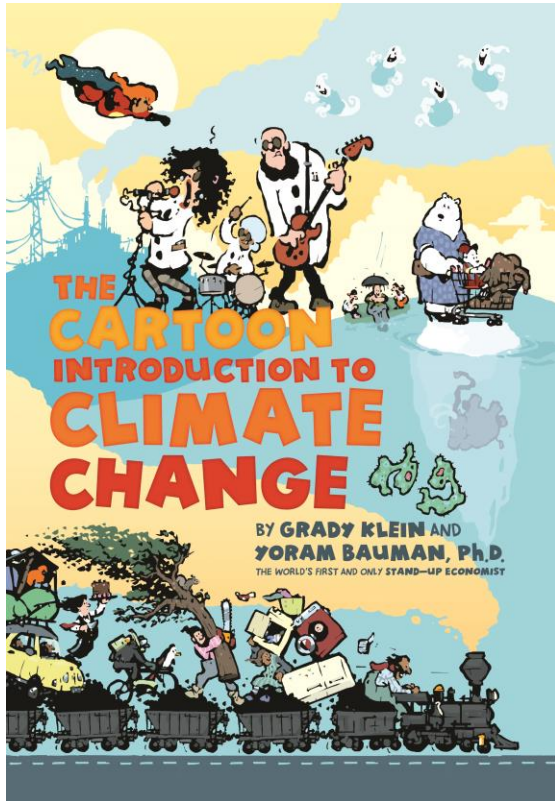
*ResponseWare License
to use with:*



COURSE LOGISTICS



OPTIONAL TEXT:
Recommend, but not required



We viewed several slides
← from Chapter 1 of this
book, but due to copyright
restrictions I will not be
posting the slides from this
text – only showing the slides
in class.
(That's another reason to
not miss class!!)



If you'd like to see the slides — or the entire
book— please support the authors by
purchasing *The Cartoon Introduction to
Climate Change* from your favorite bookstore
– or share a copy with a classmate!

MORE ON COURSE LOGISTICS

How this class will operate:

**Class is divided
into ~ 20
collaborative
learning groups**



**Most of you are
first-year
students & non-
science majors**

WHAT KIND OF BACKGROUND DO I HAVE TO HAVE?

