School of Public and Environmental Affairs
Indiana University - Purdue University Indianapolis

SPEA-V 506 (25223): Statistical Analysis for Effective Decision Making (3 cr.)

Instructor: Jerome Dumortier
Time and Location: Tuesday 6:00 pm – 8:40 pm in BS 2008
Office and Contact: BS 4074, Phone: (317) 274-1817, Email: jdumorti@iupui.edu
Office Hours: Monday 4:45 – 5:45 pm, Tuesday 4:45 – 5:45pm, and Friday 8:45-10:45 am.

Course Bulletin Description

Non-calculus survey of concepts in probability, estimation, and hypothesis testing. Applications of contingency table analysis and analysis of variance, regression, and other statistical techniques. Computer processing of data emphasized.

Course Objective

This is a graduate level statistics course focusing on the statistical analysis of public and environmental affairs. It will teach students the skills necessary to carry out statistical analysis as well as the basic theory that enables and constrains the application of statistics to real world data. The course emphasizes on teaching the fundamentals of statistics, the practical application of statistics, the interpretation of statistical data, and the use of the statistical software STATA. The course covers topics such as conditional probability, probability distributions, joint distributions, covariance, correlation, the law of large numbers, the central limit theorem, graphical and numerical summaries of data, simple and multivariate regression, hypothesis testing, sampling, estimation, and confidence intervals. At the conclusion of the course, students will be able to do the following:

- Calculate and interpret frequency distributions, measures of central tendency, and measures of dispersion
- Understand the nature and application of basic probability distributions
- Develop sampling strategies, understand sampling distributions, and calculate confidence intervals for sample statistics
- Conduct hypothesis tests
- Do simple and multiple regression analyses, interpret the relevant statistics, and conduct the basic tests of hypotheses
- Develop basic multiple regression models with an understanding of the problems encountered and methods for creating more elaborate multiple regression models
- Know how to use STATA

Although there are no prerequisites, it is highly recommended that each student has completed an undergraduate statistics and mathematics class. This course will use a large amount of mathematics and it is strongly recommend refreshing your memory. The level of presentation, the use of examples, and the time allocated to the topics are based on this assumption. Any student who has not had such preparation should anticipate undertaking self-directed remedial work in order to fully comprehend the topics. Such remedial activities include working

additional problems found in the textbook or using online resources that present concepts in alternative ways.

Recommended Textbook and Lectures

Because of high textbook costs, I have decided to use an online textbook which is freely available through the IUPUI library. The book is called *A Modern Introduction to Probability and Statistics - Understanding Why and How* by Frederik Michel Dekking, Cornelis Kraaikamp, Hendrik Paul Lopuhaä, and Ludolf Erwin Meester. The URL to the book is:

http://www.springerlink.com/content/978-1-85233-896-1/#section=531358&page=1

Note that you have to be on campus (or use a Virtual Private Network at home) to access the book. However, you can download all the chapters as pdf files to your computer. This allows you to access the book offline and at home. The book serves as a reference for the material presented in class. The material in the book is a bit more advanced than what will be covered in class. The schedule lists the chapters and sections to read. Lecture notes, assignments and all other material for this class can be found at https://oncourse.iu.edu.

If you have any questions, please feel free to come to my office hours. Note that it will not be sufficient to download the lecture notes and study them without having attended the class. The slides are no substitutes to attending lectures. If you have any questions during the lecture, please feel free to ask me. Finally, note that if you miss a class, it is your responsibility to find out if you missed any assignments or handouts.

Evaluation

There will be one midterm exam (30% of final grade) and one final exam (40% of final grade). The midterm exam is closed books and closed notes. I do not expect you to know equations and formulas by heart. I will provide you with the necessary equations and formulas on the exam. However, you are expected to know how to apply them. The midterm examination is scheduled for October 14th, 2014 during regular class time. The final exam will be take-home. The material covered in class, the lecture notes, the book, and the homework is fair game for both exams. The final exam will emphasize on the material covered after the midterm and the application of STATA. Please note that there will be no make-up exams except for medical reasons, school sponsored events, jury duty, and military duty. In any case, you have to notify me in advance if you are going to miss an exam. I need written documentation from a physician in the case of a medical problem and a note from your advisor in all other cases.

There will be 7 assignments (30% in total) during the semester. Please do your homework neatly and staple it. If you know in advance that you are going to miss a class on the due date of homework, you can drop your assignment in my mailbox outside BS 4032. You can also scan your homework and send it via email to me. The lowest homework score will be dropped.

