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: **230** Title: Human Systems and Statistics I (to be HSE 230 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)**:	
☐	☐	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.	Syllabus
		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.	Syllabus
☑	☐	vi. Simulation and Monte Carlo methods.	Syllabus
☐	☐	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.	Syllabus

Course Prefix	Number	Title	General Studies Designation

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)
1.a, 1.v.b	Statistical and graphing software is integral to the course.	The schedule of topics includes a column that details the software topics to be covered in each week.
2.a, 3.a	The prerequisites are as required	Prerequisite(s) include MAT 119, MAT 265 or Mat 171 with C or better
2.b, 2.c	As this is a statistics class all of the subtopics for section b are covered, and the demonstrations amply satisfy section c	Again, please see the list of topics in the schedule included with the sample syllabus.
3.b,3.c	this course is infused with other quantitative methods and applications	The class includes simulation of data to demonstrate a) the central limit theorem, b) why decisions may be undermined in small samples, and c) use of the signal detection model to understand diagnostic decision making including hypothesis testing inferences.

EGR 230: Catalog Description

Basic methods of exploratory data analysis (including graphics) and statistical computing methods, including a detailed look at hypothesis testing, effect size and power analysis, as well as some methods for dealing with categorical and discrete data. Both correlation/regression and analysis of variance (ANOVA) will be introduced, as well as common statistical software.

Syllabus
Human Systems and Statistics 1

Instructor: D. Vaughn Becker
Office: 150F
Room Number: SANCA 151

Course: EGR 230
Days: T/Th
Time: 10:30-11:45

Office Hours: T/TH 1:00-2:00; TBA
Email: vaughn.becker@asu.edu **Subject heading: EGR 230**

Text:
Howell, D. C. (2012). **Statistical methods for psychology** (8th ed.). Duxbury plus Course Packet of additional readings, including first three chapters of Box, G., & Hunter, W. (2005). **Statistics for Experimenters** (2nd ed). Wiley.

Prerequisite(s): PSY 101 (PGS 101) or EGR 103; MAT 119, or MAT 265 or Mat 171 with C or better

Course Description

Basic methods of exploratory data analysis (including graphics) and statistical computing methods, including a detailed look at hypothesis testing, effect size and power analysis, as well as some methods for dealing with categorical and discrete data. Both correlation/regression and analysis of variance (ANOVA) will be introduced, as well as common statistical software.

Course details

In this class, we'll be immersing ourselves in the basic methods of exploratory data analysis and statistical computing methods (with a lot of graphics). We will take a detailed look at hypothesis testing, effect size and power analysis, as well as some methods for dealing with categorical and discrete data. We will then explore both correlation/regression, and Analysis of Variance (ANOVA), with a heavy emphasis on using experimental designs to maximize the amount of information you can gain for your data collection efforts. The first class session will cover the reading for the week, while the second will cover more applied problems and software topics.

Software: We will use several statistical packages, which will cover the gambit of what you might encounter in the world of research and industry.

- We will use Excel to get a conceptual grip on the mechanics underlying each of the statistical methods that will be covered.
- R is a free program that will allow us to explore our data graphically, as well as statistically. While the learning curve is a little steep, it is alleged that R can do pretty much anything, and it is well-documented.
- SPSS reasonably easy to use, and it may be the software package that best combines ease of use and power.

Course Objectives

This course has several primary objectives:

1. To introduce students to the theory and methods of describing data with statistics.
2. To introduce students to the major considerations involved in the inferential statistical analysis of human-systems data.
3. To introduce students to the use of statistical software, with an emphasis on visualization graphics.
4. To teach the students to write up results statistical analyses in a clear and complete fashion.

Learning Outcomes:

Upon completion of this course, students will be able to:

1. Understand and critically appraise the use and reporting of descriptive and inferential statistics.
2. Apply basic descriptive and inferential statistics to the analysis of human and technological systems.
3. Conduct basic descriptive and inferential statistical analyses by hand and using computer software.
4. Describe and explore data using statistical graphics.
5. Report the results of statistical analyses in the styles currently used in the relevant literature, and explain these results in ordinary language.

Grading Requirements

Your grade in this class will be based on your performance on three types of assignments. These requirements will include weekly quizzes, homework, and 3 cumulative exams.