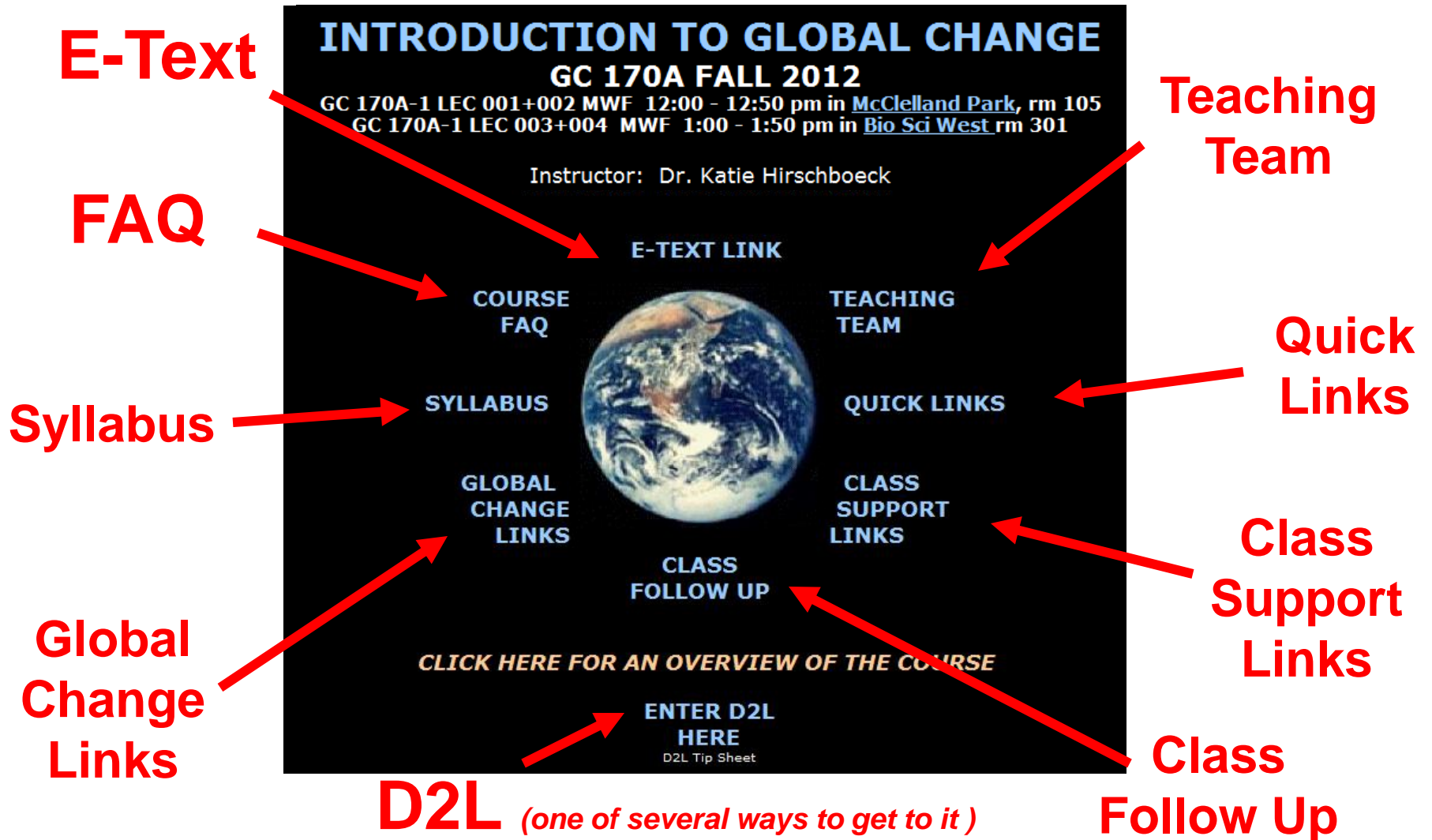
- **CRITICAL READING SKILLS**
- **WRITING SKILLS**
- **BASIC MATH & QUANTITATIVE REASONING SKILLS**
- **HIGH SCHOOL SCIENCE**
- **TEAM WORK SKILLS**

Important: regular computer access is REQUIRED for this class!

COURSE LOGISTICS

GC 170A Website (external & in D2L)

<http://www.ltrr.arizona.edu/kkh/natsgc/>

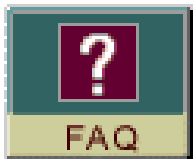
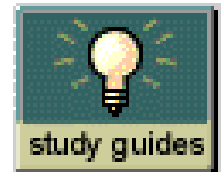
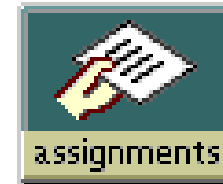
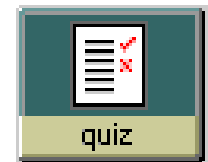


COURSE TOOLS WE'LL USE in D2L:

D2L = "Desire To Learn"

**OUR D2L SITE
MAY LOOK
DIFFERENT THAN
D2L IN SOME OF
YOUR OTHER
COURSES . . .**

**THE CHECKLIST
WILL GUIDE YOU!!**



OUR CLASS D2L SITE LAYOUT

The screenshot shows the D2L interface for course GC170A1. At the top left is the Arizona State University logo. The course title 'GC170A1' is displayed. Navigation links include 'Course Home', 'Classlist', 'Chat', 'Discussions', 'GRADES', 'SEMESTER-ON-A-PAGE', and 'READING & RQ SCHEDULE'. A 'News' section is on the left, and a 'Calendar' is on the right. The main content area is titled 'GC 170A1 INTRODUCTION TO GLOBAL CHANGE' and contains a grid of course tools. A 'LATEST NEWS' section is at the bottom.

