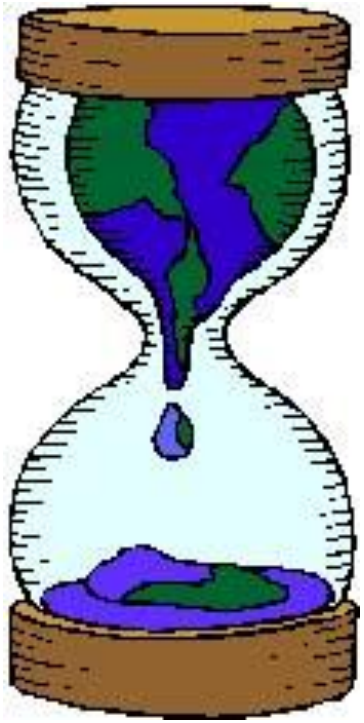
Welcome to **GC 170A1**

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 1 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 lighting 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

http://www.earthweek

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!

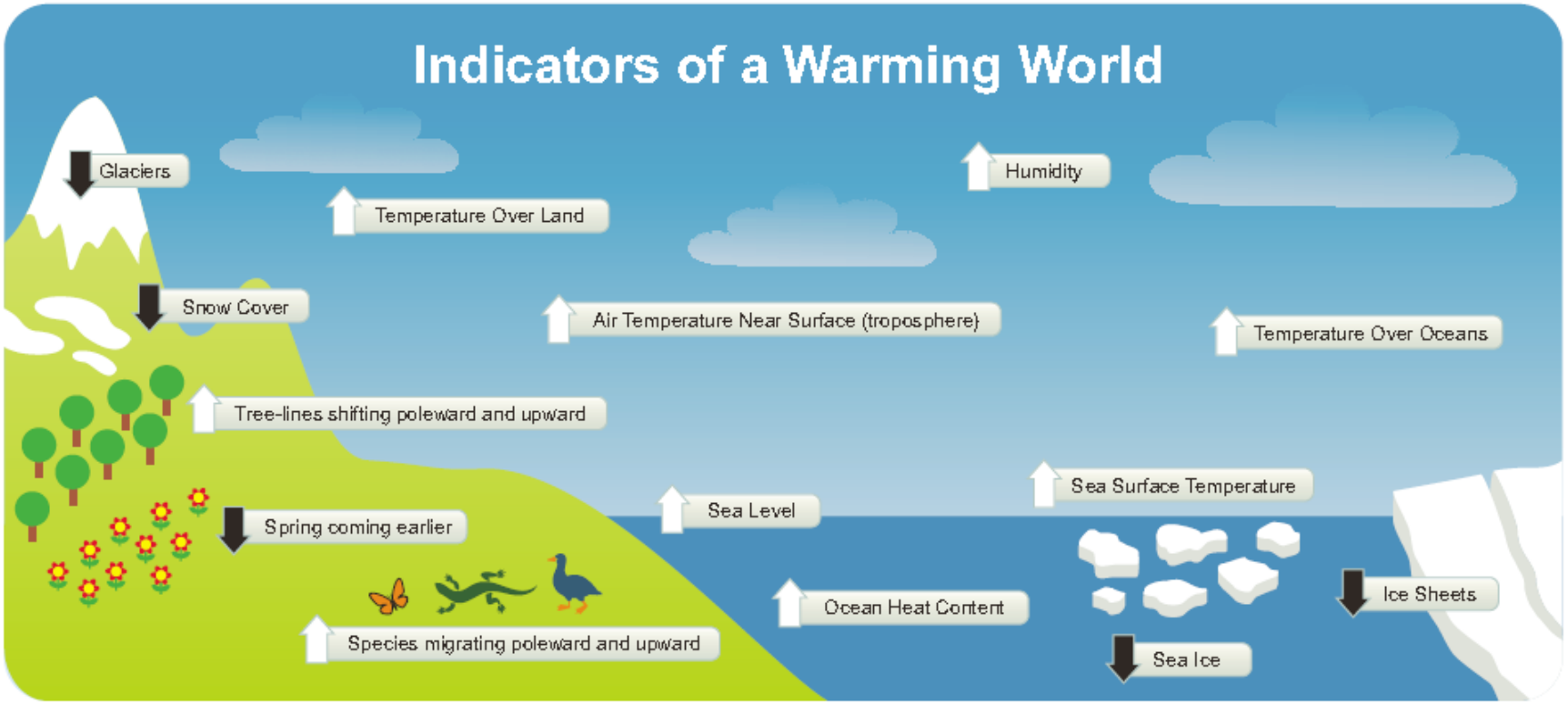
SHOULD THE UNITED STATES ADOPT A TAX ON CARBON?

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

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!

