California State University, San Marcos General Education Program
GENERAL EDUCATION NEW COURSE CERTIFICATION REQUEST
• AREA B4: Mathematics and Quantitative Reasoning
See GE Handbook for information on each section of this form

ABSTRACT

Course Abbreviation and Number:MATH 200	**Course Title: Mathematical Statistics for Nursing**	
Number of Units:3 ____		
College or Program: ☐CHABSS X CSM ☐CEHHS ☐COBA ☐Other_____	**Desired term of implementation:** ☐ Fall ☐Spring X Summer Year2014	**Mode of Delivery:** X face to face ☐hybrid X fully on-line
Course Proposer (please print):Olaf Hansen	**Email:ohansen@csusm.edu**	**Submission Date:Feb. 2014**

1. Course Catalog Description: Provides an introduction to the statistical quantitative analysis of problems in the life and health sciences. Basic concepts include exploratory data analysis with graphs to visualize center, variation and distribution; scatter plots and correlation; measuring center and spread; percentiles and detecting outliers; basic probability concepts; normal distribution; sampling designs and designing experiments; Central Limit Theorem; confidence intervals; hypothesis testing of a claim about mean or proportion; chi-square test for goodness of fit; linear regression; matched pairs; bootstrap method for small sample estimation of a parameter using the Monte Carlo method for re-sampling.

2. GE Syllabus Checklist: The syllabi for all courses certified for GE credit must contain the following:

☐	Course description, course title and course number
☐	Student learning outcomes for General Education Area and student learning objectives specific to your course, linked to how students will meet these objectives through course activities/experiences
☐	Topics or subjects covered in the course
☐	Registration conditions
☐	Specifics relating to how assignments meet the writing requirement
☐	Tentative course schedule including readings
☐	Grading components including relative weight of assignments

SIGNATURES

Olaf Hansen 4/18/14
Course Proposer Date

_____
Department Chair date

Please note that the department will be required to report assessment data to the GEC annually. _____ *DC Initial*

		Support	Do not support*
_____		☐	☐
Library Faculty	Date		

		Support	Do not support*
_____		☐	☐
Impacted Discipline Chair	Date		

		Support	Do not Support*
_____		☐	☐
Impacted Discipline Chair	Date		

		Approve	Do not Approve
_____		☐	☐
GEC Chair	Date		

*** If the proposal is not supported, a memo describing the nature of the objection must be provided.**

Course Coordinator: Varies each year. Contact the Dept. Chair for a name. Phone Email:

From: Denise Boren
Sent: Friday, April 18, 2014 11:17 AM
To: Marshall Whittlesey
Subject: Re: math 200 form

Hi Marshall - the SON supports approval of MATH 200 for a GE course.

Thank you.
Denise

Sent from my iPhone

On Feb 25, 2014, at 4:30 PM, "Marshall Whittlesey" <mwhittle@csusm.edu> wrote:
Denise,

Attached is the Math 200 B4 recertification form and model syllabus. We need a signature from somebody in Nursing as an impacted department. I don't know who that would be, but please forward it to them and have them get back to me.

Thx.

Marshall
<math200B42014_2.docx>
<syllabus_m200.pdf>

Thanks Marshall. Please consider this email confirmation of my review and support from the Library.

-Yvonne

Yvonne Nalani Meulemans
Information Literacy Program Coordinator
Associate Librarian
Kellogg Library 3422/760-750-4375

From: Marshall Whittlesey <mwhittle@csusm.edu>
Date: Tuesday, February 25, 2014 at 4:47 PM
To: Yvonne Meulemans <ymeulema@csusm.edu>
Subject: math 200 B4

Attached….

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Part A: B4 Quantitative Reasoning General Education Learning Outcomes (GELOs) related to course content. [Please type responses into the tables.]