Gradebook

Semester-on-a-Page

Reading & Online Quiz Schedule

Course Home | Classlist | Chat | Discussions | GRADES | SEMESTER-ON-A-PAGE | READING & RQ SCHEDULE

News

GC COURSE TOOLS

GC 170A1 INTRODUCTION TO GLOBAL CHANGE

Our D2L Course Tools

- E-Text Link
- Course Web
- Syllabus
- Course FAQ
- Checklist Tool
- Class Follow-Up
- Videos
- Dropbox
- Assignments
- Self Tests
- RQ's
- Study Guides

Calendar

Tuesday, August 27, 2013

Upcoming events

AUG 29 12:30 PM Read Essay "On Scientific Method" by Robert Pirsig - Due

Events (due dates etc.)

News & Announcements

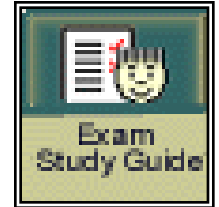
LATEST NEWS

LATEST NEWS & ANNOUNCEMENTS
(check this spot regularly for all important announcements about our class)

WELCOME TO GC 170A1 INTRODUCTION TO GLOBAL CHANGE!

Multi-Tiered Testing Approach:

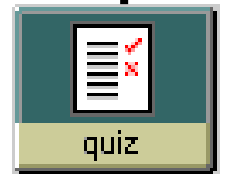
Midterm & Final
Individual Exams



In-class Individual &
Group Tests



Online Readiness
Quizzes



Ungraded
Self-Tests



**HIGH
STAKES
TESTING**



**LOW
STAKES
TESTING**

Example: **Short in-class test procedure:**

10-questions!

You'll take the test as an individual first . . .



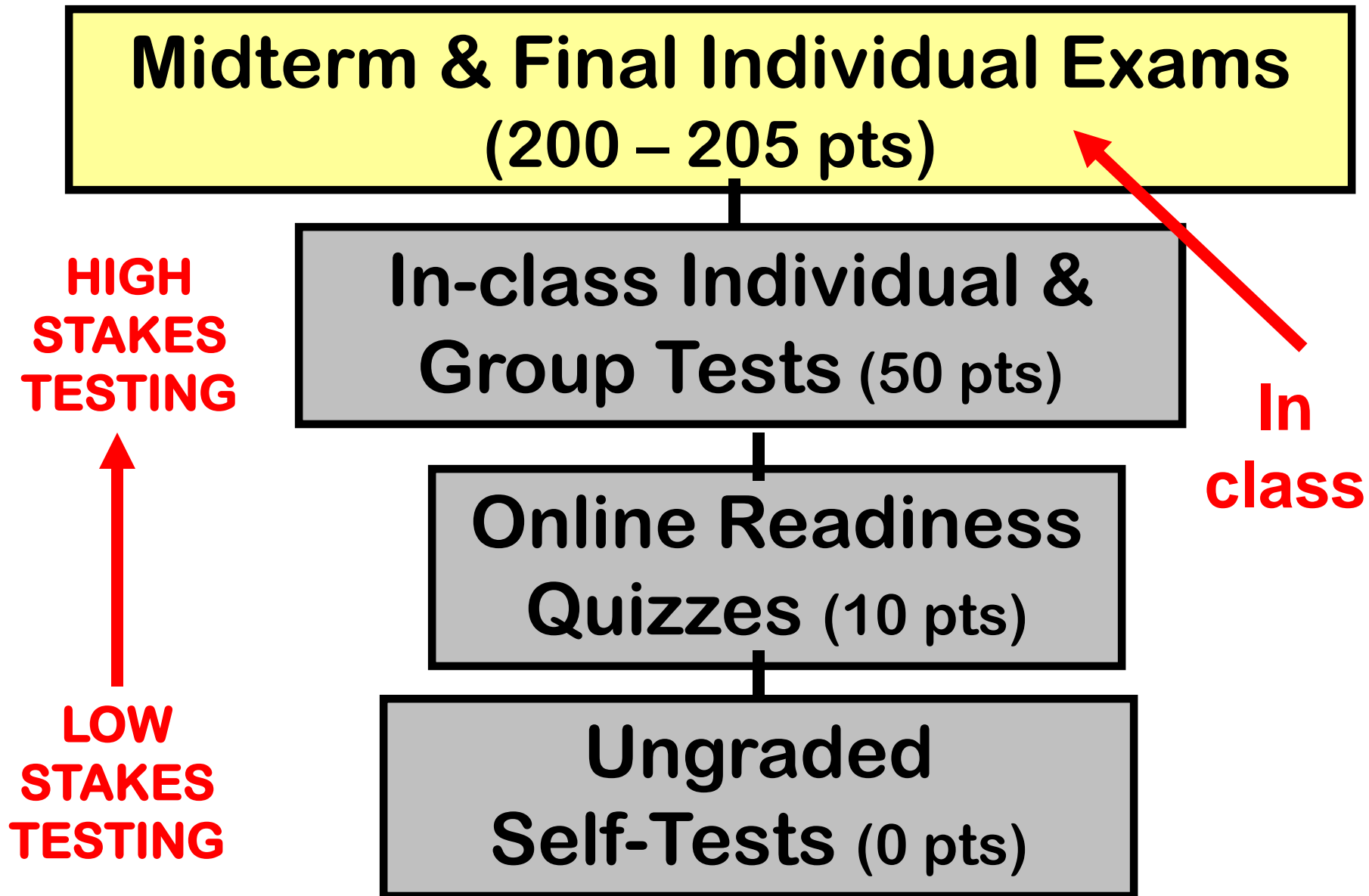
After individual tests are completed . . .