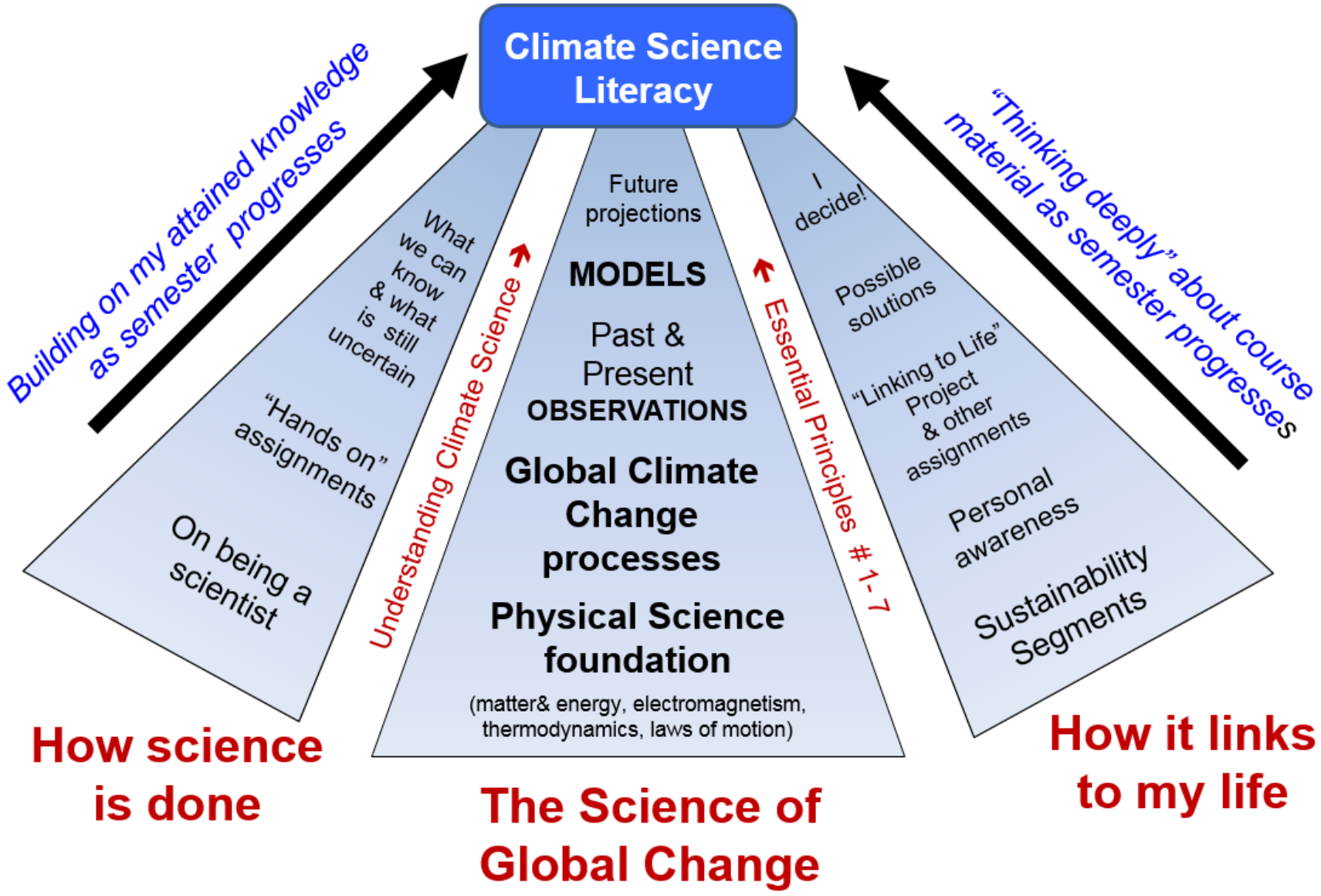


Parmesan & Yohe 2003[32], NOAA[34]

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:

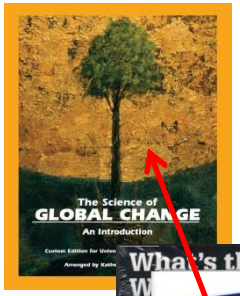
. . . and then make some informed decisions on what can be done about it!

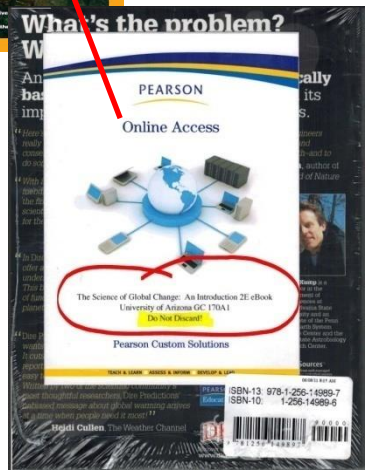
OVERALL GOAL: Enhanced Understanding Of Global Change Science, How It Operates, & What It Means To Me Personally



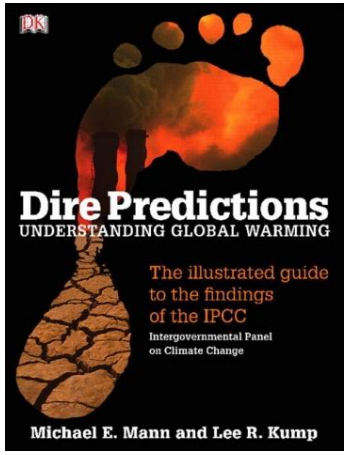
COURSE LOGISTICS

COURSE LOGISTICS





E-text



Required:

2 TEXTBOOKS

1 e-book (online)

