

# PRE- AND POST-COURSE ASSESSMENT

AGRI-NRES 103:

## *Introduction to Agricultural and Natural Resource Systems*

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# PURPOSE OF THE COURSE

- Purpose of the class
  - Provide students with an overview of the interactions between agricultural production systems and the natural resource base upon which production depends.
  - **Course is required for all majors in the College**

# PURPOSE OF THE ASSESSMENT INSTRUMENT

- Pre/post-course assessment helps inform us about:
  - Actual student learning in a course
  - Student attitudes and opinions prior to a course
  - Changes in student attitudes and opinions during a course
  - The effectiveness of the teaching/learning environment
- Evolution/development of the instrument is driven by results:
  - No instrument is perfect
  - Assessment is not about demonstrating perfection; it is about ongoing reflection and improvement

# AGRI-NRES 103: ASSESSMENT TOOL

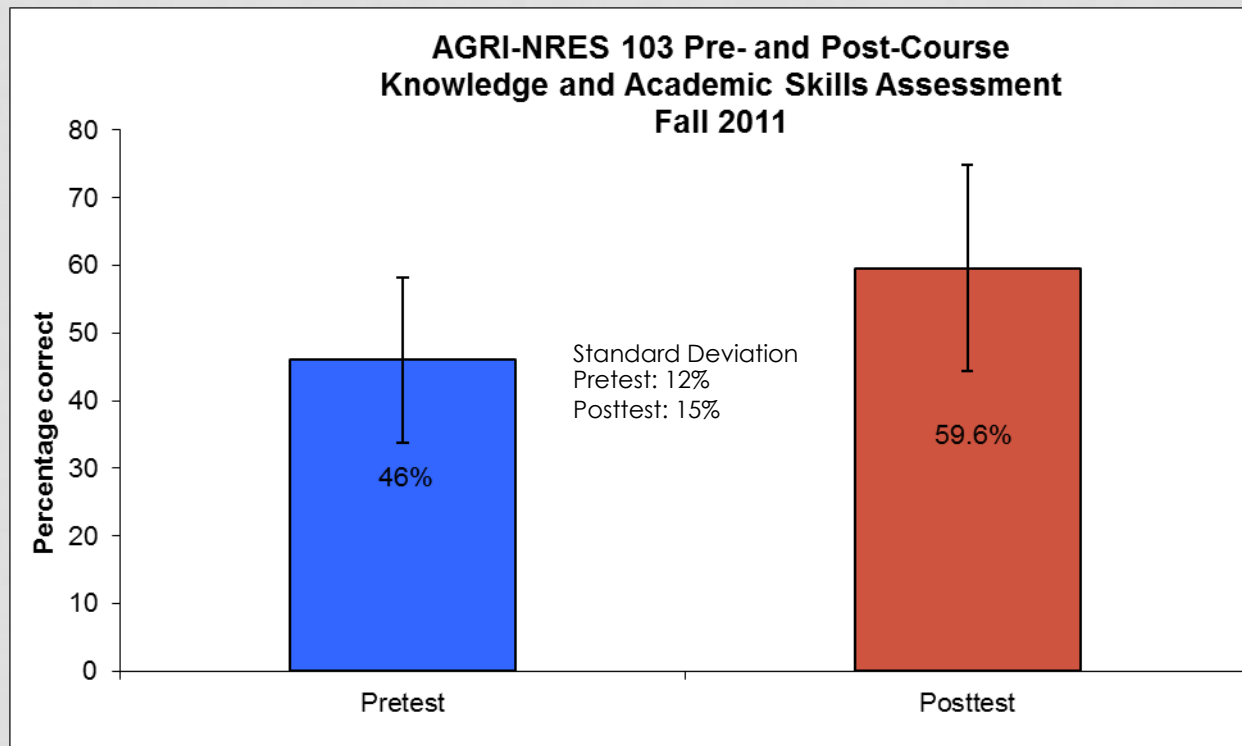
- Pre- and post-course assessment
- The assessment is course specific
  - Knowledge and academic skills
  - Attitudes and opinions
- We have 3 complete semesters of data (for institutional assessment)
  - Fall 2010 and 2011
    - Three sections, two instructors
      - Common syllabus
      - Common exams (80% in common)
  - Spring 2010 and 2011
    - One section, one instructor
- IRB Approval for Fall 2011 and Spring 2012

# ANALYTICAL METHODS

- Paired Samples T-test
  - Composite pretest to posttest performance change
  - Pretest to posttest change in student attitudes and opinions
- McNemar's test for paired binary data
  - Pretest to posttest individual knowledge and skills questions
- Pearson's parametric correlation test
  - Tendencies among factors

# COMPOSITE RESULTS FALL 2011

- n = 201 students who completed both the pretest and the posttest (354 students completed the course)
- Change: 13.6%\*\* (paired samples T-test significant at 0.01)