you'll get into your group & take the same test together as a group!



You'll find out your Group Test score right after you take it . . .

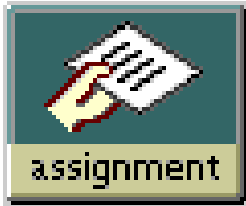
Multi-Tiered Testing Approach:



Group

ASSIGNMENTS

Individual



In Class assignments

GROUP ASSIGNMENTS *(In-Class Activities)*



G-1 Understanding Absorption Curves



G-2 Energy Efficiency



G-3 Tree-Ring Activity Parts I & II



G-4 Applying the Energy Balance Terms



G-5 Volcanism & Climate

INDIVIDUAL ASSIGNMENTS *(Short Writing Assignments)*



I-1 Climate Science Basics
Lesson 1 CO₂ & the GH Effect



I-2 Climate Science Basics
Lesson 2 Mother Nature's Influence



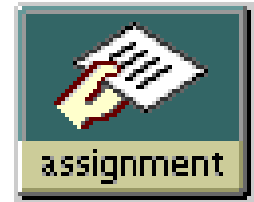
I-3 Climate Science Basics
Lesson 3 Observable Changes



I-4 Climate Science Basics
Lesson 4 Intro to Climate Modeling



I-5 Class "Climate Action Debate" Preparation



Short Writing assignments

LINKING-TO-LIFE PROJECT *(Individual Term Project in 4 Parts)*



Part A Your Ecological Footprint



Part B Thinking More Deeply

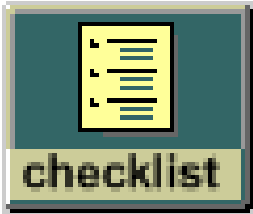


Part C Film Review Discussion Posts



Part D Final Project Report

Linking-to-Life Project



The D2L Checklist Tool

[Check off each task as you complete it to stay on track & document your progress]

A screenshot of the D2L Checklist Tool interface. The top navigation bar is red with the Arizona State University logo and the course title "GC 170A1 INTRO TO GLOBAL CHANGE SEC 001 + 002". Below the navigation bar is a yellow menu with options: "Course Home", "Classlist", "Chat", "Discussions", "Checklist", "GRADES", and "SEMESTER-ON-A-PAGE". The main content area is titled "Checklists" and shows a browser window displaying a checklist for "Week 01 - Tasks for Aug 24-30". The checklist includes three main items, each with a checkbox and detailed instructions. A blue bracket on the left side of the screenshot points from the text "The D2L Checklist Tool" to the checklist content.