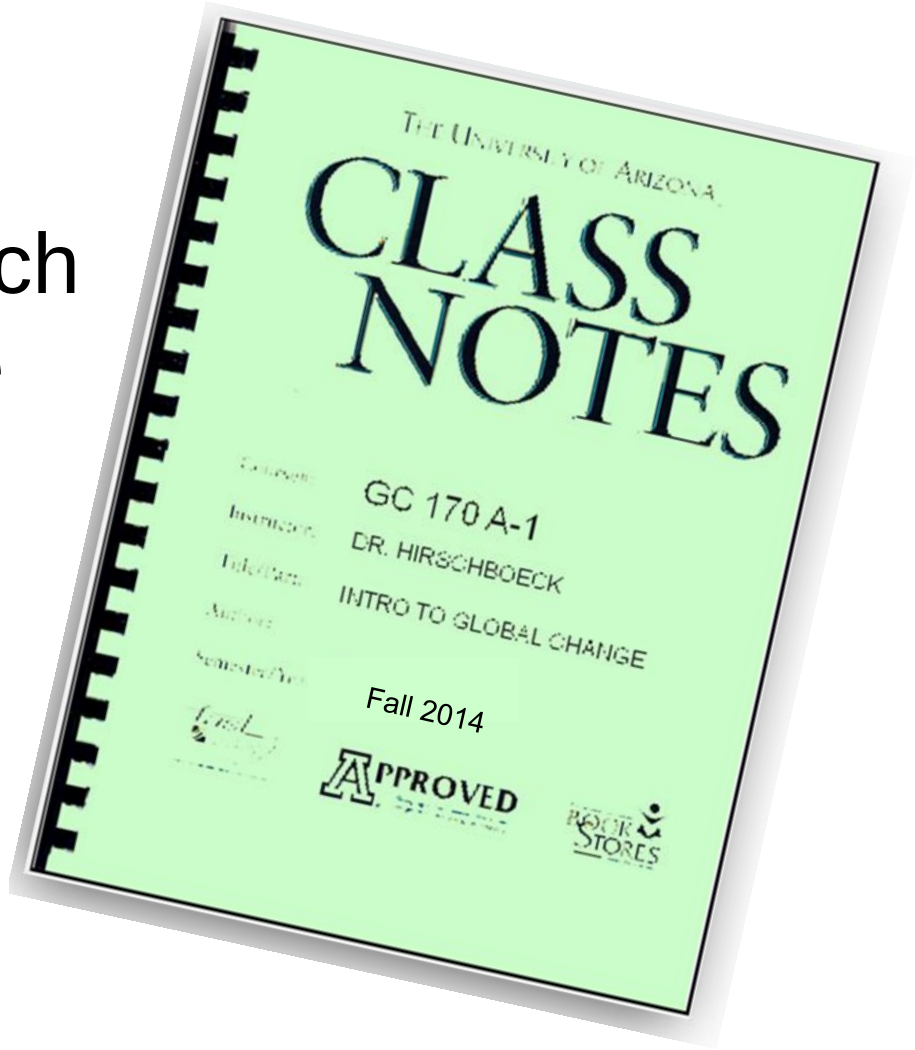
+ one paperback

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)

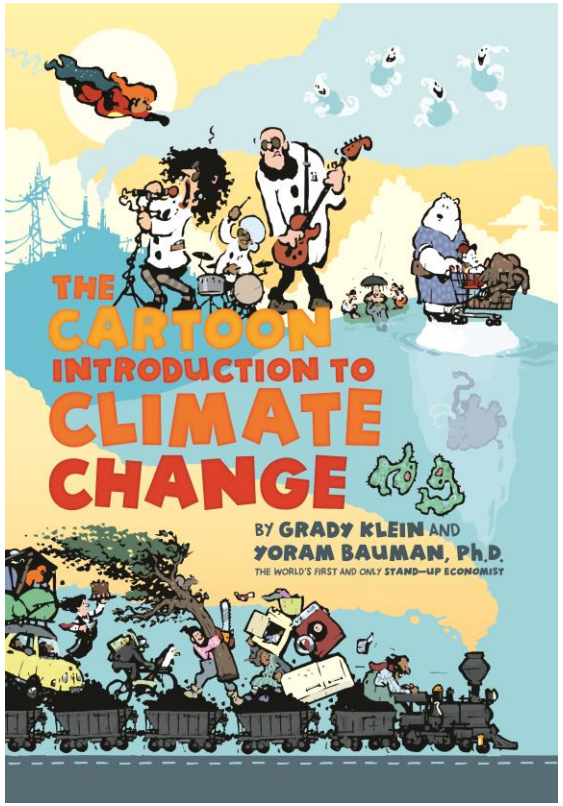
Clickers are available in the ASUA Bookstore; the Responseware license is purchased only.

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 <u>posting</u> 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?

