**BIO 500 Special Topics: Human Ecology – 3 Hours**

I. Purpose: a study of various aspects of human ecology such as

environmental problems associated with population growth, pollution,

resource depletion, energy (sources and policy), endangered species,

habitat destruction, and urban growth.

II. Textbook: Environmental Science A Global Concern, 13th Edition,

Cunningham & Cunningham, McGraw-Hill, 2014, ISBN 978-007-3532541

There are six major themes in this course: 1) Introductory

material/science, 2) Ecology, 3) Population, 4) Food, 5) Energy,

and 6) Pollution. **All necessary material needed for this course will**

**be supplied by the instructor.**

III. Grading: Will be based on the quality of the exercises completed.

A = Excellent; B = Good; C = Average; D = Below Average;

F = Unacceptable

IV. Disability Statement

Campbellsville University is committed to reasonable accommodations

for students who have documented learning and physical disabilities

as well as medical or emotional conditions. If you have a documented

disability or condition of this nature, you may be eligible for

disability services. Documentation must be from a licensed

professional and current in terms of assessment. Please contact the

Coordinator of Disability Services at 270-789-5192 to inquire about

their services.

VI. Emergency Numbers – Campus Security

**270-403-3611 (cell)**

**270-789-5555**

VII. Sexual Harassment Statement

Campbellsville University and its faculty are committed to assuring a

Safe and productive educational environment for all students. In order

to meet this commitment and to comply with Title IX of the Education

Amendments of 1972 and guidance from the Office for Civil Rights, the

University requires all responsible employees, which includes faculty

members, to report incidents of sexual misconduct shared by students

to the University’s Title IX Coordinator.

Title IX Coordinator:

Terry VanMeter

1 University Drive

UPO Box 944

Administration Building Office 8A

Phone – 270-789-5016

Email-twvanmeter@campbellsville.edu

Information regarding the reporting of sexual violence and the

resources that are available to victims of sexual violence is set

forth at: www.campbellsville.edu/titleIX

**Items to complete - check off when complete:**

\_\_\_\_\_ Check off. I read the following sections of the textbook:

1.3, 2.3, 3.4 & 3.5, 5.1, 2, 3 & 4, 7.1, 3, 6, & 7, 9.1, 2, & 4,

10.6, 11.3, 15.4, 5, & 6, 16.3, 5, & 6. 18.1 & 2, 19 all, 20 all,

21.4, 24.2, and 25.3

\_\_\_\_\_ Check off. Write a short report, 1-3 pages, on the following

topic.

Science: Authority, Tradition, and Revelation are three ways to

obtain information, but, science requires credible evidence. What

is science and when did we start thinking this way? Start with

Copernicus and Galileo and how they defied authority & tradition.

\_\_\_\_\_ Check off. Write a short report, 1-3 pages using the following

sources. Chapters 1 - 4 in the book *T. rex and the Crater of Doom,*

DVD *The Day the Mesozoic Died* & DVD *Siberian Apocalypse.* How did

“science” discover that a large asteroid likely caused the demise

of the dinosaurs? What is the Chicxulub Crater and the KT boundary,

and how do they relate to the extinction of the dinosaurs. Could

we still be struck by a rock from outer space?

\_\_\_\_\_ Check off

Law of conservation of matter –

1st Law of Thermodynamics –

2nd Law of Thermodynamics –

\_\_\_\_\_ Draw a food chain and show energy flow into and out of the system

\_\_\_\_\_ What happens with Biological magnification (amplification) of

substances like DDT and PCBs?

\_\_\_\_\_ Rachel Carson and the book *Silent Spring* – what did she tell us way

back in 1962?

\_\_\_\_\_ I looked up and read about the parameters that define the major

terrestrial biomes: desert, grassland, Eastern deciduous forest,

boreal forest (taiga), tundra, swamp, tropical rain forest,

temperate rain forest, chaparral, and estuary (like Chesapeake Bay

Examples of an aquatic biome (fresh water) would be Lake Erie),

marine biomes (salt water) would be Tampa Bay & a coral reef.