ARIZONA | GC 170A1 INTRO TO GLOBAL CHANGE SEC 001 + 002

Course Home | Classlist | Chat | Discussions | Checklist | GRADES | SEMESTER-ON-A-PAGE

Checklists

Week 01 - Tasks for Aug 24-30 - Google Chrome

<https://d2l.arizona.edu/d2l/common/popup/popup.d2l?ou=364936&queryString=&footerMsg=&>

Week 01 - Tasks for Aug 24-30

Purchase Textbooks

- Purchase "The Science of Global Change" (SGC) E-Text & "Dire Predictions" (DP) textbooks

Our two textbooks have been selected specifically for this GC 170A! Lec 001 + 002 and are **available at the ASUA Bookstore in a single package under the author name KUMP.**

Science of Global Change E-TEXT: A pamphlet with registration directions to access the E-Text online comes shrinkwrapped in the Textbook Package. It is labeled **PEARSON Online Access.**

Dire Predictions text: The shrinkwrapped package also contains the *Dire Predictions* paperback text. (no need to purchase it separately!)

[NOTE: Please contact Dr. H immediately if you discover that the bookstore has run out of copies of the textbook package.]

- Purchase Turning Tech Response Card device ("Clicker") or ResponseWare License

Information on how to decide which is right for you -- are posted under [QUICK LINKS](#) on the Main GC Webpage:

Option A = a Response card "clicker" device (which you will need to bring to class each day)
(NOTE: You should be able to use the Turning Tech clicker in several of your UA courses.)

OR

Option B = ResponseWare (i.e., "virtual clicker license" which you purchase so that you can gain access to an online interface for answering clicker questions. It can be used with a laptop, tablet or smartphone (iPhone or Android)

The logistics of how to register your Clicker or Responsware devices will be explained in class.

See [QUICK LINKS](#) for more details.

- If desired, purchase the recommended text "The Cartoon Intoduction to Climate Change"

This recommended text will be used in class lectures and referred to throughout the semester -- it is **RECOMMENDED ONLY** and **NOT REQUIRED**. but you may find it informative, easy to read and fun.

The Cartoon Introduction to Climate Change

GETTING STARTED:

1. On the **CLASS WEBPAGE**, read & study the **Syllabus** and the **online FAQ** (Frequently Asked Questions)
POP QUIZ in class coming up about this!
(To test yourself, take the Practice Self Test)
2. **Purchase and REGISTER YOUR E-TEXTBOOK & begin reading CHAPTER 1.**



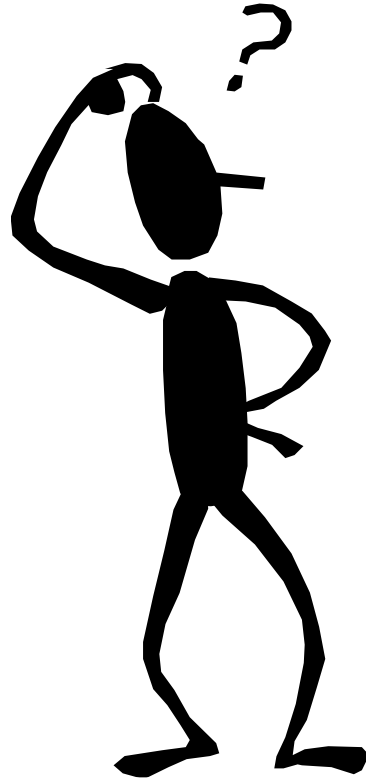
“Dr. H” CLASSROOM POLICIES



(more at online FAQ “Frequently Asked Questions”):