Math/Quant Reasoning GELOs this course will address:	Course content that addresses each GELO.	How will these GELOs be assessed?
B4.1: Explain and apply a variety of fundamental mathematical concepts, symbols, computations and principles.	Concepts: 1-variable equation; Using the logarithm and the exponential function to solve equations in one variable, binomial coefficients, factorial, number of possible permutations. Symbols: Sum symbol, binomial coefficients notation, interval notation, function notation. Principles: the same operation applied to two sides of an equation results in another equation; logarithm and exponential function are inverse functions. Determining a sample space for a random experiment and finding suitable probabilities for random experiments. Using density functions to determine probabilities; using values in tables to calculate areas, by taking suitable differences.	Students will be given a problem involving one or more of the concepts learned and be expected to solve it using the relevant symbols and computations and principles. Students will be expected to state their solution in a logical manner.
B4.2: Determine which quantitative or symbolic reasoning methods are appropriate for solving a given problem and correctly implement those methods.	Equivalence transformations on two sides of an equation lead to equations with the same solution set, for example given the current ratio of $^{14}C/^{12}C$ in a bone the students will determine the age. Students will determine lines to find the tax which is due in certain income brackets. Familiarity with lines and exponential functions is necessary for students to work with regression lines and Poisson distribution in Statistics. Additivity of areas, manipulations of inequalities to determine probabilities for confidence intervals and p-value.	The student will be given a 1-variable equation and be expected to determine what method of solution is appropriate, and implement it properly. Students will be given word problems which have to be transformed into questions about probabilities of sets.

Part B: General Education Learning Outcomes required of all GE courses related to course content:

GE Outcomes required of <u>all</u> Courses	Course content that addresses each GE outcome?	How will these GELOs be assessed?
Students will communicate effectively in writing to various audiences. (writing)	Homework, quiz, and exam problems will require students to explain their thinking.	Students will be expected to write out solutions to problems, explaining their thinking.
Students will think critically and analytically about an issue, idea or problem. (critical thinking)	Problems given will require students to determine what is being asked of them, think about what method/procedure of solution is appropriate, and properly implement that method/procedure.	Students will be expected to solve problems by using accepted principles of mathematical thinking in a logical way.

Part C: GE Programmatic Goals: The GE program aligns with CSUSM specific and LEAP Goals. All B4 courses must meet at least one of the LEAP Goals.

GE Programmatic Goals	*Course addresses this LEAP Goal:*
LEAP 1: Knowledge of Human Cultures and the Physical and Natural World.	☐ ***No*** ***X Yes***
LEAP 2: Intellectual and Practical Skills	☐ ***No*** ***X Yes***
LEAP 3: Personal and Social Responsibility	☐ ***No*** ☐ ***Yes***
LEAP 4: Integrative Learning	☐ ***No*** ☐ ***Yes***

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CSUSM Specific Programmatic Goals	**Course content that addresses the following CSUSM goals. Please explain, *if applicable.***
CSUSM 1: Exposure to and critical thinking about issues of diversity.	***X*** ☐ ***No*** ☐ ***Yes (please describe):***
CSUSM 2: Exposure to and critical thinking about the interrelatedness of peoples in local, national, and global contexts.	***X*** ☐ ***No*** ☐ ***Yes (please describe):***

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Part D: Course requirements to be met by the instructor.

Course Requirements:	**How will this requirement be met by the instructor?**
Course meets the All-University Writing requirement: A minimum of 2500 words of writing shall be required for 3+ unit courses.	Students will be expected to write out solutions to problems, explaining their thinking.
All courses offered in area B4 must have a prerequisite of at least intermediate algebra and must use a level of mathematics beyond that of intermediate algebra. No remedial algebra courses (e.g., Math 10, 20, and 30) can be used to satisfy this requirement. Even if a course has intermediate algebra as a prerequisite, it will not satisfy the Quantitative Reasoning Requirement unless it also meets each of the following three conditions:	Math 200 has an explicit prerequisite of ELM (intermediate algebra). Concerning a level of mathematics higher than intermediate algebra: the course explores the usage of exponential and logarithmic functions, their usage in statistics, and practices their properties via solutions of equations via logarithms. The course examines exponential and logarithmic relationships between variables by taking logarithmic transformations and doing linear regression on the transformed variables.
• It must focus on the use of mathematical language and formal reasoning in a variety of diverse disciplines, using a broad range of examples.	The mathematical language used includes: notions of variable, equation, solution, function, graph, sample space, probability, number of combinations, confidence interval, probabilities given a hypothesis. Students study these things and focus on solving problems concerning them. Formal reasoning includes using the ideas that: the same operation applied to two sides of an equation results in another equation, equivalent transformations of inequalities. These ideas are used as justifications for each step in a problem as a student proceeds to a solution. The language and reasoning are applied to a variety of disciplines in several ways. In word problems students learn how to apply probability theory to make statements about the likelihood of outcomes and use this to make inferences about parameters or decide between hypotheses. Applications are from various fields: Nursing, biology, taxation, agriculture, medicine, sociology, etc. These examples are intended to help the student understand the broad application of the subject.
• It must provide some historical perspective on the role which this approach has played in the development of human knowledge and of our understanding of the world.	Students are introduced to some of the most well-known people in the development of statistics, for example K. Pearson and W. Gosset, students will realize that statistics is a pretty new discipline compared to other parts of Mathematics. Another famous name connected to probability theory is S. Poisson. In examples students will see many developments of the recent history, like the transition of public perception of smoking over the last 50 years, the development of climate and the influence of climate on the distribution of fish species. Other historical examples include the measurements of body temperature by C. Wunderlich in the 19. century which lead to a wrong assumption about the mean human body temperature.
• It must demonstrate a variety of methods, such as the use of abstract symbols, of numeric techniques, of logical reasoning, of geometry,	Methods demonstrated include: usage of variables to represent quantities; usage of solution technique to solve equations; usage of graphs to understand patterns