# KNOWLEDGE AND SKILLS QUESTIONS

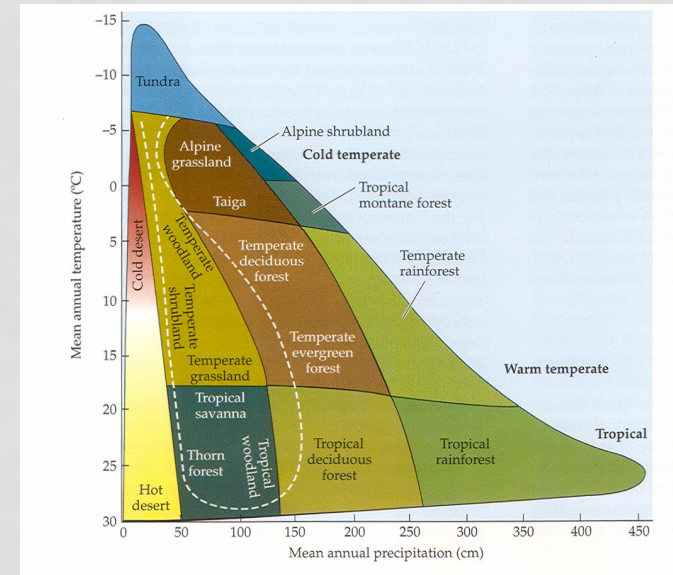
- 25 knowledge and academic skills questions
  - 13 basic knowledge-memory questions
  - 7 application-identify questions
  - 3 analysis-calculation questions
  - 2 application-prediction questions
- Sample knowledge and skills questions:

# APPLICATION SEQUENCE -1

## GRAPH ANALYSIS AND INTERPRETATION

15. Refer to the graph. Temperature and precipitation (rain, snow, etc.) are two important factors that define biomes. If Ellsworth County in central Kansas has an annual mean temperature of 12° C and precipitation of 67 cm, which of the following best identifies the biome for central Kansas?

- a. Thorn forest
- b. Tropical savanna
- c. Cold desert
- d. Temperate evergreen forest
- \*e. Temperate woodland, shrubland, or grassland



Pre: 90.5%

Post: 92.3%

Change: 1.8 (McNemar's Test not significant)

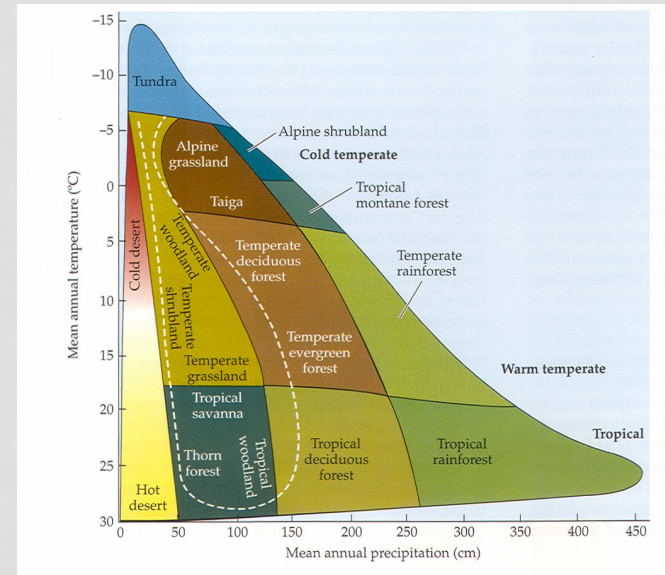


# APPLICATION SEQUENCE -2

## GRAPH ANALYSIS AND CALCULATION

16. If climate change over the next 60 years resulted in an annual mean temperature increase of  $5^{\circ}\text{C}$  and an annual mean precipitation decrease of 35 cm, calculate the new annual mean temperature and precipitation.

- a.  $12^{\circ}\text{C}$  and 67 cm
- b.  $13^{\circ}\text{C}$  and 70 cm
- c.  $5^{\circ}\text{C}$  and 35 cm
- \*d.  $17^{\circ}\text{C}$  and 32 cm
- e.  $7^{\circ}\text{C}$  and 102 cm



Pre: **76.5%** (90.5%)

Post: **81.6%** (92.3%)

Change: **5.1** (McNemar's Test not significant)

# APPLICATION SEQUENCE -3

## GRAPH ANALYSIS AND PREDICTION

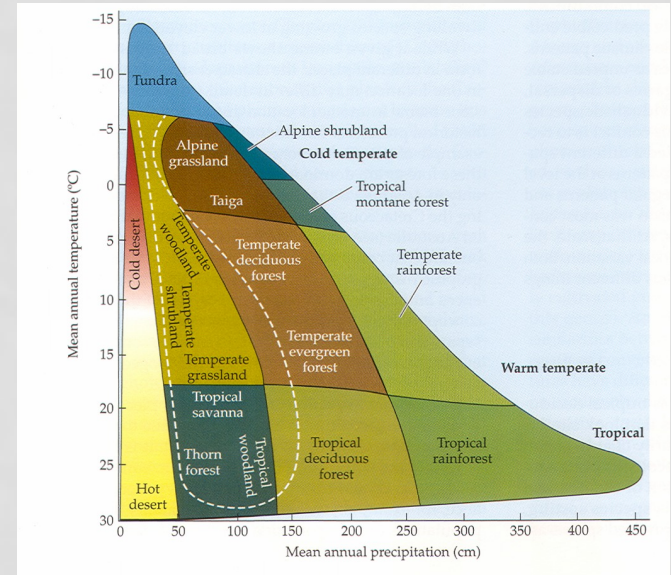
17. Given the above calculated change, again using the graph above, which of the following would best describe central Kansas' s biome in 2090, when your grandchildren inherit the family farm in Ellsworth?