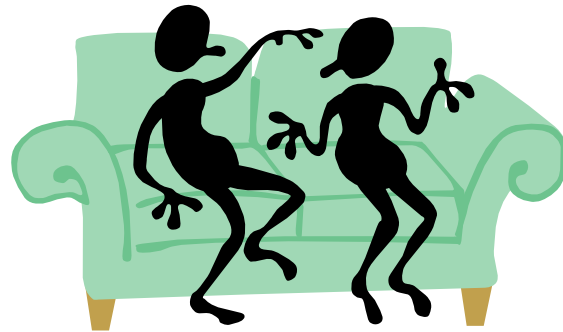
1. Sorry, but no questions can be answered *before* class until teaching equipment is set up.
2. Questions *after* class will be answered after the equipment has been shut down.
3. **Don’t distract your fellow students!** Unless laptops, phones or tablets are being used in class for an approved “Response Device Session” all electronic devices must be shut off throughout the class period. See FAQ #36
4. **No Texting – you could be called on at any moment!**
5. Respect your professor and each other. **Refrain from side conversations** during lectures, presentations, videos, etc.
6. Coming & going is distracting and disruptive to your classmates and the professor! **If you get up and leave the classroom in the middle of class, please don’t return!**

QUESTION BREAK!



Get to know someone in class:

- 1. Name?**
- 2. Where from?**
- 3. What year & major?**
- 4. Most interesting place on Earth visited?**
- 5. Ever experienced an unusual environmental phenomenon?**
(flood, landslide, earthquake, tornado, wildfire, etc. .)

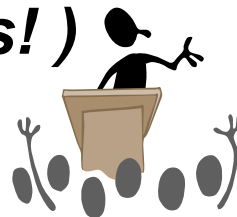


**Please complete and pass your
Background Forms
to the TA's . . .**

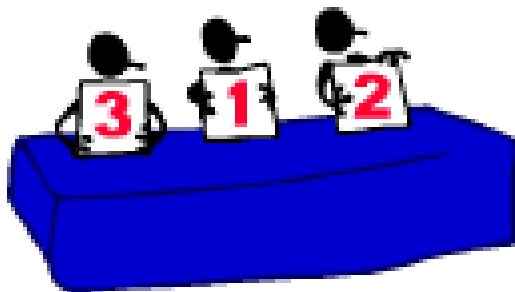
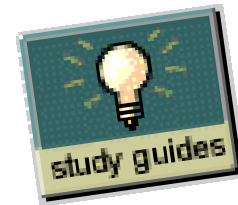
WHAT KIND OF STUDENT SHOULD I BE IN ORDER TO GET MY MONEY'S WORTH OUT OF THIS COURSE?

Students who mesh well with Dr. H's teaching style and the format of this GC 170A lecture section:

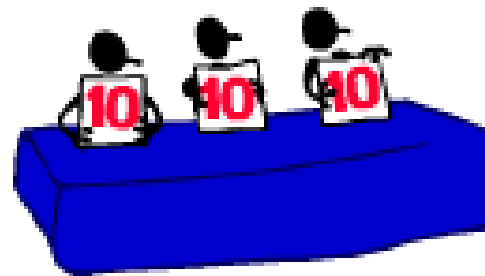
- **Like a class that is structured with lots of online support**
- **Enjoy working with fellow students in groups during part of the class period (not a loner)**
- **Have convenient access to a computer and the internet and check it frequently**
- **Are "visual" learners who like lots of graphics & videos in lectures**
- **Attend class regularly and like to keep up with the material as it is taught (tiered testing helps!)**
- **Have a sense of humor!**



Taking full advantage of **ALL** the learning tools and resources this course offers offer will give you the best return on your investment