Forgetting to bring your homework to class can happen. No penalty applies if I receive the scanned homework via email by midnight, i.e., 12:00 am, of the due date. A score of 0 applies thereafter. This policy will be strictly enforced because it would be unfair to other students who turn in their homework on time.

Grading Scale
If *x* is your class score, then the following grading scale applies:

x ≥ 97%	A+	90%> x ≥ 87%	B+	80%> x ≥ 77%	C+	70%> x ≥ 67%	D+
97% > x ≥ 93%	A	87%> x ≥ 83%	B	77%> x ≥ 73%	C	67%> x ≥ 63%	D
93%> x ≥ 90%	A-	83%> x ≥ 80%	B-	73%> x ≥ 70%	C-	63%> x ≥ 60%	D-

Anything below 60%, i.e., x<60%, results in the grade "F".

STATA Software Packages
Students will learn how to use the software STATA in this class. There are three main version of STATA: Small STATA, STATA/IC, and STATA/SE. The cheapest and least performing version is Small STATA. This version should suffice for this class and I will try to limit the datasets for exercises to a size that can be handled by this version. Note that the most powerful version of STATA is available for free on https://iuanyware.iu.edu/vpn/index.html but might be slow in the event of high traffic. All the computers in BS 1000 will be equipped with STATA/IC. So if the student ever encounters a dataset larger than what can be handled by Small STATA, the version in BS 1000 will be able to handle it. If you want to purchase the software, you can go to: http://www.stata.com/order/new/edu/gradplans/us-pickup/. The main characteristics are summarized in the table below. Note that the price might be subject to change.

	Small STATA	STATA/IC	STATA/SE
Maximum number of variables	99	2,047	32,767
Maximum number of observations	1,200	Limited by RAM on computer	Limited by RAM on computer
6-month license for students	$35	$69	IUanyWare virtual application

Canvas
This course will be using the new course management system called Canvas https://canvas.iu.edu that was adopted by Indiana University. Do not use oncourse for any business related to this class!

General Items
I really like teaching. Below is a list of items and suggestions that I would like you to keep in mind. For 9 out of 10 students, the items on this list are common sense and reflect good manners. Unfortunately, I had (very few) students in the past whose behavior forced me to explicitly state my expectations in the syllabus. My colleague, Professor Kenna Quinet, was kind enough to share her code of conduct with me. So the items you see below are a mix of her and my ideas of how students should conduct themselves in a university environment. The following suggestions may help us avoid any confusion as the semester progresses.

- Turn off your phones. Do not let it make ring or vibrate during class. This behavior is rude towards your classmates and me.
- Do not be late. You should plan in advance for traffic, parking, and other possible delays. In the event that you are late, come into the classroom quietly and take your seat. Do not

walk across the front of the classroom and do not bother your classmates to try to catch up. I do go over the homework solutions at the beginning of class. Do not expect me to hand you back your homework until the end of the class when you are late.

- You do not have to call me and leave messages (including email) about why you cannot attend class unless it is an exam day. Absence from class is your issue and you should contact someone in class to get notes. Do not come to my office hours and expect a private mentoring session on the lecture material you missed.
- Please note that there will be no make-up exams except for medical reasons, school sponsored events, jury duty, family death, and military duty. In any case, you have to notify me in advance if you are going to miss an exam. I need written documentation from a physician in the case of a medical problem and a note from your advisor in all other cases. You will not be able to schedule a make-up exam without written documentation. Do not make me ask for the documentation. If you have a legitimate excuse for being absent on an exam date, please see me in advance of the exam (with documentation) and you may be able to take the exam early. Do not ask to take an exam early because you booked a vacation without checking the syllabus first. If you are sick on an exam day and have a doctor's excuse to miss the test, you must call me and tell me you are going to miss the exam ahead of the exam time. Do not sit in class and listen to us talk through the exam and then come up after that class and tell me you need to take the exam. If you are late to an exam, you do not get extra time at the end. If you are so late that other students have already left the exam you will not be allowed to begin the exam, you will get a zero unless you have a verifiable emergency for why you were so late.
- Cheating will be met with the most severe penalties allowed by the University.
- Please do your homework neatly and staple it. If you know in advance that you are going to miss a class on the due date of homework, you can drop your assignment in my mailbox outside BS 4032. You can also scan your homework and send it via email to me. Forgetting to bring your homework to class can happen. No penalty applies if I receive the scanned homework as one file in Portable Document Format (PDF) via email by midnight, i.e., 12:00 am, of the due date. A score of 0 applies thereafter. This policy will be strictly enforced because it would be unfair to other students who turn in their homework on time. It is your obligation to present proof of submission if there is any question about whether the homework was sent.
- I encourage you to come to office hours if you have questions, comments, and concerns. Do not come to office hours and solve the homework in front of me. This is unfair to other students.
- I strongly prefer if you use my email address, i.e., jdumorti@iupui.edu, for communication instead of oncourse. It is much more convenient and you get a quicker response. Note that it is university policy that you have to use your official university account for communication with me. If you send me an email from a non-university account, e.g., Gmail, Yahoo, etc., I will respond to your IU/IUPUI account. Do not send me a message on oncourse after the end of the semester. Always use my email.
- I am more than happy to discuss your educational, professional and career objectives.
- There is no extra credit in this class