etc.	and trends easily via picture; usage of a set of principles which are used to justify moving from one assertion to the next; usage of tables to find areas/probabilities.
A **statistics component** may be included which must:	
• Develop the students' ability to comprehend the power and broad utility of the fundamental mathematical models presented, rather than merely teaching rote statistical skills; and	Math200 teaches statistics not only as a tool but each statistical estimator and test is motivated and derived. For example in exams and quizzes students need to be able to explain the meaning of a derived p-value. Because the course contains a probability component students will be able to interpret p-values, so it will not be enough to say that a certain hypothesis should be rejected on a 5% level, but students need to say that the p-value is the probability for an outcome given that a hypothesis is true. Determining the hypothesis and the alternative is part of some problems and students will need to set up the question correctly. Similar for confidence intervals, where students need to formulate correctly the meaning of a confidence level as a probability of capturing the correct number with the help of an estimator.
• Must indicate applications to several areas.	Nearly every problem in the text book is about an application in nursing, biology, environmental science, chemistry, or sociology.
A **computer science component** may be included which must:	
• Teach a computer language that is suitable for use in diverse areas;	N/A to Math 200
• Teach this language in such a way that the student is led to a fundamental understanding of the nature of problem solving by combining data structures with algorithms; and	N/A to Math 200
• Provide fundamental skills in the use of computers for the application of university level quantitative methods to the solution of problems in many diverse areas.	N/A to Math 200

Mathematical Statistics for Life Sciences / Nursing

Math 200 Spring 2014 Course Information

Instructor: Olaf Hansen
Email: ohansen@csusm.edu
Office: Sci2 229
Office phone: 760–750–8005

Office hours: Monday 15^{00}–17^{00}, Thursday 14^{30}–15^{30}
Website: faculty.csusm.edu/ohansen and cougar courses
http://cc.csusm.edu/

Lecture: Tuesday, Thursday 10^{30}–11^{45}, SBSB 1103
Prerequisites: Fulfillment of the ELM requirement.
Textbook: Customized B. Baldi, D. Moore, "StatPortal for Baldi, The Practice of Statistics in the Life Sciences", W.H. Freeman and Company, ISBN 9781429266956, you can purchase the access to the electronic version directly from http://courses.bfwpub.com/psls2e.php, or a hard copy from the university bookshop.

Course description: This course provides an introduction to the statistical quantitative analysis of problems in life and health sciences. Basic concepts include explanatory data analysis with graphs to visualize center, variation, and distribution; scatter plots and correlation; measuring center and spread; percentiles and detecting outliers; basic probability concepts; normal distribution; sampling designs and designing experiments; Central Limit Theorem; confidence intervals; hypothesis testing of a claim about mean or proportion; chi-square test for goodness of fit; linear regression; matched pairs; boostrap method for small sample estimation of a parameter using Monte Carlo method for resampling.

General Education Student Learning Outcomes for General Education Area B4:

After completing the course students will be able to

- B4.1: Explain and apply a variety of fundamental mathematical concepts, symbols, computations and principles.
- B4.2: Determine which quantitative or symbolic reasoning methods are appropriate for solving a given problem and correctly implement those methods.