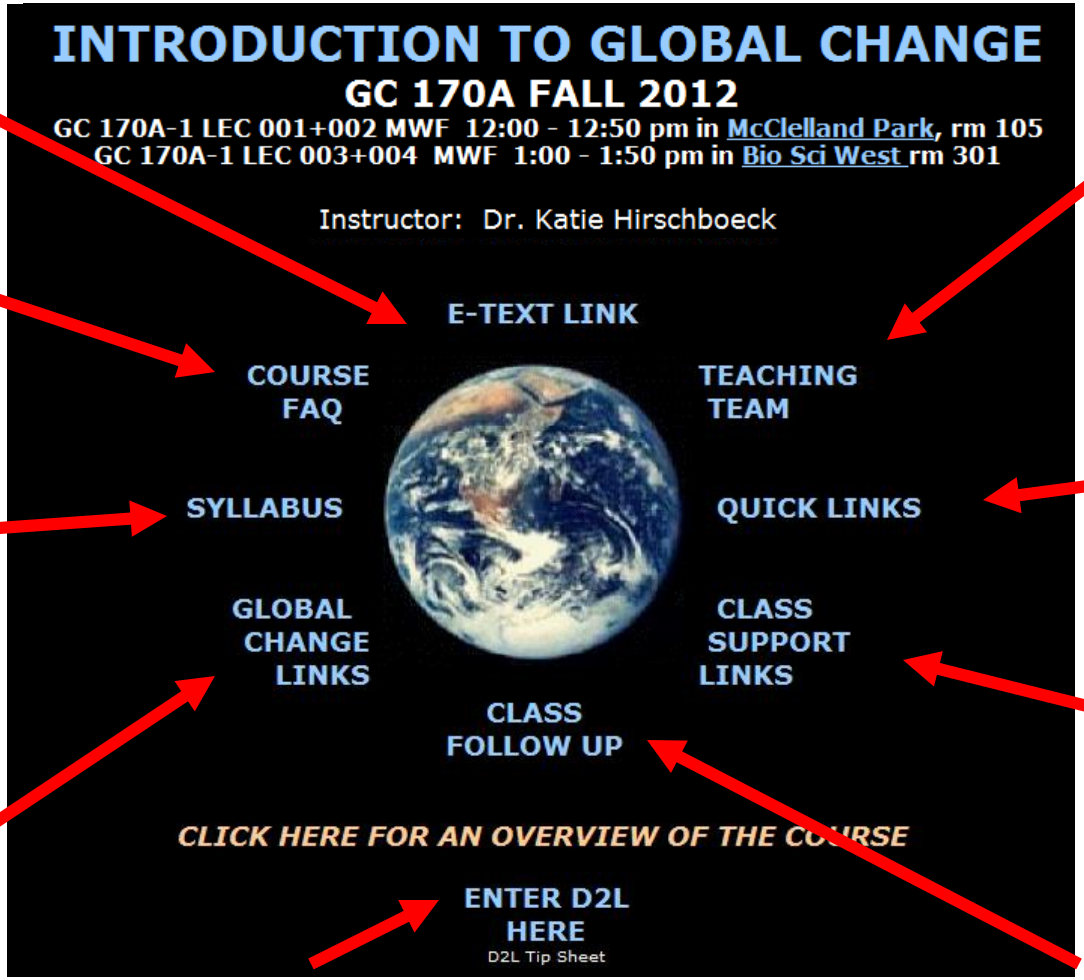
- **CRITICAL READING SKILLS**
- **WRITING SKILLS**
- **BASIC MATH & QUANTITATIVE REASONING SKILLS**
- **HIGH SCHOOL SCIENCE**
- **TEAM WORK SKILLS**

Important: regular computer access is REQUIRED for this class!

COURSE LOGISTICS

GC 170A Website (external & in D2L)

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



E-Text

FAQ

Syllabus

Global Change Links

Teaching Team

Quick Links

Class Support Links

Class Follow Up

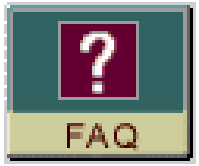
D2L *(one of several ways to get to it)*

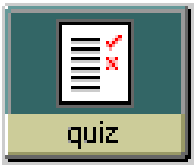
COURSE TOOLS WE'LL USE in D2L:

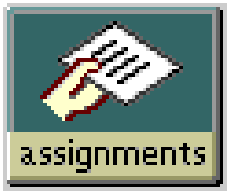
D2L = "Desire To Learn"

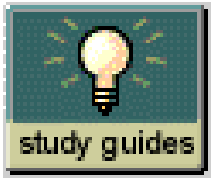
OUR D2L SITE MAY LOOK DIFFERENT THAN D2L IN SOME OF YOUR OTHER COURSES . . .

THE CHECKLIST WILL GUIDE YOU!!

