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| 1. **Institution and Course Information** | |
| Name of Institution | **Navajo Technical University** |
| Department | **Engineering, Mathematics, & Technology** |
| Course Number, Title, Credits | **MTH 213 Elementary Statistics (3)** |
| Co-requisite Course Number and Title, if any |  |
| Is this application for your system (ENMU, NMSU, & UNM)? |  |
| Name and Title of Contact Person | **Gholam Ehteshami, Department Chairperson** |
| Email and Phone Number of Contact Person | **gehteshami@navajotech.edu; 505-786-4100** |

**Was this course previously part of the general education curriculum?**

Yes No

**This course will fulfill general education requirements for (check all that apply):**

AA/AS/BA/BS  **AAS**

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| 1. Content Area and Essential Skills |

**To which content area should this course be added?** *Indicate “Other” if the course is not associated with one of the six NM General Education content areas.*

Communications Mathematics Science Social & Behavioral Sciences

Humanities Creative & Fine Arts Other

**Which essential skills will be addressed?**

Communication Critical Thinking Information & Digital Literacy

Quantitative Reasoning Personal & Social Responsibility

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| 1. Learning Outcomes |

**This course follows the CCNS SLOs for**

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| MATH 1350 Introduction to Statistics. This course discusses the fundamentals of descriptive and inferential statistics. Students will gain introductions to topics such as descriptive statistics, probability and basic probability models used in statistics, sampling and statistical inference, and techniques for the visual presentation of numerical data. These concepts will be illustrated by examples from a variety of fields. |

**List all learning outcomes that are shared between course sections at your institution.**

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| **Common Course Student Learning Outcomes (find Common Course SLOs at:** [**http://www.hed.state.nm.us/programs/request-a-change-to-the-nmccns.aspx**](http://www.hed.state.nm.us/programs/request-a-change-to-the-nmccns.aspx)**)** |
| Explain the general concepts of statistics.  a. Explain and evaluate statistics used in the real world (from a news article, research project, etc.).  b. Use statistical vocabulary appropriately.  c. Distinguish between descriptive and inferential statistics.  d. Distinguish between qualitative and quantitative data.  e. Distinguish between populations and samples, and parameters and statistics.  f. Give examples of independent and dependent variables.  2. Presentation and description of data.  a. Present data graphically using histograms, frequency curves and other statistical graphs.  b. Interpret graphs of data, including histograms and shapes of distributions.  3. Summarize data using measures of central tendency and variation.  a. Calculate and interpret the mean, median, and mode to describe data.  b. Calculate and interpret range, variance, and standard deviation to describe data.  4. Present the concepts of probability.  a. Interpret basic probabilities.  b. Calculate probabilities using compound probability rules and the binomial distribution.  c. Calculate probabilities using the standard normal distribution and relate them to areas under the curve.  d. Determine if the binomial distribution can be approximated with the normal distribution.  e. Describe the relationship between the sampling distribution and the population distribution.  f. Use the central limit theorem to approximate the probability distribution and calculate probabilities.  5. Compute point and interval estimates.  a. Determine the confidence interval for a parameter.  b. Interpret the confidence level and margin of error.  c. Determine whether a statistical technique is appropriate under stated conditions.  6. Perform hypothesis tests.  a. Determine whether a statistical test is appropriate under stated conditions.  b. Identify null and alternative hypothesis.  c. Perform and interpret statistical tests (e.g. z-test, t-test, one-tailed and two-tailed, one-sample, two-sample) and determine whether data is statistically significant.  d. State the conclusion of a hypothesis test.  e. Interpret a p-value as compared to a significance level.  f. Explain why a test can lead us to reject a null hypothesis, not accept one.  g. Distinguish between Type I and Type II errors.  7. Analyze data using regression and correlation.  a. Explain the difference between correlation and causation.  b. Construct and interpret scatter plots.  c. Calculate and interpret the linear correlation coefficient.  d. Determine and use the equation of a least-squares regression line between two variables to make predictions.  e. Interpret the meaning of the coefficient of determination.  8. Optional topics.  a. Inter-quartile range, box-plots, stem-and-leaf plots.  b. Combinations and permutations.  c. The Poisson distribution.  d. Statistical power.  e. Chi-square.  f. Analysis of variance. |

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| **Institution-specific Student Learning Outcomes** |
| List institution-specific Student Learning Outcomes |

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| 1. Narrative |

**Explain what students are going to do to develop the critical skills** (selected above) **and how you will assess their learning?**

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| **Communication.** *Genre and Medium Awareness, Application and Versatility; Strategies for Understanding and Evaluating Messages; and Evaluation and Production of Arguments.* |
| In this class, students read a variety of research projects that have been conducted on the Navajo Nation. They compare and contrast in small group and whole class discussions differences in research design and research methods. They map out individually and in groups various research processes depending on the question and subject matter. They learn various strategies for understanding and evaluating general concepts of statistics, and also learn how to combine these strategies into ways of gathering ideas about their own research. They examine different types of data. They analyze how data are collected and displayed. They summarize data using measures of central tendency and variation. They learn the connection between descriptive and inferential statistics using probability concepts; examine basic properties of probability; and analyze probability by describing the relationship between sampling and population distributions. Oral participation is stressed all along. Students must understand, follow, explain, describe, and act out. Each student produces a PPT presentation pertaining to a final project and delivers it to the class. |