Schedule

Fundamental of Probability

Week 1: 26-Aug	Lecture 1: Introduction to the course, basic mathematical tools, and introduction to probability Reading: • Chapter 1 and 2 (2.1 – 2.4)
Week 2: 2-Sep	Lecture 2: Conditional probability and independence, discrete and continuous random variables Reading: • Chapter 3, 4, and 5
Week 3: 9-Sep	Lecture 3: Measures of central tendency and variability, joint distributions, and independence Reading: • Chapter 7 (7.1 – 7.2, 7.4) and 9 **Homework 1 due**
Week 4: 16-Sep	Lecture 4: Covariance, correlation, the law of large numbers, and the central limit theorem Reading: • Chapter 10, 13 (13.1, 13.3 – 13.4), and 14 **Homework 2 due**
Week 5: 23-Sep	Lecture 5: Graphical and numerical summaries Reading: • Chapter 15.1 – 15.2, 15.4 – 15.5, and 16

Fundamentals of Statistics

Week 6: 30-Sep	Lecture 6: Basic statistical models and unbiased estimators Reading: • Chapter 17 and 19 **Homework 3 due**
Week 7: 7-Oct	Lecture 7: Efficiency, mean squared error, and the method of least squares Reading: Chapter 20 (20.1 and 20.2) and 22
Week 8: 14-Oct	**MIDTERM EXAMINATION**
Week 9: 21-Oct	Fall Break (no class)

Schedule (continued)

Week 10: 28-Oct   Lecture 8: Confidence intervals
                       Reading:
                       Chapter 23 (23.1, 23.2, 23.4) and 24
                       Homework 4 due

Week 11: 4-Nov   Lecture 9: Hypothesis testing, t-test, and comparing two samples
                       Reading:
                       - Chapter 25, 26, 26, and 28

Week 12: 11-Nov   Lecture 10: Introduction to STATA
                       STATA lecture in BS 1000
                       Homework 5 due

Fundamentals of Regression Analysis

Week 13: 18-Nov   Lecture 11: Regression I
                       Readings will be assigned

Week 14: 25-Nov   Lecture 12: Regression Analysis with STATA
                       STATA lecture in BS 1000
                       Readings will be assigned
                       Homework 6 due

Week 15: 2-Dec   Lecture 13: Regression II
                       Readings will be assigned
                       Homework 7 due

Week 16: 9-Dec   Lecture 14: Regression III
                       Readings will be assigned

Week 17: 16-Dec   **FINAL EXAM DUE AT 6:00 PM VIA CANVAS**

Syllabus Addendum: SPEA 2014 Policies
There are a number of campus-wide policies governing the conduct of courses at IUPUI. These
can be found at http://registrar.iupui.edu/course_policies.html. Additional information for SPEA
courses is below.

Civility and Disorderly Conduct
SPEA, which is a professional school, expects students to conduct themselves in a courteous and
civil manner in interactions with professors and fellow students. This requires each person to be
courteous, tolerant, and respectful during interactions with one another in all interactions,
including face-to-face interactions, e-mail, and telephone conversations. Examples of
discourteous behavior during class include reading the newspaper, working crossword puzzles,
listening to headphones, talking or laughing with other, arriving late, using computers to surf the
web, allowing cell phones to ring or sending text messages, or other non-class activities. The use
of language, tone, or gestures that are inappropriate or offensive is also discourteous. These

behaviors are not acceptable, and SPEA faculty and staff will address these problems as they arise either in class or on an individual basis.

Disorderly conduct that interferes with teaching, research, administration, or other university or university-authorized activity will not be tolerated and will be reported immediately to the Office of the Dean of Students for disposition, which may result in disciplinary action, including possible suspension and/or expulsion from the university. Responsibilities and expectations of students and faculty can be found at http://registrar.iupui.edu/misconduct.html.