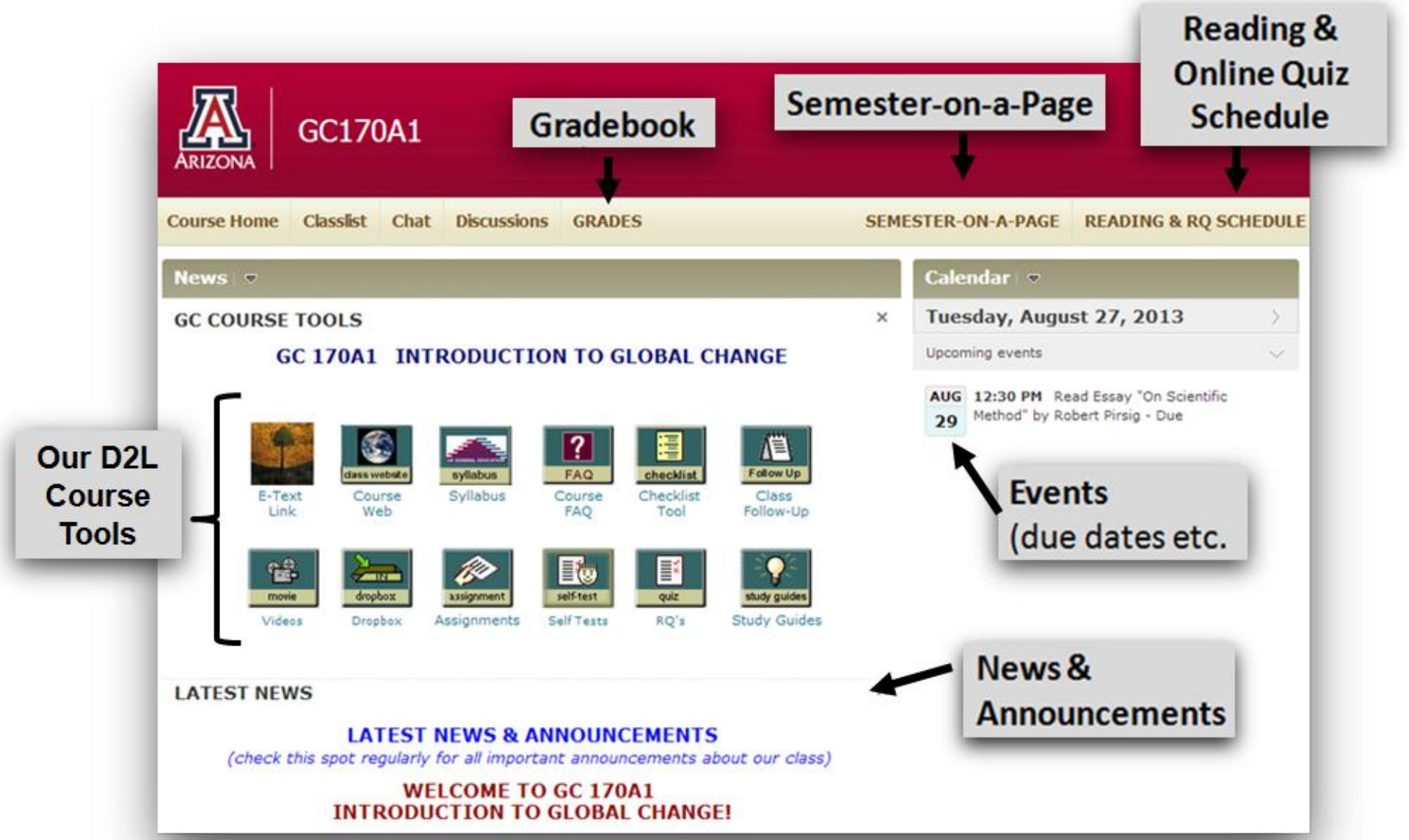








OUR CLASS D2L SITE LAYOUT . . . .



Multi-Tiered Testing Approach:

HIGH STAKES TESTING

LOW STAKES TESTING

Midterm & Final Individual Exams

In-class Individual & Group Tests

Online Readiness Quizzes

Ungraded Self-Tests

Example: Short in-class test procedure:

10-questions!

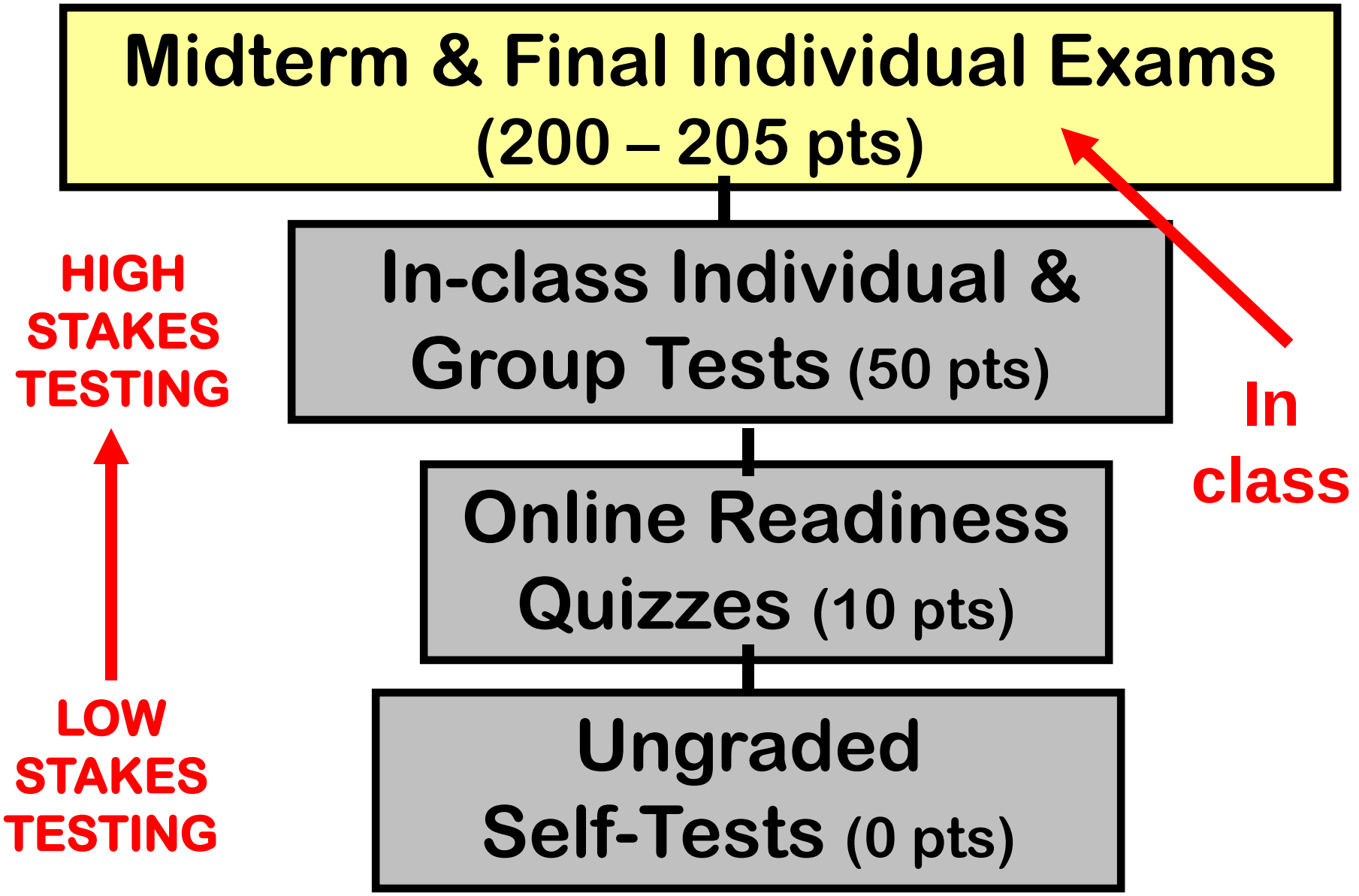
You'll take the test as an individual first . . .