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| **Critical Thinking.** *Problem Setting; Evidence Acquisition; Evidence Evaluation; and Reasoning/Conclusion* |
| This class provides students with a strong background in critical thinking. It requires students to analyze data for their own research projects. They must read critically and engage in small and whole group discussions. They must communicate general concepts of statistics. Students learn statistical processes through learning how to ask appropriate research questions about issues that are relevant to the Navajo Nation. The formulation of research questions sets the stage for the students' own research methods and designs. The students gather appropriate evidence and critically evaluate the research data. They critically evaluate the data, and develop conclusions on the basis of that analysis. They test the gathered data to relevant criteria and standards of statistics. |

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| **Quantitative Reasoning.** *Communication/Representation of Quantitative Information; Analysis of Quantitative Arguments; and Application of Quantitative Models* |
| Students learn procedures for gathering, organizing, analyzing, and presenting quantitative data. They do these things by developing research questions that pertain to their own interests. Areas often include: consumer economics, traditional Navajo farming, student perceptions and attitudes among different statuses, genders, and age groups. They develop survey instruments, collect survey data in the field using traditional pencil-and-paper methods, and tabulate the data. They analyze the information using descriptive statistics. They calculate and interpret the mean, median, and mode to calculate range, variance, and standard deviation. They learn that data are the systematic collection and analysis of numerical information so as to explain, compute, calculate, and predict. Students calculate probabilities using compound probability rules and binomial distributions, compute point and interval estimates, and perform hypothesis tests to draw conclusions from the information and develop recommendations. They augment the quantitative data with qualitative information: interviews, focus groups. On the basis of all this, they draw conclusions from the information and develop recommendations for improving life on the Navajo Nation. |

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| **Personal & Social Responsibility***. Intercultural reasoning and intercultural competence; Sustainability and the*  *natural and human worlds; Ethical reasoning; Collaboration skills, teamwork and value systems; and Civic discourse, civic knowledge and engagement – local and global* |
| In this box, provide a narrative that explains how the proposed course addresses the outcomes of the third essential skill. 200 – 300 words. |

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| **Information & Digital Literacy.** *Authority and Value of Information; Digital Literacy; Information Structure; and Research as Inquiry* |
| In this box, provide a narrative that explains how the proposed course addresses the outcomes of the third essential skill. 200 – 300 words. |

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| 1. Supporting Documents |

**Sample Course Rubric Attached** (recommended) **Sample Assessment Attached** (required)

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| 1. Assessment Plan (Must be on file with HED by August 1, 2019) |

**Link to Institution’s General Education Assessment Plan** Click here to enter text.

This course meets Navajo Tech's institutional standards for General Education and has been reviewed and approved by our General Education Committee and Assessment Committee. Student learning data will be gathered from the last of the course's project assignments. Data summaries from all sections of the course will be compiled on a semester-by-semester basis by the University's Offices of Assessment and Institutional Research. Departmental faculty will review the data and design course and GenEd program improvements during Assessment Days each semester. An annual summary that includes summaries of program improvement will be prepared by the Assessment Committee and included in the University's Annual Student Learning Report. Curriculum revisions as needed will be designed by the General Education Committee and reviewed and approved by the Faculty Congress.

**This course meets institutional standards for general education.**

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Signature of Chief Academic Officer Date

**HED Internal Use Only**

Presented to NMCC on\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date

Approved Denied

If denied, rationale:

Institution Notified on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date

**Sample Assessment: MTH 213 project assignment-with-rubric**

**Assignment steps:**

1. Identify a research problem.

2. Create a research question.

3. Define terms and concepts.

4. Define the survey population.

5. Develop instrumentation plan.

6. Collect survey data.

7. Analyze the data.

8. Summarize all of these steps in a Powerpoint presentation.

9. Summarize all of these steps in a narrative of at least 750 words. Include graphs and charts in an appendix as needed.

**Rubric**

**QUANTITATIVE REASONING RUBRIC**

**Adapted from NMHED Quantitative Reasoning rubric • Navajo Technical University**

Student: Date:

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| OUTCOMES | SCALE | | | SUBTOTALS & COMMENTS |
| Emerging (1 pts) | Developing (2 pts) | Proficient (3 pts) |
| *Express quantitative information* | Student explains the meaning of graphics, numbers, or alge­braic symbols within a given context. | Emerging skill descriptions plus: Translates mathematical graphics and symbolism into written or oral language; translates written or oral lan­guage into mathematical sym­bols and graphics. | Developing skill descrip­tions plus: Integrates writ­ten and symbolic mathe­matical constructs in de­scribing particular contexts. |  |
| *Evaluate a quantitative argument* | Student summarizes quanti­tative arguments presented by others. | Emerging skill descriptions plus: Differentiates and de­scribes the parts of a quanti­tative argument presented by others; compares the conclu­sions of a quantitative argu­ment with conclusions from other reliable sources. | Developing skill descrip­tions plus: Uses appropriate techniques of mathematical proof or statistical analysis, evaluates each component of a quantitative argument for mathematical validity and demonstrates whether an overall quantitative ar­gument is valid, invalid, or questionable. |  |
| *Interpret re­sults to solve a problem* | Student identifies, describes, and classifies quantitative in­formation needed to address contextual problems. | Emerging skill descriptions plus: Identifies appropriate mathematical or statistical models to represent quantita­tive information in contextual problems; applies those mod­els to generate numeric pre­dictions. | Developing skill descrip­tions plus: Assesses the va­lidity of numeric predictions and correct unreasonable findings; analyzes and inter­prets results; uses them in a quantitative argument to support a position or line of reasoning or solve a contex­tual problem. |  |
| TOTAL/COMMENTS | | | | |

Scale: 9 points = A; 8 = points = B; 7-6 points = C; 5-4 points = D; less than 4 points = F