ARIZONA STATE UNIVERSITY

GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

*Copy and paste **current** course information from Class Search/Course Catalog.*

Academic Unit: **Human Systems Engineering** Department: **The Polytechnic School**

Subject: **EGR** Number: **320** Title: Human Systems and Statistics II (to be HSE 330 when new prefix is approved) Units: 3

Is this a cross-listed course? (Choose one)
If yes, please identify course(s): **No**

Is this a shared course? (choose one) If so, list all academic units offering this course: No

Course description:

Requested designation: (Choose One)

*Note- a **separate** proposal is required for each designation requested*

Eligibility:

Permanent numbered courses must have completed the university's review and approval process.
For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu or Lauren.Leo@asu.edu.

Submission deadlines dates are as follow:

For Fall 2015 Effective Date: October 9, 2014

For Spring 2016 Effective Date: March 19, 2015

Area(s) proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- Literacy and Critical Inquiry core courses (L)
- Mathematics core courses (MA)
- Computer/statistics/quantitative applications core courses (CS)
- Humanities, Arts and Design core courses (HU)
- Social-Behavioral Sciences core courses (SB)
- Natural Sciences core courses (SQ/SG)
- Cultural Diversity in the United States courses (C)
- Global Awareness courses (G)
- Historical Awareness courses (H)

A complete proposal should include:

- ☐ Signed General Studies Program Course Proposal Cover Form
- ☐ Criteria Checklist for the area
- ☐ Course Catalog description
- ☐ Course Syllabus
- ☐ Copy of Table of Contents from the textbook and list of required readings/books

Respectfully request that proposals are submitted electronically with all files compiled into one PDF. If necessary, a hard copy of the proposal will be accepted.

Contact information:

Name: Nancy J. Cooke Phone: 480-727-5158

Mail code: 2880 E-mail: ncooke@asu.edu

Department Chair/Director approval: *(Required)*

Chair/Director name (Typed): Ann McKenna Date: 12/30/14

Chair/Director (Signature): Ann McKenna

Rev. 1/94, 4/95, 7/98, 4/00, 1/02, 10/08, 11/11/ 12/11, 7/12, 5/14

Arizona State University Criteria Checklist for

MATHEMATICAL STUDIES [CS]

Rationale and Objectives

The **Mathematical Studies** requirement is intended to ensure that students have skill in basic mathematics, can use mathematical analysis in their chosen fields, and can understand how computers can make mathematical analysis more powerful and efficient. The **Mathematical Studies** requirement is completed by satisfying both the **Mathematics [MA]** requirement and the **Computer/Statistics/Quantitative Applications [CS]** requirement explained below.

The **Mathematics [MA]** requirement, which ensures the acquisition of essential skill in basic mathematics, requires the student to complete a course in College Mathematics, College Algebra, or Pre-calculus; or demonstrate a higher level of skill by completing a mathematics course for which a course in the above three categories is a prerequisite.

The **Computer/Statistics/Quantitative Applications [CS]** requirement, which ensures skill in real world problem solving and analysis, requires the student to complete a course that uses some combination of computers, statistics, and/or mathematics.* Computer usage is encouraged but not required in statistics and quantitative applications courses. At a minimum, such courses should include multiple demonstrations of how computers can be used to perform the analyses more efficiently.

*CS does *not* stand for computer science in this context; the "S" stands for statistics. Courses in computer science must meet the criteria stated for CS courses.

Revised April 2014

Proposer: Please complete the following section and attach appropriate documentation.

ASU--[CS] CRITERIA

A COMPUTER/STATISTICS/QUANTITATIVE APPLICATIONS [CS] COURSE MUST SATISFY ONE OF THE FOLLOWING CRITERIA: 1, 2, OR 3

YES	NO		Identify Documentation Submitted
		1. Computer applications*: courses must satisfy both **a** and **b**:	
☒	☐	**a.** Course involves the use of computer programming languages or software programs for quantitative analysis, algorithmic design, modeling, simulation, animation, or statistics.	Syllabus
		b. Course requires students to analyze and implement procedures that are applicable to at least one of the following problem domains **(check those applicable)**:	Syllabus
☐	☒	i. Spreadsheet analysis, systems analysis and design, and decision support systems.	
☐	☒	ii. Graphic/artistic design using computers.	
☐	☒	iii. Music design using computer software.	
☐	☒	iv. Modeling, making extensive use of computer simulation.	
☒	☐	v. Statistics studies stressing the use of computer software.	Syllabus
☐	☒	vi. Algorithmic design and computational thinking.	