After individual tests are completed . . .

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

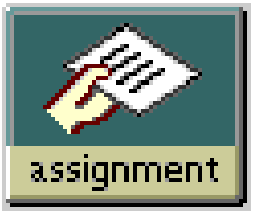
You'll find out your Group Test score right after you take it . . .

Multi-Tiered Testing Approach:



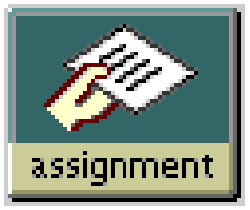
ASSIGNMENTS

Group



In Class assignments

Individual



Short Writing 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 CO_2 & 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

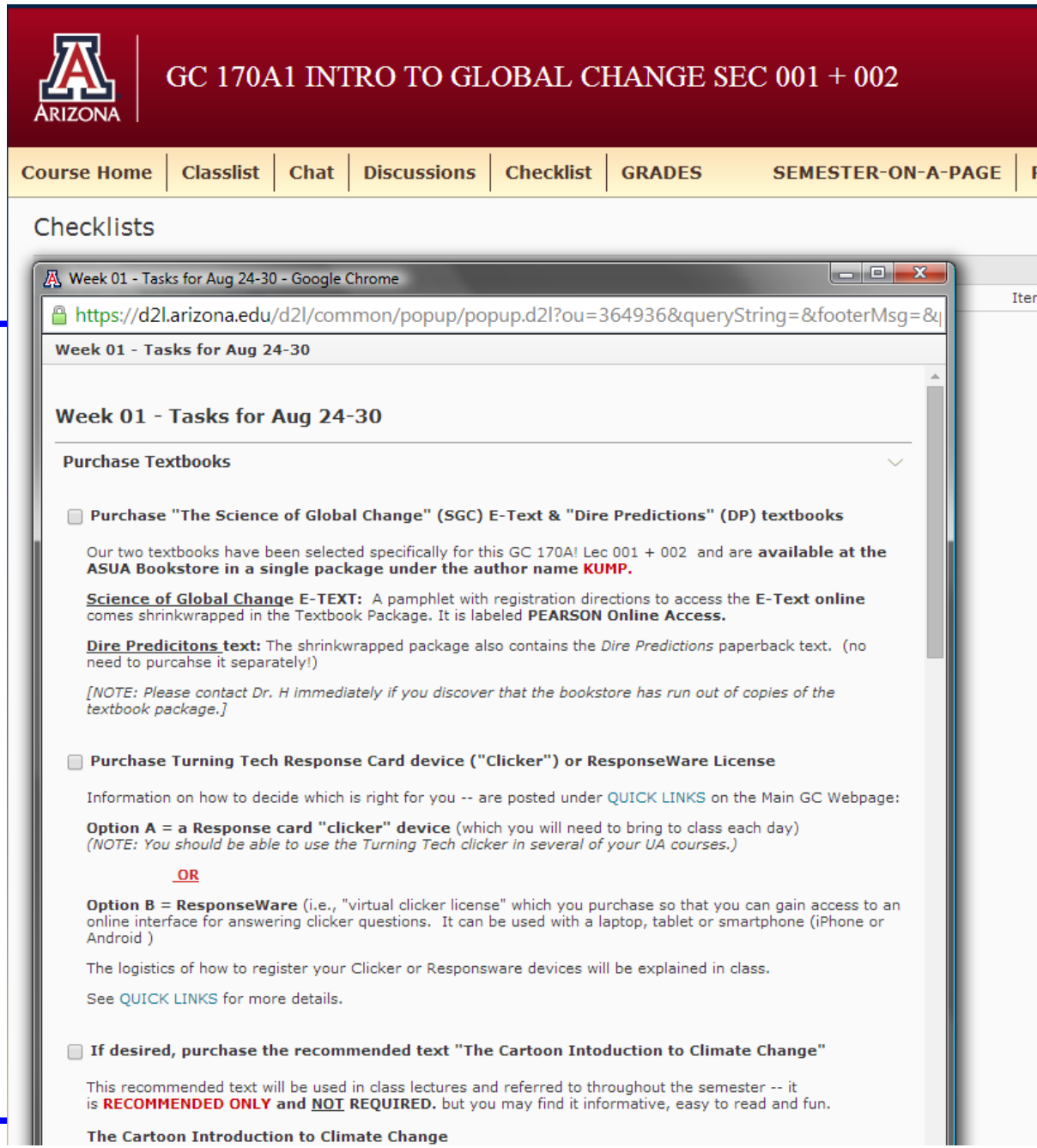
LINKING-TO-LIFE PROJECT
(Individual Term Project in 4 Parts)

- 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]



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)

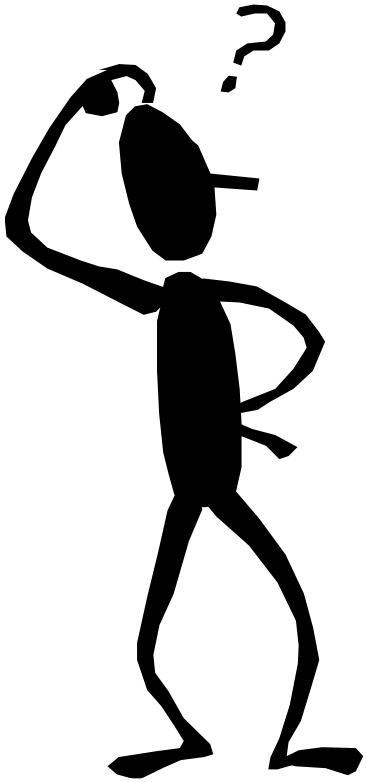
2. **Purchase and REGISTER YOUR E-TEXTBOOK & begin reading CHAPTER 1.**

