AGRI 491/491G
DATA ANALYSIS AND INTERPRETATION
WESTERN KENTUCKY UNIVERSITY

Course Information

Instructor:	Dr. Stephen A. King
Format:	Web-Course
CRNs:	46606 (491); 46607 (491G)
Section:	700
Credit Hours:	3

Please note that there is concurrently a traditional/classroom section of this course. It is being offered Tuesdays and Thursdays 11:10-12:30 in EST 250 on the WKU-Bowling Green campus. You are welcome to officially switch to the traditional/classroom section, or if you wish you can attend lecture periods without officially switching. Students enrolled in the web-course sections must take exams at an approved WKU Distance Learning Testing Center.

Contacting Dr. King

- The most reliable method of contacting Dr. King is to call or text him at his cell number 270-991-9804. Feel free to call or text between 8:00 AM and 10:00 PM any day of the week.
- Secondarily, visit Dr. King at his office located in the Environmental Science and Technology (EST) building room 240 on the WKU-Bowling Green Campus. The most likely times to catch Dr. King in his office are between 2:00 PM and 5:00 PM Monday and Wednesday and between 4:00 PM and 5:00 PM Tuesday and Thursday. If this does not work for you please call Dr. King at 270-991-9804 to establish an alternative time.
- Although a call/text to the cell phone or personal office visit are preferred, you are welcome to email Dr. King at Stephen.King2@wku.edu or call him at his office number 270-745-5964.

Course Prerequisites

The official course prerequisites are AGRI 291 or MATH 116, senior standing, and 3.0 cumulative GPA. Students that have not fulfilled these prerequisites may receive instructor consent. Of these official prerequisites, MATH 116 (college algebra) is the most important.

Course Description

AGRI 491/491G is designed to help students gain an understanding of how to analyze and interpret data, and how to use statistical software.

Course Objectives

Upon completion of the course students are expected to gain a general understanding of basic and foundational statistical principles including:

1. Graphical and numerical description of data
2. Probability and probability distributions
3. Experimental design
4. Analysis of variance
5. Linear regression and correlation
6. Application of statistical software for data analysis and manipulation

Course Text/Materials

There is no specific textbook required for this course. If a student desires a textbook, any good quality statistics text that covers the topics listed in the course outline (see last page of syllabus) should suffice. The following textbook is recommended:

> Lawal, Bayo. 2014. *Applied Statistical Methods in Agriculture, Health, and Life Science.* Cham (ZG), Switzerland: Springer International Publishing AG. 799 pp. ISBN 978-3-319-05554-1 (hardcover, $89.99), ISBN 978-3-319-0555-8 (eBook, $69.99), Available from https://www.springer.com/us/book/9783319055541

Course notes will be provided for most topic areas and distributed via the course *Blackboard* site. It is recommended that students purchase a 3-ring binder (2 ½ to 3 inch) for organizing course notes and other materials. Even for the online environment having organized ready access to materials in hardcopy form may be beneficial when taking non-proctored online quizzes.

Information Technology Requirements

You should have access to relatively new versions of the following information technology:

- Windows based personal computer
- Antivirus software
- High-speed internet connection
- Internet browser such as Internet Explorer, Mozilla Fire Fox, or Chrome
- Microsoft Word with Equation Editor 3.0
- Microsoft Excel
- Adobe Reader (freely available from http://www.adobe.com/)

It is not required that you own the above information technology. Every single one of you has access to these technologies through the various computer labs on the WKU campus. For location and operating hours of these labs see: http://www.wku.edu/it/labs/

WKU offers a free version of the Symantec antivirus software. You can download it by:

1. http://www.wku.edu/it/sms/
2. Click on "WKU Software Center"
3. Log-in
4. Click "Personal"
5. Look for Symantec Corporation "Symantec Endpoint Protection"

If I receive a corrupted file and if my anti-virus software detects that it is corrupted I will not open it. Thus I will not be able to grade it. I am sure that you want to earn credit for your work, so I suggest that you make sure your files are clean. Please note that if you have trouble locating, selecting, downloading, or installing the anti-virus software you need to call the WKU IT Help Desk at 270-745-7000.

Handheld Calculator

All students are expected to have a quality handheld calculator. Cell phone calculators and other internet enabled devices are not allowed during proctored quizzes and exams. There are numerous calculators that will suffice for this course. Agribusiness students should strongly consider investing in a Hewlett-Packard HP-12c, which is a quality calculator that will suffice for this course as well as for other AGEC

courses, such as AGEC 463 Agricultural Finance. Other statistical oriented calculators, rather than financial oriented calculators, may be more appropriate for this course.

Calculators with functions such as the following may be beneficial.