- a. Thorn forest
- \*b. Hot desert
- c. Boreal forest
- d. Tropical montane forest
- e. Temperate woodland, shrubland, or grassland

Pre: 77.1% (90.5%; 76.5%)

Post: 79.7% (92.3%; 81.6%)

Change: 2.8 (McNemar' s Test not significant)



# ATTITUDE AND OPINIONS QUESTIONS

- 24 Attitude and Opinion Questions
  - Public policy and government interaction
  - Science
  - Climate change
- Sample Attitude and Opinion Questions
  - Net agree = strongly agree + agree
  - Paired samples T-test: compares means for pretest and posttest responses
    - Strongly agree = 1
    - Agree = 2
    - Disagree = 3
    - Strongly disagree = 4

# ATTITUDES AND OPINIONS

34. How a farm is managed has no ecological impact on the surrounding area.

a. Strongly agree      b. Agree      c. Disagree      d. Strongly disagree

**Net Agree:**

**Pre: 12.7%**

**Post: 6.3%**

**Change: -6.4**

**Mean**

**Pre: 3.14**

**Post 3.51**

**Change 0.37\*\*** (ANOVA at 0.01)

# ATTITUDES AND OPINIONS

37. Urban lawn management has no ecological impact on the surrounding area.

a. Strongly agree      b. Agree      c. Disagree      d. Strongly disagree

**Net Agree:**

**Pre: 23.7%**

**Post: 9.2%**

**Change: -14.5**

**Mean:**

**Pre: 2.85**

**Post: 3.29**

**Change: 0.44\*\*** (ANOVA at 0.01)

# ATTITUDES AND OPINIONS

46. Evolution is an ongoing process in nature.

a. Strongly agree      b. Agree      c. Disagree      d. Strongly disagree

**Net Agree:**

**Pre: 82.8%**

**Post: 89.3%**

**Change: 6.5**

**Mean:**

**Pre: 1.88**

**Post: 1.71**

**Change: 0.17\*\*** (ANOVA at 0.01)

# ATTITUDES AND OPINIONS

47. Evolution applies to human beings in the same way that it applies to all other organisms.

a. Strongly agree      b. Agree      c. Disagree      d. Strongly disagree

**Net Agree:**

**Pre: 73.2%**

**Post: 71.1%**

**Change not significant**

**Mean:**

**Pre: 2.04**

**Post: 2.07**

**Change: 0.03**

# ATTITUDES AND OPINIONS

48. Human beings are an integral part of the natural world.

a. Strongly agree      b. Agree      c. Disagree      d. Strongly disagree

**Net Agree:**

**Pre: 90.2%**

**Post: 94.2%**

**Change: 4.0**

**Mean:**

**Pre: 1.83**

**Post: 1.64**

**Change: 0.19\*\*** (ANOVA at 0.01)



# CORRELATION ANALYSIS

- Women tend to be more willing (than men) to consider changing the way they use natural resources (0.343\*\*)
- Students from farm/rural communities tend to:
  - be less willing (than metropolitan students) to consider changing the way they use natural resources (0.295\*\*)
  - believe that government should **not** take action to limit human drivers of climate change (0.257\*\*)
- Students who disagree that climate change is real tend to:
  - disagree that it is important to learn science (0.438\*\*)
  - be unwilling to consider changing the way they use natural resources (0.445\*\*)
  - disagree that learning about water is important (0.483\*\*)
  - disagree that it is important to learn about human impacts on the environment (0.479\*\*)
- (Correlations are significant at 0.01 confidence level)

# CONCLUSIONS

- Our pre/post-assessment provides clear evidence that:
  - students learn new concepts and academic skills in the course
  - student attitudes and opinions change over the course of the semester
  - Our students largely accept several scientifically well-supported, but culturally/politically contested scientific findings:
    - evolutionary science (80%+)
    - climate change and human drivers of climate change (80%+)
    - government must play a significant role in addressing public issues in agricultural science and natural resources
    - we must become more knowledgeable about, and learn to manage better, human impacts on the natural environment

# ACKNOWLEDGEMENTS

- We thank our students who graciously give their time and effort for our course assessment. They do so knowing that improvements in the course will benefit future students.
- We thank Dr. Steven S. Waller, Dean of the College of Agriculture and Natural Resources, for his full support of our assessment efforts in AGRI-NRES 103.

- ***End Session***