\_\_\_\_\_ Normal Borlaug (Nobel Peace Prize) coined the catchy phrase the

Green Revolution – What did he do?

\_\_\_\_\_ Monsanto and GM foods – Watch the DVD *Pandora’s Box* and summarize

the message:

\_\_\_\_\_ Watch the DVD *The Future of Food* and summarize the message:

\_\_\_\_\_ Alien species in Kentucky. What is Kudzu?

\_\_\_\_\_ Extinction in Kentucky. What was the Passenger Pigeon?

\_\_\_\_\_ On another piece of paper, draw the nitrogen cycle and the carbon-

oxygen cycle – check off here.

\_\_\_\_\_ The limiting factor is the essential in shortest supply – apply to

a desert.

\_\_\_\_\_ Apply to a tundra.

\_\_\_\_\_ Lily pad riddle: A lily pad doubles every day and the pond is

completely covered on the 30th day – on what day was it half

covered? Write your answer here: \_\_\_\_\_\_\_\_\_

\_\_\_\_\_ What is a climax ecosystem?

\_\_\_\_\_ What is secondary succession as applied to the ecosystem?

\_\_\_\_\_ What is the current estimate for the population of the earth?

\_\_\_\_\_\_. It is growing at \_\_\_\_\_\_% each year which adds \_\_\_\_\_\_

million people yearly to the total.

\_\_\_\_\_ Complete this on another sheet of paper. Use the Population

Reference Bureau Data Sheet for 2014 to look up data on two

countries – Italy, a rich, industrialized country and Niger a poor,

agricultural country. Make a chart with birth rate per 1000, death

rate per 1000, percent growth rate, total fertility rate (average

number of children per woman), percent under 15 years of age. You

can add another column, Double Time, by dividing the number 70 by

the % growth d(not decimal equivalent) – if growth continues as

reported, the population will double in this time frame.

\_\_\_\_\_ Check off here, but complete on another piece of paper. Using the

text and other sources, come up with an explanation why these

countries are so different with their population growth. Just 3 or

4 reasons, not a treatise.

\_\_\_\_\_ If we could bring the TFR down to about 2.1 children per female,

growth would eventually stop. This is called replacement. What

is ZPG, zero population growth?

\_\_\_\_\_ I watched the video on population growth, and here are my comments:

\_\_\_\_\_ Only two ways to slow/stop population growth – either the birth

rate goes \_\_\_\_\_\_ or the death rate will go \_\_\_\_\_\_\_\_.

\_\_\_\_\_ Birth Control: Most are aware of birth control pills, condoms,

vasectomies and tubal ligations; however, these might not be

appropriate for poor countries. I looked up and read about

Norplant, hormone IUD, the Patch, and Depo Provera which are longer

lasting methods perhaps more appropriate for poor countries.

\_\_\_\_\_ \_\_\_\_\_\_\_ is the % failure rate for the rhythm method which is

approved by the Catholic Church. Failure rates are for 100 woman-

years of use – 100 women using the method for a year, so you can

get a % failure rate.

\_\_\_\_\_ Ru-486 is a chemical method of performing an \_\_\_\_\_\_\_.

\_\_\_\_\_ Momentum: tendency to stay in motion once placed in motion

M = mass x velocity In terms of population Mass = \_\_\_\_\_\_\_\_\_\_

and Velocity = \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Hard to stop population growth!!

\_\_\_\_\_ Many demographers, individuals who study population growth, are

of the opinion that the single biggest reason population continues

to climb is the low status of women. I looked up and read about

the status of women in Saudi Arabia.

\_\_\_\_\_ Protein deficiency disease is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Marasmus is not getting enough calories.

\_\_\_\_\_ I read about these two nutritional deficiency diseases and observed

some images of both.

All protein is not created equal! Some is high quality and some is

low quality. Explain why this is so and identify sources of

both.

\_\_\_\_\_ In 1798 Thomas Malthus wrote a short essay about population and

food – what was his conclusion?

\_\_\_\_\_ Aquaculture? What is it, and what are some success stories?