- Mathematical functions, such as:
  - y^x, $\frac{1}{x}$, $\sqrt[x]{y}$, e^x, $n!$, LN

- Statistical functions, such as:
  - Mean
  - Median
  - Mode
  - Variance
  - Standard deviation
  - Coefficient of variation
  - Weighted mean
  - Linear regression

For those interested in the HP-12c it is available in a standard and platinum version. The MSRP are $69.99 and $79.98 respectively. However, it is easy to find discounted prices from various retailers such as Amazon or even directly from Hewlett-Packard http://www.hp.com/#Product. Each version comes with a high quality user's guide and the platinum version in the past has been packaged with a tutorial DVD.

Course Design and Requirements

General Format

The course is constructed around the following modules

1. Describing Data
2. Probability & Probability Distributions
3. Statistical Inference
4. Analysis of Variance (ANOVA)
5. Regression Analysis

Exercises

It is expected that there will be one exercise/homework assignment per module.

Quizzes

It is expected that there will be one quiz per module.

Examinations

Two mid-term examinations are expected and a final exam. All exams will be taken via an approved WKU Distance Learning Testing Center.

G-Component Research Project

Students taking this course as part of graduate-level curriculum are required to complete a project to fulfill the G-component of the class. This project will encompass an analysis and summarization of data in-line with the individual student's interest. SAS is expected be utilized for the analysis of the data. Successful completion of the project is essential to receiving a passing grade in the course.

The research project involves the following components:

1. Research Proposal, due September 7
2. Identification of Presentation Venue & Date, due September 28
3. Research Report, due 2-weeks prior to the scheduled presentation date. (Absolute latest, November 16)
4. Research PowerPoint Presentation slide program, due 1-week prior to the scheduled presentation date. (Absolute latest, November 23)
5. Research Presentation, must be completed no later than the Thursday prior to final examination week. (Absolute latest, November 30)

All documents must be submitted in electronic form. Presentations are expected to be given using Microsoft PowerPoint; other formats may receive instructor consent. A copy of the PowerPoint presentation must be submitted electronically to Stephen.King2@wku.edu one week prior to presentation date. The student is responsible for identifying/creating the venue for the research presentation. The venue must include an ample audience of peers and university level agricultural faculty or agricultural research professionals. Students are strongly encouraged to utilize the Kentucky Academy of Science (KAS) Meeting as their presentation venue. Otherwise, the venue must be located on or near the WKU-Bowling Green Campus.

The Kentucky Academy of Science Meeting will take place at Murray State University on November 3 and 4. Abstract submissions are due to the KAS no later than October 1. For further information please see http://kyacademyofscience.net/programs/annual-meeting/

The general guidelines for the research report are as follows:

1. Your research report must examine an agricultural problem, opportunity, or issue.
2. Your report must include a clear research question that seeks to explain some result or aberration.
3. Your report should add something new to the existing literature in agriculture, or at the very least, add something new to the content of the course such as data for applied statistical analysis for agriculture.
4. You must utilize an adequate amount of peer-reviewed articles and empirical data from agriculture. Due to the limited amount of time, secondary data or data from research previously conducted is strongly encouraged.
5. You must properly and completely cite published work within the text of the paper and must include a complete and properly formatted reference list. Reference citations and reference listing must follow an approved format, such as the author-date format of *The Chicago Manual of Style*.

More specific formatting and content guidelines for the research proposals, reports, and presentations will be posted to *Blackboard*. Please note that you do not want to plagiarize, such action on any component of the research project will result in a failing grade for the course.

Grading

Your final course grade will be determined by:

Grading System for Undergraduate Curriculum Students				
Component	Quantity	Points	Total Points	Proportion of Course Points
Exercises/Homework Assignments	5	50	250	25.0
Quizzes	5	50	250	25.0
Mid-term Exams	2	125	250	25.0
Final Exam	1	250	250	25.0
Total			1,000	100

Grading System for Graduate Curriculum (G-Component) Students				
Component	Quantity	Points	Total Points	Proportion of Course Points
Exercises/Homework Assignments	5	50	250	16.7
Quizzes	5	50	250	16.7
Mid-term Exams	2	125	250	16.7
Research Proposal	1	100	100	6.7
Research Report	1	250	300	20.0
Research Presentation	1	150	100	6.7
Final Exam	1	250	250	16.7
Total			1,500	100

Course grades will be assigned using the following grading scale:

Grading Scale							
Grade	*Percentage*	*Point Range (Undergraduate)*			*Point Range (Graduate)*		
A	≥ 90	900	to	1,000	1,350	to	1,500
B	80 - 89.99	800	to	899	1,200	to	1,349
C	70 - 79.99	700	to	799	1,050	to	1,199
D	60 - 69.99	600	to	699	900	to	1,049
F	< 60	0	to	599	0	to	899

The letter grades A, B, C, D, and F have the following significance:

- A – "excellent" valued at four quality points per semester hour;
- B – "good" valued at three quality points per semester hour;
- C – "average" valued at two quality points per semester hour;
- D – "below average, unsatisfactory" valued at one quality point per semester hour; and
- F – "failure" valued at no semester hours earned and no quality points.