"Dr. H" CLASSROOM POLICIES

(more at online FAQ "Frequently Asked Questions"):

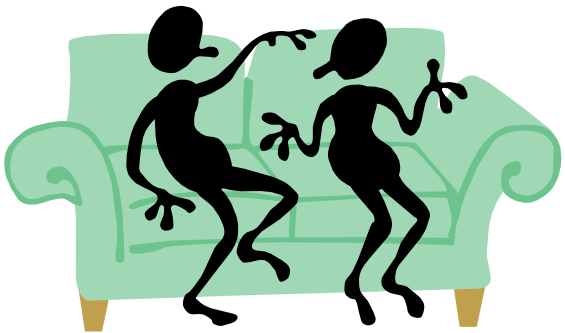
1. **Sorry, but no questions can be answered *before* class until teaching equipment is set up.**
2. **Questions *after* class will be answered after the equipment has been shut down.**
3. **Don't distract your fellow students! Unless laptops, phones or tablets are being used in class for an approved "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:

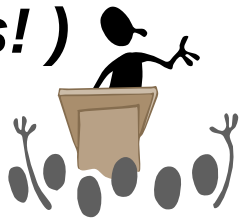
- ***Like a class that is <u>structured</u> with lots of online support***

- ***Enjoy working with fellow students <u>in groups</u> during part of the class period (not a loner)***

- ***Have convenient access to a <u>computer and the internet</u> and check it frequently***

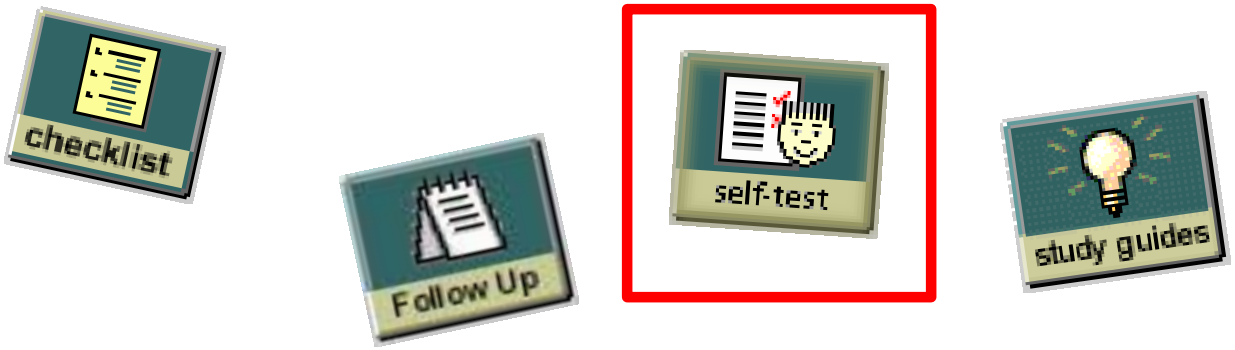
- ***Are "visual" learners who like lots of graphics & videos in lectures***

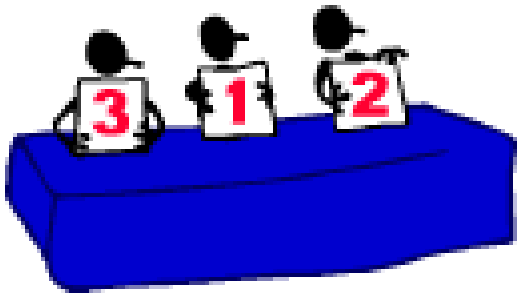
- ***<u>Attend class regularly</u> and like to keep up with the material as it is taught (tiered testing helps!)***