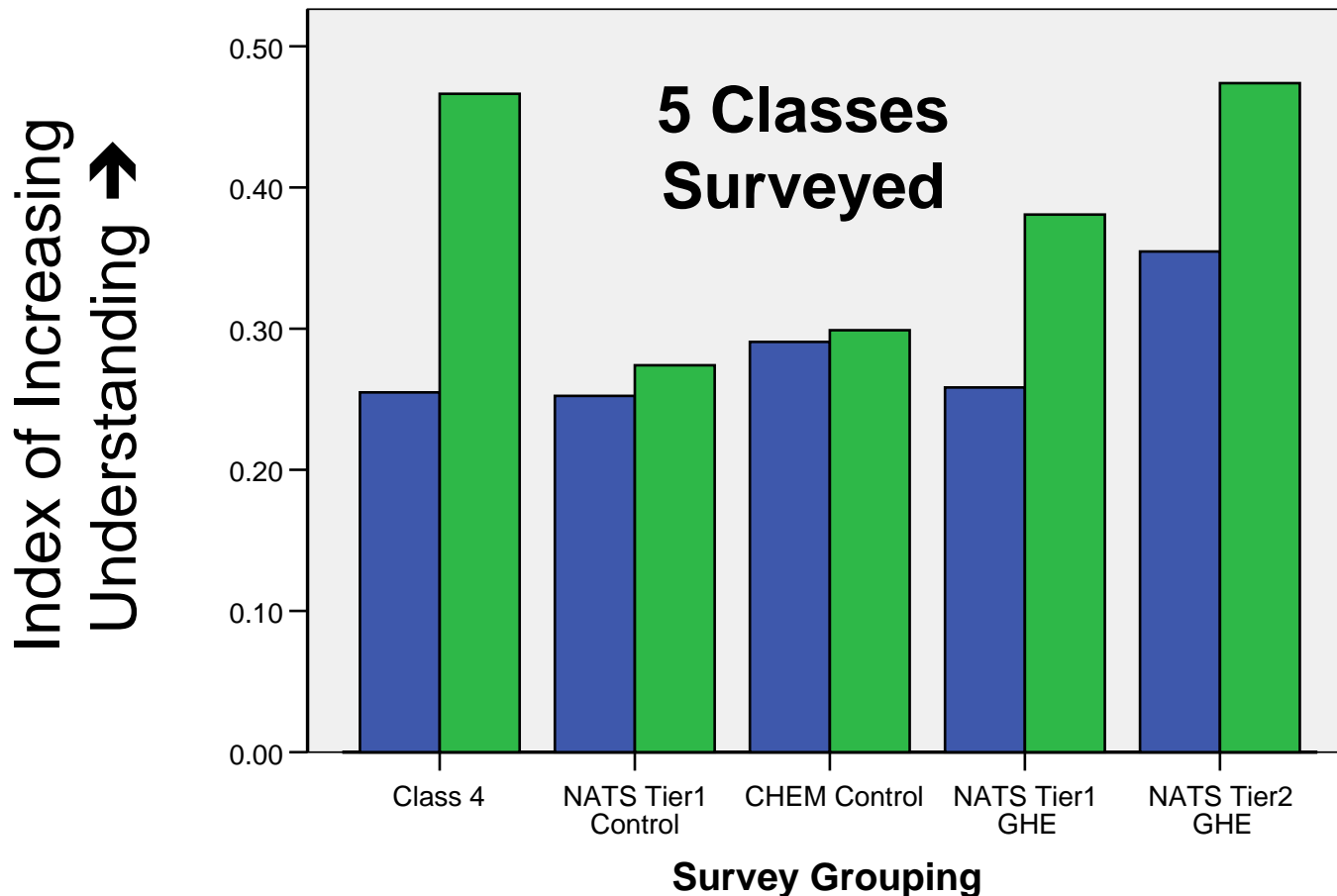


OR




Student Pre & Post-Test Study on : “How well do you understand the science underlying the GREENHOUSE EFFECT?”


 = Start of Semester Scores  = End of Semester Scores



“How well do you understand the science underlying the GREENHOUSE EFFECT?”

