

## ES106 Lab Quiz 2 Study Guide (Spring 2023)

(Week 6 Earth-Sun-Seasons, Week 7 Moisture in Atmosphere, Week 8 Oregon Climate, Week 9 Climate Change)

### RECOMMENDED STUDY TECHNIQUES

- 1) Use lab manual, text book and internet resources to define key terms below
- 2) use the concepts below as a guide to help you focus on key terms
- 3) memorize terms and concepts (make flash cards, rewrite definitions 100 times, etc.)
- 4) go back over the labs and make sure you can do the math tricks / skills
- 5) review some of the important figures in your lab manual and text
- 6) review your lab practice questions and answer sheets
- 7) Visit the ES106 Lab Resources Section of class web site, review Youtube instructional videos, go over answer keys to labs and problem sets
- 9) drink plenty of water; **STUDY A MINIMUM OF 2 HOURS to ensure success...**

### Key Concepts and Problem Solving Skills

Can you convert from English to metric system units?

Can you do unit algebra?

Do you know the difference between mass, volume, length, time, velocity, density?

Can you re-arrange an equation to solve for the unknown variable?

Can you measure angles of solar insolation using a protractor and diagrammatic sketch?

Can you identify the seasons in relation to the Earth rotation-revolution-angle of tilt relative to the sun?

Do you know seasonal changes in atmospheric heat according to latitude?

Can you measure and identify locations of latitude and longitude on the Earth's surface?

Can you plot meteorological data on an X-Y graph?

Can you calculate relative and specific humidity?

Can you calculate the temperature of air using a gradient function?

Can you read a map and measure distances using a scale?

Can you convert between temperature units of Celsius and Fahrenheit?

Do you know the basic characteristics of the troposphere?

Do you know how the seasons work and why? Daily temperature fluctuations and why?

Do you know about solar influx vs. latitude vs. angle of incidence?

Do you understand relative vs. specific humidity?

Do you know the mechanisms for lifting of air? Can you sketch them from memory?

Do you know the mechanisms of cyclones and anticyclones?

Can you make an interpretation from an isobaric pressure map?

Can you sketch / label the global atmospheric circulation model?

Can you sketch / label warm fronts, cold fronts, and occluded fronts?

Can you identify Oregon Physiographic and Climactic Zones on a map? Where are the wet and dry regions, and why?

### LAB QUIZ 1 STUDY RESOURCES

*Class Notes:*

[https://people.wou.edu/~taylors/ES106\\_Lab/class\\_notes\\_atmosphere1.pdf](https://people.wou.edu/~taylors/ES106_Lab/class_notes_atmosphere1.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/class\\_notes\\_atmosphere2.pdf](https://people.wou.edu/~taylors/ES106_Lab/class_notes_atmosphere2.pdf)

*Chapter Readings:*

[https://people.wou.edu/~taylors/ES106\\_Lab/Reading\\_Ch16\\_Atmosphere\\_Composition.pdf](https://people.wou.edu/~taylors/ES106_Lab/Reading_Ch16_Atmosphere_Composition.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Reading\\_Ch17\\_Atmosphere\\_Precip.pdf](https://people.wou.edu/~taylors/ES106_Lab/Reading_Ch17_Atmosphere_Precip.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Climate\\_of\\_Oregon\\_Wikipedia\\_April2021.pdf](https://people.wou.edu/~taylors/ES106_Lab/Climate_of_Oregon_Wikipedia_April2021.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Willamette\\_Valley\\_Climate\\_Overview.pdf](https://people.wou.edu/~taylors/ES106_Lab/Willamette_Valley_Climate_Overview.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Week8\\_Global\\_Climate\\_Change/Chap13\\_Climate.pdf](https://people.wou.edu/~taylors/ES106_Lab/Week8_Global_Climate_Change/Chap13_Climate.pdf)

*PowerPoint Slide Shows:*

[https://people.wou.edu/~taylors/ES106\\_Lab/atm1\\_structure.pptx](https://people.wou.edu/~taylors/ES106_Lab/atm1_structure.pptx)

[https://people.wou.edu/~taylors/ES106\\_Lab/atm2\\_precip.ppt](https://people.wou.edu/~taylors/ES106_Lab/atm2_precip.ppt)

[https://people.wou.edu/~taylors/ES106\\_Lab/Oregon\\_Geography\\_and\\_Climate\\_Overview.pdf](https://people.wou.edu/~taylors/ES106_Lab/Oregon_Geography_and_Climate_Overview.pdf)

*Video Resources:*

Solar Heating of the Earth (Youtube ~3 min) [https://www.youtube.com/watch?v=dg\\_DOM10Qoo](https://www.youtube.com/watch?v=dg_DOM10Qoo)

Earth-Sun Relations-Seasons-Atmospheric Heating (10 min) <https://www.youtube.com/watch?v=rcquRMaVSKU>

Diurnal Heating of Land vs. Water (Youtube ~4 min) <https://www.youtube.com/watch?v=QdFSjYJPjDE>

Heating of Land and Water Vernier Experiment (~3 min) <https://www.youtube.com/watch?v=2TVRbkccOXg>

Differential Air Temperatures of Land and Water (~3 min) <https://www.youtube.com/watch?v=y986-h3dfCk>