\_\_\_\_\_ Mariculture? What is it and what are some success stories?

\_\_\_\_\_ Genetically modified foods? What are they? Am I eating them?

\_\_\_\_\_ What is Bt corn?

\_\_\_\_\_ What is Roundup-ready Soybeans? Who makes this as well as the

Roundup?

\_\_\_\_\_ 10-10-10 has 10% \_\_\_\_\_\_\_\_, 10% \_\_\_\_\_\_\_\_\_, and 10% \_\_\_\_\_\_\_\_\_?

\_\_\_\_\_ What is a pre-emergent herbicide, and what does it have to do with

no-till farming? Name one used on corn:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Since 1950 population has doubled; however, food production has

tripled. In the long run, will more food solve the food

problem? Explain why not.

\_\_\_\_\_ In terms of energy, the three, big fossil fuels are:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ What is OPEC: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Name some members that are located around the

Persian Gulf:

\_\_\_\_\_ Every day the U.S. uses about \_\_\_\_\_\_\_ million barrels of oil.

\_\_\_\_\_ We are importing less due to increased domestic production;

however, we still import about \_\_\_\_\_\_%.

\_\_\_\_\_ We buy most of our oil from #1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ,#2 \_\_\_\_\_\_\_\_\_\_\_\_

and #3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (top 3 sources)

\_\_\_\_\_ Look up EPA mileage estimate for a Prius -vs- Chevrolet Suburban.

Toyota Prius \_\_\_\_\_\_\_mpg vs Suburban \_\_\_\_\_\_mpg

\_\_\_\_\_ The Prius is a hybrid car – what does that mean?

\_\_\_\_\_ Brazil has experimented with switching their transportation system

from petroleum-based gasoline to ethanol (an alcohol) derived from

what crop? \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Coal is mostly burned to produce electricity; however, it produces

the most air pollution of the three main fossil fuels. Which two

states have the largest coal reserves? (Hint: not KY or WV!)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ A process called “fracking” has opened up large reserves of both

natural gas and petroleum here in the USA. What is “fracking”?

\_\_\_\_\_ The most famous equation of the 20th century is Einstein’s

E = \_\_\_\_\_\_. It shows the conversion of mass to \_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ Nuclear power was supposed to make electricity too cheap to meter.

Well, that didn’t work out; however it is attractive because it

produces no air pollution. The energy in the nucleus is released

when an atom of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (an element) is split.

\_\_\_\_\_ Many are afraid of nuclear power because of three, well publicized,

well-publicized accidents. Identify these accidents:

One near Harrisburg/Hershey, PA:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The second in the Ukraine of the former USSR:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

And a third in Japan caused by a giant Tsunami:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ The worst kind of accident at a nuclear power plant is called a

LOCA. A LOCA is a \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_

This was sensationalized in the movie China Syndrome.

\_\_\_\_\_ I read the following and looked up isotopes, fission, chain

reaction and half life.

Isotope –

Fission –

Chain reaction –

Half-life -

There are 92 natural elements in the earth’s crust, hydrogen to

uranium. The numbers, 1 to 92, are determined by the number of

protons in the nucleus – hydrogen has 1 and uranium has 92.

This is known as the atomic number. The addition of neutrons to

the nucleus does not change the “number”; however, it changes

the atomic weight. Elements with the same atomic number and

different atomic weights are known as isotopes. Uranium has two

main isotopes, U235 (0.7% of the total) and U238 (99.3% of the

total). The 238 version of uranium will not split (called

fission); however, the 235 version will split if it captures a

neutron and becomes U236. This form of uranium is extremely

unstable and wants to fly apart; however, 0,7% is not enough to

support a chain reaction (split after split, etc.).

\_\_\_\_\_ At Paducah, KY we used to increase the % of u235 by removing some of

the U238? The term for this is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Currently, we are concerned that \_\_\_\_\_\_\_\_\_\_ (a country) wants to

increase the % U235 to make bomb-grade uranium.

To make a fuel rod for a nuclear power plant the % U235 needs to be

about \_\_\_\_\_\_\_\_%. About \_\_\_\_\_\_% is needed to make a nuclear bomb?