***The **computer applications** requirement **cannot** be satisfied by a course, the content of which is restricted primarily to word processing or report preparation skills, the study of the social impact of computers, or methodologies to select software packages for specific applications. Courses that emphasize the use of a computer software package are acceptable only if students are required to understand, at an appropriate level, the theoretical principles embodied in the operation of the software and are required to construct, test, and implement procedures that use the software to accomplish tasks in the applicable problem domains. Courses that involve the learning of a computer programming language are acceptable only if they also include a substantial introduction to applications to one of the listed problem domains.

YES	NO		Identify Documentation Submitted
		2. Statistical applications: courses must satisfy **a**, **b,** and **c**.	
☒	☐	**a.** Course has a minimum mathematical prerequisite of College Mathematics, College Algebra, or Pre-calculus**,** or a course already approved as satisfying the MA requirement.	Syllabus
		b. The course must be focused principally on developing knowledge in statistical inference and include coverage of all of the following:	
☒	☐	i. Design of a statistical study.	Syllabus
☒	☐	ii. Summarization and interpretation of data.	Syllabus
☒	☐	iii. Methods of sampling.	Syllabus
☒	☐	iv. Standard probability models.	Syllabus
☒	☐	v. Statistical estimation	Syllabus
☒	☐	vi. Hypothesis testing.	Syllabus
☒	☐	vii. Regression or correlation analysis.	Syllabus
☒	☐	**c.** The course must include multiple demonstrations of how computers can be used to perform statistical analysis more efficiently, if use of computers to carry out the analysis is not required. .	Syllabus

YES	NO		Identify Documentation Submitted
		3. Quantitative applications: courses must satisfy **a**, **b, and c:**.	
☐	☐	**a.** Course has a minimum mathematical prerequisite of College Mathematics, College Algebra, or Pre-calculus**,** or a course already approved as satisfying the MA requirement.	
		b. The course must be focused principally on the use of mathematical models in quantitative analysis and decision making. Examples of such models are:	
☐	☐	i. Linear programming.	
☐	☐	ii. Goal programming.	
☐	☐	iii. Integer programming.	
☐	☐	iv. Inventory models.	
☐	☐	v. Decision theory.	
☐	☐	vi. Simulation and Monte Carlo methods.	
☐	☐	vii. Other (explanation must be attached).	
☐	☐	**c.** The course must include multiple demonstrations of how computers can be used to perform the above applications more efficiently, if use of computers is not required by students.	

Course Prefix	Number	Title	General Studies Designation
HSE	330	Human Systems and Statistics 2 Designation: CS	

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
Statistical applications	Students will gain extensive experience analyzing data using Excel and SPSS	Along with demonstrations in lectures students will be given multiple in-class (designated SPSS in lecture title) and take home data sets that they will analyze using SPSS and Excel

Catalog Description

Statistical methods commonly used in human systems engineering research. Emphasis will be placed on: (i) connecting research designs and statistical analysis, (ii) interpreting and breaking-down significant effects, (iii) addressing practical problems associated with doing research in applied contexts, (iv) using statistical methods to understand the connection between variables in a complex system, and (v) the use of statistical software. Primary focus is on analysis of variance (ANOVA) but other techniques (including mediation analysis, structural equation modeling and cluster analysis) will also be introduced. Recommended for preparation for both graduate study and careers in related industry.

HSE 330 - Human Systems and Statistics 2

Instructor:
Rob Gray
Office: TBD
Phone: TBD
Email: robgray@asu.edu

Office Hours:
TBD. Please email for an appointment outside of office hours.

Course Description and Objectives: Statistical methods commonly used in human systems engineering research. Emphasis will be placed on: (i) connecting research designs and statistical analysis, (ii) interpreting and breaking-down significant effects, (iii) addressing practical problems associated with doing research in applied contexts, (iv) using statistical methods to understand the connection between variables in a complex system, and (v) the use of statistical software. Primary focus is on analysis of variance (ANOVA) but other techniques (including mediation analysis, structural equation modeling and cluster analysis) will also be introduced. Recommended for preparation for both graduate study and careers in related industry.

Prerequisite: EGR 230 or PSY 230 or PSY 231

Learning Outcomes: By the end of the course it is expected that students will be able to:

(i) Explain the theoretical rationale for Analysis of Variance
(ii) Identify the appropriate statistical analysis given a description of an experiment
(iii) Apply statistical analyses learned using computer software
(iv) Interpret significant main effects and interactions using appropriate additional statistical tests
(v) Summarize current issues associated with replicability in behavioral research
(vi) Demonstrate the ability to handle practical problems associated with conducting experiments in applied contexts (e.g., lack of a control group, unbalanced designs)
(vii) Identify and describe methods that can be used to analyze the connections between systems of variables

Required Textbooks:
Keppel, G. & Wickens, T. D. (2004). *Design and Analysis: A researchers handbook (Fourth Edition)* . Englewood Cliffs, New Jersey: Prentice Hall.

