Statistics and Probability in Elementary Mathematics

GMCS-306, Tues./Thurs., 9:30am-10:20am

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Office Hours  1030-1200 Tues/Thurs  or by appointment

Course Overview and Description: A major goal of the course is to help you develop a deeper conceptual understanding of important topics in elementary school mathematics, particularly regarding probability and statistics. The orientation in this class will be the belief that mathematics is about developing insight into structures and relationships. Solutions to complex problems arise from understanding them deeply. You should strive to reorganize and deepen your understanding so that you will know mathematics in a way that will be helpful to your future students. In order to deepen your understanding of these concepts in elementary mathematics, you will be asked to solve mathematics problems. However, you will be asked to explain your reasoning and focus on underlying concepts, as opposed to merely reporting your solutions. This will involve doing mathematics with a focus on underlying concepts, connections to other mathematics, and with a focus on how to help your future students develop meaning. In addition, you will be expected to present your ideas about problems and to make sense of others’ ideas.

Prerequisites: MA 211 and satisfactory performance on the Mathematics Department Placement Exam, Liberal Studies

Required Text: Reconceptualizing Mathematics Second Edition
Part IV: Reasoning About Chance and Data (Sowder, Sowder, & Nickerson, 2010)
Available in bookstore under Sowder.

Learning Outcomes:

1) Ability to define and explain the following: probabilistic situation, event(s), experiment, outcome(s), probability of an event, sample space, equally likely outcomes, rules of probability, disjoint events, independent events, conditional probability, statistic(s), sample statistic, population parameter, population, sample, a biased sample, random sample, stratified random sample, strata, cluster sample, systematic sampling, self-selected, voluntary sample, convenience sample, simple random sample, categorical data, measurement data, range, nth percentile, median, quartile(s), inter-quartile range (IQR), outlier, arithmetic average, mean, mode, bell curve, normally distributed, normal
curve, z-score, standard deviation, dependant variable, positively associated, negatively associated, independent variable, line of best fit (regression line), correlation coefficient, confidence intervals, permutations and combinations.

2) Two ways of quantifying the probability of an event; theoretical and experimental.

3) Total probability of an experiment; what it means for an event to not be possible; how to figure out a probability of an unknown event given the probability of all other events.

4) How to make a systematic list; e.g. tree diagram and Venn diagram; ability to explain the sample space visually.

5) Explain various results of research about teaching children probability and statistics.

6) Ability to represent statistic data visually; e.g. bar chart (bar graph), circle graph (pie chart), stem-leaf plot, histogram, scatter plot, and line-graph.

Course Attendance: It is extremely important that you keep up-to-date on the work. When you do not understand something, try to get it cleared up as soon as possible. Attendance at each class is expected and required. Please inform me immediately of any medical or other circumstances that may affect your work. I am most easily contacted by e-mail. I am available by appointment for meetings at either office.

Class Expectations:
1. Please turn cell phones off before class begins. No texting, calling, playing, etc. The course requires your participation and such activity is disruptive to others in the class.
2. You are expected to participate in group work and discussions. At these times, you are encouraged to speak freely with your neighbors about the given activity. If you or your group completes an activity before the rest of the class, discuss your solutions with your neighbors. Challenge yourself to think further about the problem and to explain your thinking. When anyone is addressing the whole class, you are expected to be attentive and respectful. If you have a question, please ask.

Course Evaluation
Homework: Homework will be assigned (nearly) every class period and assignments will be due once a week. Each written assignment will usually be worth 10 points. Selected problems will be graded and points will be deducted for incomplete assignments. I will not accept late homework except in the case of a documented illness or emergency. I encourage you to work on your homework with others, presenting and reacting to each others’ mathematical arguments, as you will do in class. Your homework, however, should be an individual write-up. It is not acceptable to copy someone else’s homework. Presenting someone else’s work as your own constitutes plagiarism.
Exams: Missed exams can only be made-up in the case of a University-approved absence. First Exam will be Thursday, Oct. 10th; Second Exam will be Tuesday, Nov. 19th; Final exam is Thursday, Dec. 12th at 0800-1000.

Project: You will have an assignment, due near the end of the course, to work in a small group to conduct a survey and present and interpret the data. You will need to arrange time to work with two other people on this group project and write-up.

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<thead>
<tr>
<th>Grades will be weighted as follows:</th>
<th>Grades will be based on the following scale:</th>
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<tbody>
<tr>
<td>Participation 5%</td>
<td>90–100% A</td>
</tr>
<tr>
<td>Homework 15%</td>
<td>80–89% B</td>
</tr>
<tr>
<td>Group Project 15%</td>
<td>70–79% C</td>
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<tr>
<td>Exam 1 20%</td>
<td>60–69% D</td>
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<tr>
<td>Exam 2 20%</td>
<td>59% and below F</td>
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<td>Final Exam 25%</td>
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Important Dates: Sept. 14 is the last day to drop classes—6 pm. Sept. 16 is the last day to add classes or change grading basis.

Statement on Cheating and Plagiarism: Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one’s grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term ‘cheating’ not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one’s own work. Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the University. For more information on the University’s policy regarding cheating and plagiarism, refer to the Schedule of Courses (‘Legal Notices on Cheating and Plagiarism’) or the University Catalog (‘Policies and Regulations’).

Students with Disabilities: The University is committed to providing reasonable academic accommodation to students with disabilities. The Student Disability Services provides university academic support services and specialized assistance to students with disabilities. Individuals with physical, perceptual, or learning disabilities as addressed by the Americans with Disabilities Act should contact Student Disability Services (http://www.sa.sdsu.edu/dss/dss_home.html) at
(619) 594-6473 for information regarding accommodations. Please notify me so that reasonable efforts can be made to accommodate you.

**University Policy on Absence for Religious Observance:** By the end of the second week of classes, students should notify the instructors of affected courses of planned absences for religious observances. Instructors shall *reasonably accommodate students who notify them in advance of planned absences for religious observances.* Please notify the instructor in a timely manner and a reasonable accommodation will be reached.

This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.