Students are encouraged to review pages 31-32 of the Western Kentucky University 2015-2016 Undergraduate Catalog for further information on the "grading and quality point system."

Extra Credit

Although there is no guarantee that extra credit or bonus points will be made available, historically there have been an ample amount of extra credit opportunities. The maximum allowable amount of extra credit that a student can earn is limited to 50 points or 5 percentage points.

Other Important Notices

Student Accessibility Resource Center

In compliance with university policy, students with documented disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Student Accessibility Resource Center (SARC) on the first floor of the Downing Student Union in room 1074. Please do not request accommodations directly from the professor without a letter of accommodation from the Student Accessibility Resource Center. For further information on the Student Accessibility Resource Center please see http://www.wku.edu/sarc/ or contact SARC at 270-745-5004 or sarc@wku.edu.

Cheating/Plagiarism

According to the student handbook: Any student who commits any act of academic dishonesty will receive from the instructor a failing grade in that portion of the coursework in which the act is detected or a failing grade in the course without possibility of withdrawal. Any student committing such acts in this class will receive a failing grade for the course. Further information on academic offenses, academic dishonesty, plagiarism, and cheating can be obtained from pages 33-34 of the Western Kentucky University 2015-2016 Undergraduate Catalog.

WKU Title IX Sexual Misconduct/Assault Policy

Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf and Discrimination and Harassment Policy (#0.2040) at https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf
Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121. Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the University and MUST report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159.

The Learning Center (TLC)

Should you require academic assistance with your WKU courses, The Learning Center (located in the Downing Student Union, Room 2141) provides free supplemental education programs for all currently enrolled WKU students. TLC @ DSU offers certified, one-on-one tutoring in may subject areas and academic skill areas by appointment or walk in. Online tutoring is offered to distance learners. TLC is also a quiet study area (with side rooms designated for peer-to-peer tutoring) and offers a computer lab to complete academic coursework. Additionally, TLC has satellite locations. Each satellite location is a quiet study center and is equipped with a small computer lab. For further information call (270) 745-6254 or see http://www.wku.edu/tlc

Study Hours and Time Management

Earning a college degree is a full time job. In general it is recommended that students study 3 hours per credit hour per week. AGRI 491/491G is a 3 credit hour course. Thus, in order to perform well in this course it is expected that you devote 9 hours of study time per week to this course. If you are devoting less than 9 hours of study time per week to this course and not earning the grade you desire you might reconsider your study habits and management of time. WKU offers dining halls and dormitories for a reason; these services help make your use of time more efficient and effective. For each topic area that we study you will be given a set of learning objectives, questions, and exercises which if followed will help to make your study time more effective and efficient. Additionally, *The Learning Center* occasionally offers *Academic Advantage Series Workshops* that may help you in improving your study habits and time management.

Weekly Activities	Time (hours)
Attending Class (15 credit hours)	15
Study Time (3 hours/credit hour)	45
Rest/Sleep (8-hours/day)	56
Cooking/Eating/Showering/Etc. (3-hours/day)	21
Socializing/Exercising/Relaxing/TV/Etc. (2-hours/day)	14
Free Time (Work or something else)	17
Total Hours Per Week	168

Tentative Course Outline

Module-1: Describing Data (August 22 - September 7)

- Introduction to Statistical Concepts and Data
- Graphical Description of Data
- Measures of Central Tendency (Mean, Median, Mode)
- Measures of Variation (Variance, Standard Deviation, Coefficient of Variation)
- Measures of Shape (Skewness, Kurtosis)

Module-2: Probability and Probability Distributions (September 12 – September 28)

- Methods of Assigning Probability
- Structure of Probability
- Marginal and Conditional Probability
- Laws of Addition and Multiplication
- Discrete Probability Distributions (Binomial, Poisson, Hypergeometric)
- Continuous Probability Distributions (Uniform, Normal, Exponential)

Exam #1 (Expected Completion Date: Tuesday, October 3)

Module-3: Statistical Inference (October 10 – October 26)

- Sampling and Sampling Distributions
- Confidence Intervals
- Hypothesis Testing with Single Samples
- Hypothesis Testing with Two Samples

Exam #2 (Expected Completion Date: Tuesday, October 31)

Module-4: Analysis of Variance (ANOVA) (November 2 – November 14)

- Experimental Design
- One-Way ANOVA
- Two-Way ANOVA

Module-5: Regression Analysis (November 16 – November 30)

- Simple Linear Regression
- Multiple Linear Regression
- Properties of OLS
- Violations of Basic Assumptions (Heteroskedasticity, Autocorrelation)

Final Exam (Expected Completion Date: Thursday, December 7)