Climate and Air Masses (Youtube ~4 min) <https://www.youtube.com/watch?v=QxvF1nnWRwg>

Introduction to Relative Humidity and Dew Point (~2.5 min) <https://www.youtube.com/watch?v=OiejHVHrdOo>

Evaporation, Humidity and Hydrologic Cycle (Youtube ~11 min) <https://www.youtube.com/watch?v=6oZ7HxrnSWo>

Sling Psychrometer - How it works <https://www.youtube.com/watch?v=OZh9ksAy9kc>

Orographic Lifting (Youtube ~2 min) <https://www.youtube.com/watch?v=H9ZK1CnjCFo>

Adiabatic Processes / Lapse Rates (Youtube ~2 min) <https://www.youtube.com/watch?v=p-BLGbkhSO0>

Overview of Lifting Mechanisms (youtube ~9 min) <https://www.youtube.com/watch?v=NaTOdq0K-c>

Orographic Lifting Process (youtube ~1.5 min) <https://www.youtube.com/watch?v=GJR893xiTr0>

Climate of the Pacific Northwest (Youtube ~7 min) <https://www.youtube.com/watch?v=QeGKIY8XFP0&t=337s>

Rainshadow in the Pacific Northwest (Youtube ~2 min) <https://www.youtube.com/watch?v=DoKTTHd-XEQ&t=73s>

Big Chill – Global Climate Change <https://www.youtube.com/watch?v=CCUrljERHcA>

*Lab Answer Keys:*

[https://people.wou.edu/~taylors/ES106\\_Lab/Lab5\\_Key\\_Earth\\_Sun.pdf](https://people.wou.edu/~taylors/ES106_Lab/Lab5_Key_Earth_Sun.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Lab6\\_Key\\_Moisture.pdf](https://people.wou.edu/~taylors/ES106_Lab/Lab6_Key_Moisture.pdf)

[https://people.wou.edu/~taylors/ES106\\_Lab/Lab7\\_Key\\_Oregon\\_Climate.pdf](https://people.wou.edu/~taylors/ES106_Lab/Lab7_Key_Oregon_Climate.pdf)

*ES106 Lab Canvas Practice Quizzes:*

Task 6-6. Practice Quiz - Earth-Sun Relations

Task 7-6. Lab Practice Quiz - Moisture in Atmosphere

Task 8-5. Oregon Climate Lab Practice Quiz

RECOMMENDED: STUDY A MINIMUM OF 2 to 3 HOURS TO DO WELL ON LAB QUIZ 2!

## KEY WORDS

### ***Heat Energy (Review from Quiz 1)***

phase changes  
states of matter  
solid  
liquid  
gas  
heat energy  
floaters  
sinker  
gravity-driven density contrast  
temperature  
    degree C/F  
heat flow  
high temp to low temp  
heat - volume expansion  
cooling-volume contraction  
volume-density relationships  
heat loss  
heat gain  
heat transfer  
conduction  
convection  
radiation  
heat absorber  
heat reflector  
convection cells  
evaporation  
condensation  
melting  
freezing

### ***Week 6 Earth-Sun Relations***

meteorology  
weather  
climate  
temperature  
humidity  
precipitation  
cloudiness  
air pressure  
wind speed  
atmosphere composition  
nitrogen  
oxygen  
argon  
carbon dioxide

water vapor  
dust  
condensating nuclei  
atmospheric structure  
    troposphere  
    tropopause  
    stratosphere  
    stratopause  
altitude vs. temp variation  
altitude vs. press. variation  
Earth-Sun Relation  
Rotation / revolution  
speed of rotation  
earth day / earth year  
rotational axis  
    north pole  
    south pole  
equator  
axial tilt (23.5 deg.)  
insolation  
angle of incidence  
summer solstice  
winter solstice  
spring equinox  
fall equinox  
circle of illumination  
tropic of cancer (23.5 deg north)  
tropic of Capricorn (23.5 deg. South)  
absorption  
reflection  
continental heating  
ocean heating  
latitudinal heating  
general circulation

### ***Week 7 Moisture in Atmosphere***

water vapor  
precipitation  
solid, liquid, gas  
heat energy  
evaporation  
condensation  
freezing  
heat  
humidity  
specific humidity  
relative humidity  
vapor saturation

dew point temperature  
saturation capacity  
temperature vs. humidity  
temperature vs. air volume  
hot air balloon model  
dew point  
fog / clouds / rain  
condensating nuclei  
cloud droplets  
rising air mass  
sinking air mass  
Lifting Mechanisms  
    forceful lifting  
    convergent lifting  
    orographic lifting  
    frontal wedging  
cloud form  
    cirrus  
    cumulus  
    stratus  
nimbostratus  
rain-hail-snow

### ***Week 8 Oregon Climate***

air mass  
weather fronts  
source regions  
weather vs. frontal position  
westerly airflow  
orographic lifting  
Coast Range, Cascade Range  
Rain Shadow Effect  
Oregon desert / rain forest  
Rainshadow

### ***Week 9 Climate Change***

Weather vs. Climate definition  
Last glacial maximum  
Ice cores  
Oxygen isotopes  
Global warming  
Sea Level Change  
Milankovitch cycle  
Ice Ages, cycles, interglacials