Quizzes

This class will consist of weekly quizzes. These quizzes will consist of multiple choice questions and short answer questions. The quizzes will cover the reading for the week and will be administered prior to the first lecture of the week. You will have **10 minutes** to complete each quiz.

Homework

Homework assignments will be due each Friday at 5 PM, and should be submitted electronically.

Exams

Each exam will be open-book, open-note, but will be timed at 1.5 hours. Exams will largely focus on worked problems and multiple choice, multiple answer questions about conceptual issues.

Grading policy

Your grade will be based on the following weightings. 300 points

20% the best 12 of the 15 weekly quizzes

30% the best 12 scores of the 15 homework assignments
20% 2 mid-term exams
30% 1 cumulative final exam

Your course grade will be assigned according to the following scale:

Letter grade	Points
A	270-300
B	240-269
C	210-239
D	180-209
F	179

Standard rules of rounding will apply, so .5 and above will be rounded up to the next whole number.

Missed Assignments

There will be **no makeup assessments** for this class except in specific circumstances (i.e. religious practices and university-sanctioned activities). The course has built in drop grades to cover missed assignments. If for some reason, you must miss multiple assignments make sure that you contact me before the exam.

Academic Integrity

Students will be held to the statutes of academic integrity put forth in the "Student Code of Conduct" that can be found in the Student Handbook: https://students.asu.edu/srr/code.

Please review the Student Academic Integrity Policy on Academic Integrity and Plagiarism at: http://www.asu.edu/aad/manuals/acd/studentacint.html

Please note that the University policies against Disruptive, Threatening, and Violent behavior will be enforced. Please review these in the Student Services Manual, SSM 104–02; http://www.asu.edu/aad/manuals/ssm/ssm104-02.html

Additionally, the use of use of pagers, cell phones, and recording devices is not permissible within the classroom without explicit consent from the instructor. Before each quiz, make sure to put away all notes and preparatory materials, turn off all pagers and cell phones, and removed all hats. Testing irregularities could be construed as cheating by the instructor.

The course content, including lectures, is copyrighted material and students may not sell notes taken during the conduct of the course (see ACD 304–06, "Commercial Note Taking Services" for more information).

Students with Disabilities

Students registered with the Disability Resource Center (DRC) are strongly encouraged to talk to the instructor about any assistance that might be needed

for this class. I am happy to make accommodations as needed. Please submit appropriate documentation from the DRC.

Class Schedule

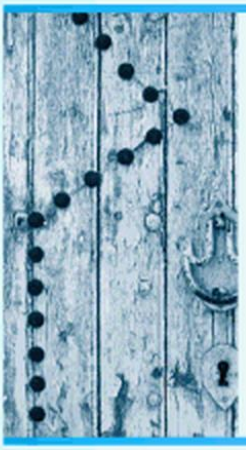
We will try to keep to the schedule below. Test dates are subject to change as the semester progresses based on the needs of class and topic completion.

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

Class Schedule

Week	Topic	Howell text	BHH2	Software
1	Describing and exploring data	1 to 24		intro to R and SPSS
2	Distributions and their parameters	28-56	**17-27**	plots in R
3	Boxplots and the Normal dist	57-64, 74-86	**27-39**	more SPSS
4	Sampling distributions and Hypothesis testing	92-112		Spread sheet z test, central limit theorem simulation
5	Probability and the Binomial Distribution	116-137	**48-60**	discrete distributions in R, decision theory
	EXAM 1			
6	Categorical data and Chi Square	142-168	**46-47, 112-117**	Spreadsheet Chisquare
7	T-tests	178-213 **[*690-704*]**	**67-91**	Spreadsheet Ttests
8	***odds ratios, binomial, McNemar, poisson inferences***		**92-105**	***all*** R
9	Correlation and Regression	244-260		spreadsheet CnR, SPSS
10	inferences about regression parameters	261-270 **[*273-285*]**		SPSS
	EXAM 2			
11	***Alternative correlation techniques, permutation***	***296-314***		***all*** R
12	Power	223-237	105-122	
13	Basic ANOVA	320-337	133-144	spreadsheet ANOVA
14	**ANOVA2**			R, SPSS
15	***Trend analysis and Design strategy***	***[408-415]***		SPSS
	EXAM 3			

Table of contents from
Howell, D. C. (2012). **Statistical methods for psychology** (8th ed.). Duxbury



Brief Contents