Academic Misconduct

Students are responsible for upholding and maintaining academic and professional honesty and integrity (*IUPUI Code of Student Rights, Responsibilities, and Conduct*, available at http://www.iu.edu/~code/, Part II Student Responsibilities, G).

Plagiarism is the most common academic misconduct violation, and some students, who have been disciplined for plagiarism, have said they were not aware that they had plagiarized their work. Be aware that 'not knowing' does not excuse academic misconduct – every student is responsible for knowing the rules. The IU School of Education's 'How to Recognize Plagiarism' is an on-line tutorial that can help you avoid plagiarism. It can be accessed at http://www.indiana.edu/~istd/. If you have any questions about what constitutes academic misconduct for a course you are taking, be sure to ask the instructor for an explanation.

All faculty have the responsibility of fostering the "intellectual honesty as well as the intellectual development of students" and part of this responsibility means that faculty must investigate cases of potential academic misconduct promptly and thoroughly. Faculty members also have the responsibility of taking appropriate action when academic misconduct occurs. The penalties for academic misconduct include but are not limited to lowering a grade on an assignment, lowering a course grade, or failing a student for a course. Significant violations of the *Code* can result in expulsion from the University.

SPEA faculty take their responsibilities seriously and do not tolerate cheating, plagiarism, or any other form of academic misconduct. If you have not done so, you should read about your responsibilities in the IUPUI *Code of Student Rights, Responsibilities, and Conduct* to ensure that you understand what these terms mean and what penalties can be issued for academic misconduct.

The *IUPUI Code of Student Rights, Responsibilities, and Conduct* defines four areas of academic misconduct: cheating, fabrication, plagiarism, and interference. The prohibited activities and actions include the following:

1) Cheating. A student must not use or attempt to use unauthorized assistance, materials, information, or study aids in any academic exercise, including, but not limited to, the following:
    a) A student must not use external assistance on any "in-class" or "take-home" examination, unless the instructor specifically has authorized external assistance. This prohibition includes, but is not limited to, the use of tutors, books, notes, and calculators.
    b) A student must not use another person as a substitute in the taking of an examination or quiz.
    c) A student must not steal examinations or other course materials.
    d) A student must not allow others to conduct research or to prepare work for him or her without advance authorization from the instructor to whom the work is being submitted.

       Under this prohibition, a student must not make any unauthorized use of materials obtained from commercial term paper companies or from files of papers prepared by other persons.

    e) A student must not collaborate with other persons on a particular project and submit a copy of a written report which is represented explicitly or implicitly as the student's individual work.

    f) A student must not use any unauthorized assistance in a laboratory, at a computer terminal, or on field work.

    g) A student must not submit substantial portions of the same academic work for credit or honors more than once without permission of the instructor to whom the work is being submitted.

    h) A student must not alter a grade or score in any way.

2) Fabrication. A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citations to the sources of information.

3) Plagiarism. A student must not adopt or reproduce ideas, words, or statements of another person without appropriate acknowledgment. A student must give credit to the originality of others and acknowledge an indebtedness whenever he or she does any of the following:

    a) Quotes another person's actual words, either oral or written;

    b) Paraphrases another person's words, either oral or written;

    c) Uses another person's idea, opinion, or theory; or

    d) Borrows facts, statistics, or other illustrative material, unless the information is common knowledge.

4) Interference.

    a) A student must not steal, change, destroy, or impede another student's work. Impeding another student's work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain.

    b) A student must not give or offer a bribe, promise favors, or make threats with the intention of affecting a grade or the evaluation of academic performance.

Communication between Faculty and Students
In order to verify the identity of all parties involved, effective September 1, 2004, all email communication from current SPEA students to SPEA staff must originate from an Indiana University email account. For email communication with SPEA faculty, current SPEA students should refer to course syllabi for instructors' preferences (Oncourse, Webmail, etc.). This policy applies to current students only. Instructions for forwarding your IUPUI email to another account can be found at http://uits.iu.edu/scripts/ose.cgi?berh.def.help.

Students Needing Support From Counseling and Psychological Services
SPEA encourages any student who has concerns about their personal welfare to seek assistance with the professionally trained counselors of the IUPUI Counseling and Psychological Services (CAPS). CAPS provides direct professional psychological services, including crisis response, counseling, assessment and referral to all IUPUI students. More information can be found at http://studentaffairs.iupui.edu/health-wellness/counseling-psychology/index.shtml.

Students Needing Support From Adaptive Educational Services
Students needing accommodations because of a disability will need to register with Adaptive Educational Services (AES) and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 274-3241. Visit http://aes.iupui.edu/ for more information.