\_\_\_\_\_ Nuclear waste is dangerous because it has such a long half-life.

What was being built at Yucca Mountain, Nevada? The current

administration stopped construction on this project.

\_\_\_\_\_ What is at Maxey Flats, Kentucky? This is in Fleming County.

\_\_\_\_\_ Currently, there is a lot of controversy about the construction of

a pipeline which will deliver oil from Canada to Texas. What is

the name of this pipeline project:

\_\_\_\_\_ This pipeline is to carry oil from an oil sand deposit at

Athabasca, Canada (Alberta – Northeast of Edmonton). Check off:

I looked up Athabasca on a map of Canada.

\_\_\_\_\_ The hydrocarbon at Athabasca is not really “oil” – it is called

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is very thick.

\_\_\_\_\_ Complete the statement - It is estimated that the amount of oil in

Canada’s oil sands is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_ Identify some environmental concerns people have about the Keystone

Pipeline.

\_\_\_\_\_ Alternative energy sources: Solar – identify the TWO big

disadvantages that make it expensive.

\_\_\_\_\_ Wind energy – where is this even feasible?

\_\_\_\_\_ I read about and looked at images of the Ivanpah solar power plant

outside Las Vegas.

\_\_\_\_\_ Pollution: a pollutant is anything that degrades the environment-

examples include air, water, solid wastes, toxic chemical & noise

What does it mean if we say a pollutant is biodegradable? + some

examples

\_\_\_\_\_ What does it mean if we say a pollutant is persistent? + some

examples

\_\_\_\_\_ What does it mean if few say a pollutant is permanent? + some

examples

\_\_\_\_\_ On another sheet of paper give a short (really short) history of

the Hooker Chemical Company and the Love Canal.

\_\_\_\_\_ Do the same thing with Minamata Disease.

\_\_\_\_\_ Photochemical smog is the most common air pollution in the U.S.

How is it formed, and what is in it?

\_\_\_\_\_ What is put on the exhaust system of our cars to help control this

type of air pollution?

\_\_\_\_\_ LA has the worst air pollution in the U.S. because they often have

an “inversion layer” that traps pollutants. What is an inversion

layer in the atmosphere?

\_\_\_\_\_ Acid rain forms when oxides of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and oxides of

\_\_\_\_\_\_\_\_\_\_\_\_ get into the air and combine with water to form

\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ There are skeptics about climate change; however, scientists are in

agreement that it is real, and that we are causing it. The

“Greenhouse” effect happens when gases like \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_ get

into the atmosphere and trap heat from the sun. If nothing is

done, one of these gases, \_\_\_\_\_\_\_, will double pre-industrial

levels by 2050.

\_\_\_\_\_ Death of Lake Erie (cultural eutrophication) – I read about how

fertilizer runoff, untreated sewage , and industrial wastes

impacted Lake Erie. Decomposition processes in the lake removed

much of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the water causing the fish to die.

\_\_\_\_\_ Destruction of the ozone layer – The ozone layer high up in the

atmosphere protects us from harmful \_\_\_\_\_\_ rays from the sun.

Ozone, which is O3, was (is) being broken down by chemicals such as

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_ What was the worldwide agreement concerning these chemicals?

\_\_\_\_\_ I read about the ozone hole that developed over Antarctica.

\_\_\_\_\_ The Valley of the Drums in Bullitt County, KY was an EPA Superfund

Site. I read about and looked at images of this site.

\_\_\_\_\_ What is the Superfund? Are there any Superfund sites in Kentucky?

\_\_\_\_\_ In addition to the DVD/videos previously noted, There are several

additional to watch and summarize.

An Inconvenient Truth – Al Gore’s production

Who Killed the Electric Car

Saved by the Sun

Climate of Doubt – 1st part only, you will get the picture

Food, Inc.

Future of Food

Uranium: Twisting the Tail of the Dragon

\_\_\_\_\_ Written Report on chapters 1 - 8 of the Meaning of the 21st

Century by James Martin.