Course outcomes:

After completing the course students will be able to

- define and identify different kinds of data and samples,
- describe and explore data,
- identify and use linear and exponential functions,
- solve linear and exponential equations,
- interpret correlation coefficients and regression lines,
- interpret two–way tables,
- recognize observational and experimental studies,
- use probability models to describe random phenomena, identify the normal distribution and use tables to evaluate the cumulative normal distribution,
- apply the binomial and Poisson distribution to model discrete observations,
- use and interpret statistical tests,
- calculate and interpret confidence intervals,
- apply the chi–square test by hand.

Homework:	Homework will be regularly assigned, but not collected. The questions of the daily quizzes are taken from the homework questions.
Quizzes:	There will be a quiz every day. Every quiz is worth 10 points, see below for the grading of the quizzes. The three lowest quizzes will be dropped. I will assign online questions each week, these have to completed in the week they are assigned. In order to access these assignments you need to sign up with stats portal (http://ebooks.bfwpub.com/psls2e.php), which is a web site run by the book publisher (W.H. Freeman and Company).
Writing requirement:	Your 2500 word writing requirement will be met by the daily quizzes and homework problems.
Exams:	We will have 3 midterm and one final exam, see below for the dates of the exams.
General policy:	It is important that students attend classes. It is expected that students read the relevant sections of the textbook before they come to class. When a class is missed, the student is responsible to obtain the class notes from another student. All work for homework and exams must be your own. No cheating is tolerated. Anyone who cheats during an exam will receive an F for this exam. Incidents of Academic Dishonesty will be reported to the Dean of Students, Sanctions at the University level may include suspension or expulsion from the University (see also, page 92–93, University Catalog 2012–2014). If a student misses an exam and can present a legitimate, documented excuse the exam will not be counted and the final exam will get more weight for the calculation of the overall grade (Examples of legitimate excuses are: illness (then I would like to get a note from the doctor), University activities (then I would like to get a note from the instructor), serious family emergencies,...). Students who have a disability, which may require some modification of seating, testing, or other class requirements, are encouraged to contact me after class or during office hours.

Grading: Grading will be based on the homework, three midterm exams, and one comprehensive final exam.

		Date
Exam 1:	15 %	February 27
Exam 2:	15 %	March 27
Exam 3:	15 %	April 24
Final Exam:	30 %	May 13, 11^{30}–13^{30}
Quizzes:	20 %	
Online assignments:	5 %	

There will be a grade for every exam and the grade for the quizzes is given by the following table (the grade will include plus and minus):

Grade	Percentage
F	0 %–39%
D	40%–54%
C	55%–69%
B	70%–84%
A	85%–100%

Tentative Course Outline:

Week	Sections	
1/20 – 1/24	1	Picturing distributions with graphs.
1/27 – 1/31	2,3	Describing distributions with numbers, scatter plots, and correlation.
2/3 – 2/7	3,A3.1	Correlation coefficients and lines.
2/10 – 2/14	A3.2, A3.3	We study the exponential function, by studying different forms of growths and use the logarithmic function to solve exponential equations.
2/17 – 2/21	4,5	The regression line and two–way tables.
2/24 – 2/28	7	Samples and observational studies, **1. exam**.
3/3 – 3/7	9	We introduce probability.
3/10 – 3/14	11	Then we learn about the most important continuous distribution:The Normal Distribution.
3/17 – 3/21	12	We continue with the normal distribution and learn about two discrete distributions: The binomial and the Poisson distribution.
3/24 – 3/28	13	We study sample distributions, **2. exam**.
3/31 – 4/4		Spring Break.

4/7 – 4/11	14	We use the Central Limit Theorem and the normal distribution, to find confidence intervals and understand the logic of statistical testing.
4/14 – 4/18	15	We learn some practical questions connected to confidence intervals and tests.
4/21 – 4/25	17	Now we remove one of the assumptions from the previous sections and use the t-distribution for confidence intervals and tests. **3. exam**.
4/28 – 5/2	21	The χ^2–test brings us back to the partitioning of observations in groups which we have seen in chapter 5.
5/5 – 5/9	10	If time allows we will cover chapter 10, where we learn about general rules for the calculation of probabilities and Bayes' Theorem.