Students Called to Active Duty
SPEA encourages any student who is in the Indiana Military Reserves and is called to active duty to finish his/her coursework if at all possible. Students who cannot complete their courses have the option of withdrawing with 100% fee refund, but this request must be made within one week of being called to active duty. Students who are called to active duty may qualify for an incomplete (provided that all the above criteria have been met). For further information, please see the Office of the Registrar's website at http://veterans.iupui.edu/practices/withdrawal.php.

FLAGS System
SPEA faculty will be using IU's FLAGS System (Fostering Learning, Achievement, and Graduation Success) to provide real-time feedback on student performance in the course. Periodically throughout the semester, data on factors such as class attendance, participation, and success with coursework, etc. will be entered with suggestions on ways to improve performance. Students may access this information in the student center: Onestart > Student Services page > Student Center > My Academics and Grades > My Grades.

Administrative Withdrawal (AW)
If this class is utilizing the Administrative Withdrawal (AW) Policy, a student could be withdrawn from the class if they miss more than half of the required class activities within the first 25% of the course. More information can be found in the attendance and/or assessment portion of the syllabus if this policy is being used.

Course Withdrawals
Students who stop attending class without properly withdrawing from the class will receive a grade of F. It is important to withdraw from a course within specified timeframes (see chart below). Note that withdrawals after Week 12 of a regular session or Week 4 of a summer session are rarely granted. Poor performance in a course is not grounds for a late withdrawal.

Withdrawal forms will not be processed in the Office of the Registrar after the last day of classes. Any requests for a late withdrawal after the last day of classes must go through the grade appeal process, but each student should remember that in accordance with campus policy, SPEA does not permit a student to withdraw from a course if he/she has completed the course requirements. Grade replacement should be used in this case. See the Office of the Registrar's website at http://registrar.iupui.edu/withdraw.html for more information. To withdraw, obtain a withdrawal slip (DROP/ADD Form) from the SPEA Student Services window. Instructions for completing it are given on the form.

Withdrawal Deadlines	
Course deleted from record, no grade assigned, 100% refund (Advisor signature IS NOT required)	Week 1 (last day)

| Withdrawal with automatic grade of W (Advisor signature IS required) | Week 2– Week 7 (regular session) Week 2 – Week 3 (summer session) |
| Withdrawal with grade of W or F (Advisor and instructor signatures ARE required) | Week 8 – Week 12 (regular session) Week 3 – Week 4 (summer session) |

Incompletes

A grade of incomplete (I) indicates that a 'substantial portion' of the work in a course has been satisfactorily but not entirely completed by the student as of the end of the semester. The incomplete can be given to a student facing a hardship such that such that it would be unjust to hold the student to the established time limits for completing the work. To be eligible for the incomplete in a SPEA course, the student's work must be of passing quality, and the student must have completed 75% of the course requirements. Poor performance in a course is not grounds for an incomplete. SPEA follows the campus guidelines, which may be accessed at the Office of the Registrar's website at http://registrar.iupui.edu/incomp.html, in awarding incompletes. Incompletes must be removed within a time period not to exceed one year after the semester in which the student was enrolled in the course. The incomplete will revert to an 'F' if the work is not completed within the allotted timeframe established by the instructor.

Grade Changes

Under certain circumstances, students can seek grade changes for previously taken courses if they believe that a grade has been calculated or assigned incorrectly. A student who is seeking a grade change must first contact the instructor and ask for the grade change. In the event the instructor does not change the grade, the student can file a Change of Grade Petition with the Registrar's Office. In SPEA, a student has 90 days after the conclusion of a course to appeal a grade. In cases of extenuating circumstances, SPEA may consider petitions filed after this date. SPEA will review the request and make a final decision on a case-by-case basis. The Change of Grade petition form is located at the Office of the Registrar's website at http://registrar.iupui.edu/grdfrm.html.

Final Exam Schedule

If a final exam is given, it must be held on the day and time set in the final exam schedule. If an instructor has changed the final exam date, the student should first consult with the instructor. Students who have more than three final exams in one day or insufficient time to get from one exam to another should consult with their instructors to resolve these conflicts. If a student is not able to resolve a final exam problem with the instructor, the student may report the problem to the Director of the program. Tests or major writing assignments may not be required during the week before the formal final exam week unless assigned or announced at the beginning of the semester. See the Office of the Registrar's website at http://registrar.iupui.edu/final-policy.html for the policy and final exam week schedule.

Note: This syllabus is tentative and subject to change.