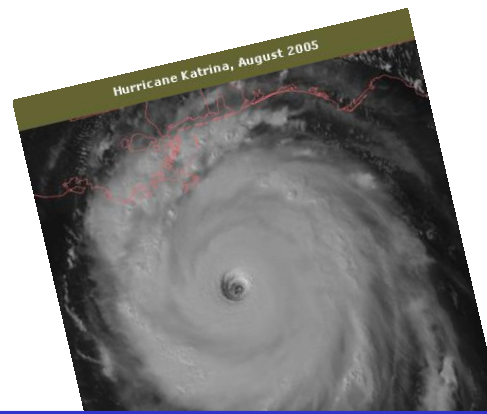
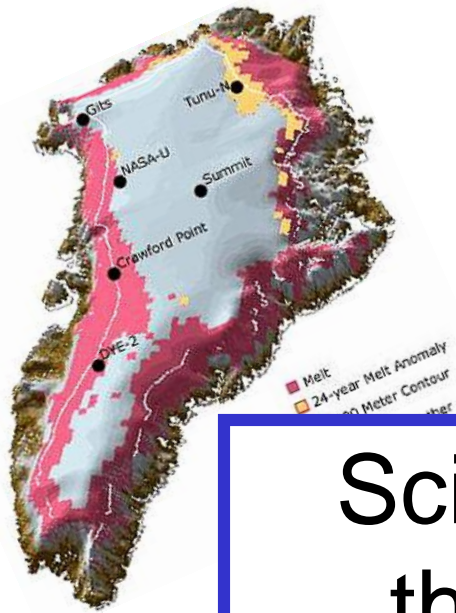
**Dr. H's
GC Class**

 = Start of Semester Scores

 = End of Semester Scores

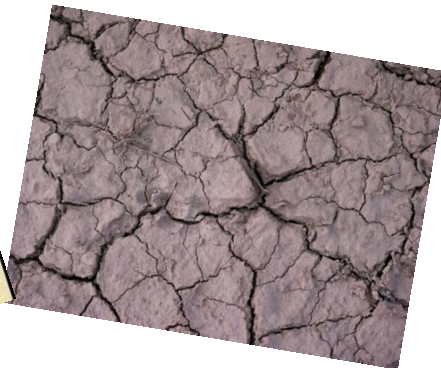


**A FEW COMMENTS
ON SCIENCE
&
GLOBAL CHANGE**



Science is demonstrating
that this planet is more
vulnerable than had
previously been thought.

~ Richard Benedick



Is there “a” single scientific method?

Many scientists regard such blanket descriptions of what they do with suspicion.

The traditional approach is typically stated as:

observation → hypothesis → prediction → testing

. . . but there are actually many ways of doing science!
scientists use a ***body of methods*** particular to their work.

All approaches contain the key steps of:

OBSERVATION, ANALYSIS and drawing **CONCLUSIONS**

These must be repeatable and able to be substantiated by others.

HYPOTHESES are “tentative guesses” based on observations, *in contrast to . . .*

THEORIES have met extensive observational and experimental tests.

A **long-standing THEORY** (which has not been disproven) is the closest thing we have to a law!

(The derisive phrase “just a theory” does not apply to a well-substantiated theory that has stood the test of time!)

LAWS apply everywhere in the universe and are overarching statements about how the universe works.

Observations?

- How can the **whole Earth** be observed?
 - collecting & monitoring LOTS of data
 - plus remote sensing from satellites



- How can change over **long periods of time** be observed?



- paleoclimatic indicators,
“natural archives” (tree rings, etc.)

- Combine the above with computer models of past, present and future environments based on input from local, regional, and global observations

How do SCIENTISTS talk about science? . . .



www.symphonyofscience.com/videos.html

When you get you CLASS NOTES next week, read through the interesting QUOTES by scientists under TOPIC #1

We'll start each class the semester with a quote that fits the day's topic.

RECAP: ASSIGNMENTS FOR THURSDAY:

1. On the **CLASS WEBPAGE**, read & study the **Syllabus** and the **online FAQ** (Frequently Asked Questions)
POP QUIZ in class coming up about this
(To test yourself, take the Practice Self Test)
2. **Purchase & REGISTER YOUR E-TEXTBOOK**
& begin reading **CHAPTER 1.**



**SEE YOU ON
THURSDAY!!**

(if you want to
ADD the course
see Dr H right now!)