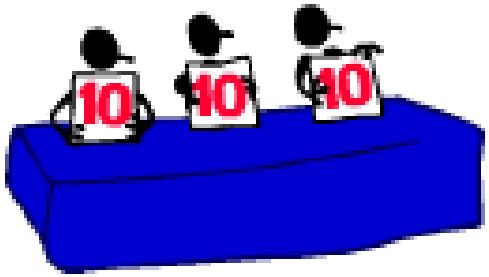
- ***Have a sense of humor!***

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





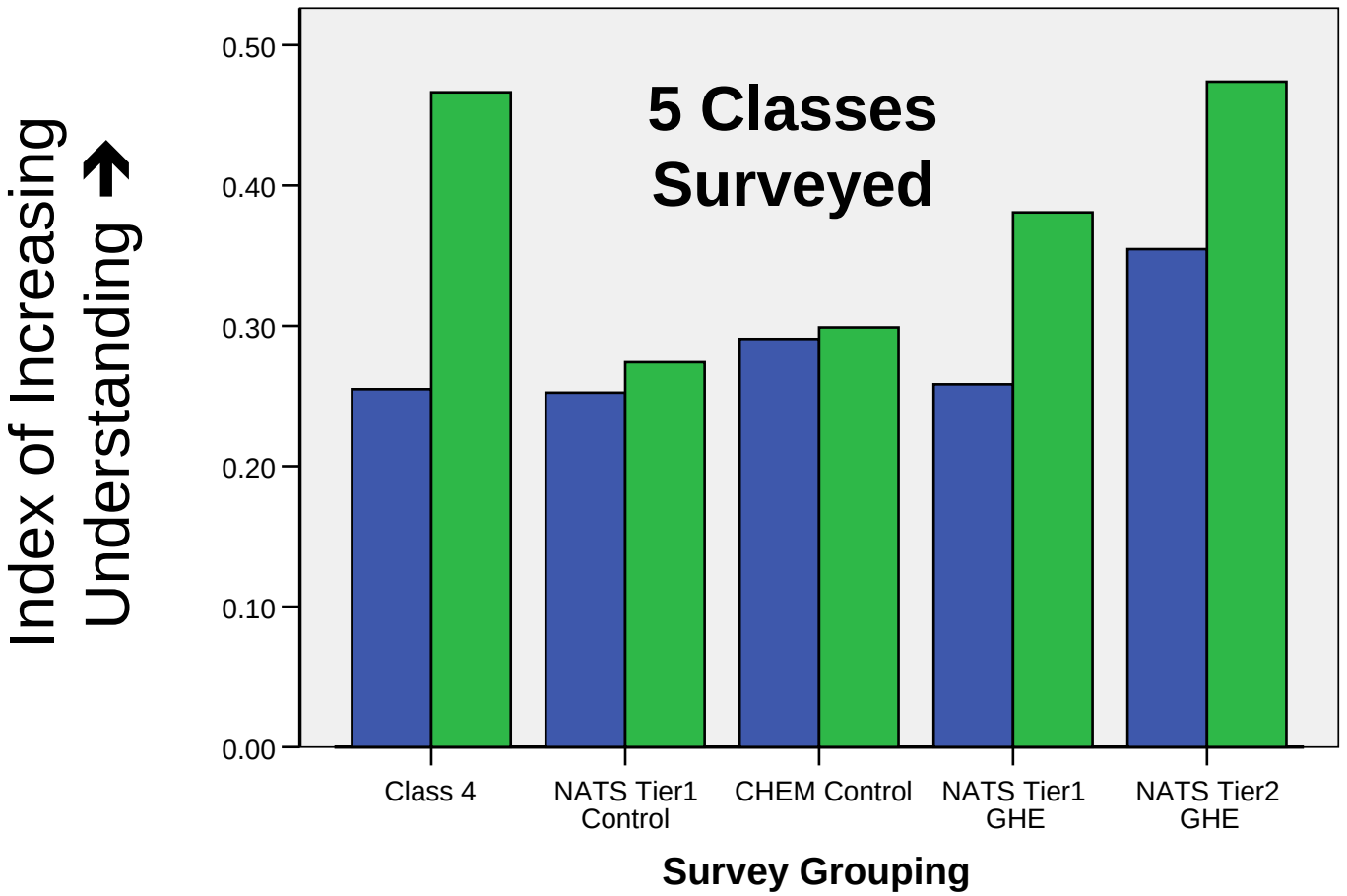
OR



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

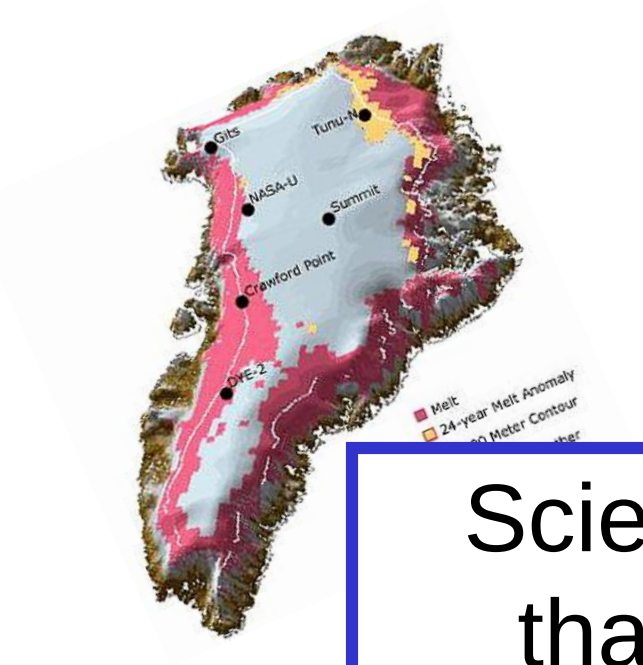
= Start of Semester Scores

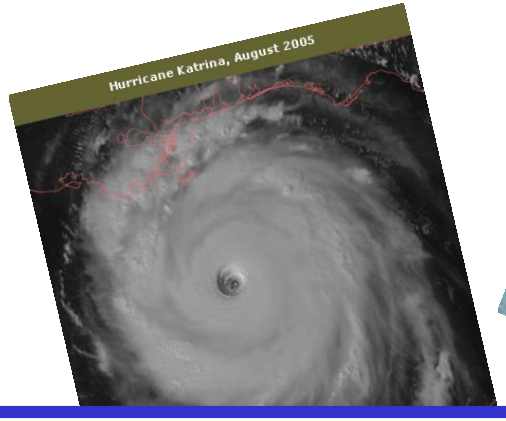
= End of Semester Scores



"How well do you understand the science underlying the GREENHOUSE EFFECT?"

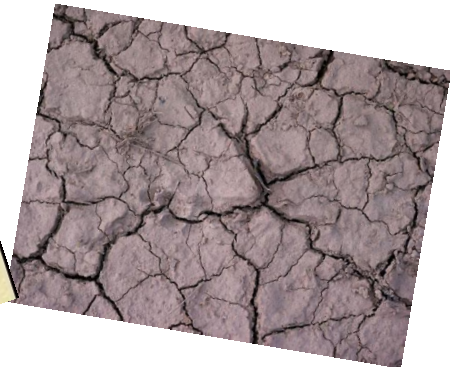
A FEW COMMENTS ON SCIENCE & GLOBAL CHANGE





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!)