Iacobucci, D. (2008). *Mediation Analysis (Quantitative Applications in the Social Sciences).* Los Angeles: Sage.

Blunch, N. (2008). *Introduction to Structural Equation Modelling Using SPSS and AMOS*. *).* Los Angeles: Sage.

Recommended Textbook:

Knapp, H. (2014). *Introductory Statistics Using SPSS.* Los Angeles: Sage.

Course Requirements and Grading:

1. **Exams (3 x 25% = 75%)** – There will be three in class exams during the course

2. **Homework Problems (10 x 2%=20%)** – There will be 10 home work problem sets during the course
3. **Position paper (5%)** – Students will be required to write a short paper discussing the issue of replicability in behavioural research.

Letter grade	Percentage
A	>90
B	80-89
C	70-79
D	60-69
E	<60

Standard rules of rounding will apply, so .5 and above will be rounded up to the next whole number. There will be no +/- grading.

Course Schedule:

Class dates:

Lecture#	**Topic**
1	Course Overview
2	Review of the Basics of Research Design
3	The Logic of Hypothesis Testing and Sources of Variability
4	Descriptive Statistics in SPSS
5	ANOVA Assumptions and how to test if they have been violated?
6	Single Factor Designs (Repeated Measures, Between Subjects)
7	SPSS Single Factor ANOVA
8	Breaking down significant ANOVA effects
9	SPSS Post-hoc analyses
10	**In class exam #1**
11	Questionable Statistical Practices
12	Effect Size and Power
13	Factorial Designs: One IV Type
14	Factorial Designs: Mixed
15	SPSS Factorial Designs
	Fall Break
16	Breaking down interaction effects I
17	Breaking down interaction effects II
18	SPSS Breaking down interactions
19	**In class exam #2**
20	Matching designs and experiments

21	Dealing with practical problems in Applied Research I
22	Dealing with practical problems in Applied Research II **(Position Paper Due)**
	Veteran's Day
23	Mediation Analyses
24	Structured Equation Modelling
25	Cluster Analysis Techniques
26	Systems Analysis Tools in SPSS
	Thanksgiving
27	Review
	In class exam #3

Attendance, Behavior, & Grading Policies: The class will employ interactive learning strategies with the instructor and/or students working on example data sets in class. Much of the course material cannot be conveyed via lecture slides or other posted material. Therefore, attendance is mandatory for all sessions. Accommodations will be made for religious observances provided that students notify the instructor at the beginning of the semester concerning those dates. Students who expect to miss class due to officially university-sanctioned activities should inform the instructor early in the semester. Alternative arrangements will generally be made for any examinations and other graded in-class work affected by such absences.

Late coursework will be penalized 10% per day and will not be accepted (i.e., student receiving grade of 0) after 5 days.

Cell phones and pagers must be turned off during class to avoid causing distractions. The use of recording devices is not permitted during class. Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

All students in this class are subject to ASU's Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. All violations will be reported to the Dean's office, who maintain records of all offenses. Students are expected to abide by the FSE Honor Code (http://engineering.asu.edu/integrity/).

Other information:

Suitable accommodations will be made for students having disabilities and students should notify the instructor as early as possible if they will require same. Such students must be registered with the Disability Resource Center and provide documentation to that effect.

The information in the syllabus, other than grade and absence policies, may be subject to change with reasonable advance notice

Design and Analysis: A Researchers Handbook (3rd Edition) by Geoffrey Keppel
Table of Contents

Designed to bridge the gap between elementary texts in statistics and experimental design and professional source books, this volume provides students with the basic information necessary to design and analyze meaningful experiments in the behavioral, social, and biological sciences. Explores a variety of ANOVA designs, and shows how to perform analytical comparisons to further understand significant effects.

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MEDIATION ANALYSIS

Dawn Iacobucci
Owen Graduate School of Management, Vanderbilt University

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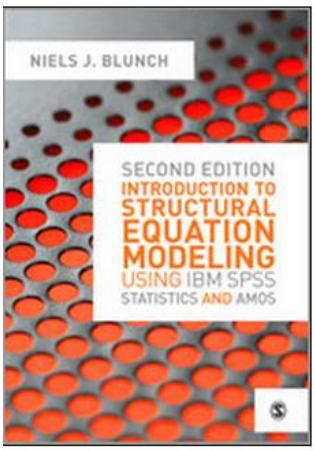

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