**General Education Course Inclusion Proposal**

**Quantitative Reasoning and Analysis**

*This proposal form is intended for departments proposing a course for inclusion in the Northern Michigan University General Education Program. Courses in a component satisfy both the Critical Thinking and the component learning outcomes. Departments should complete this form and submit it electronically through the General Education SHARE site.*

**Course Name and Number: Psychological Statistics (PY305)**

**Home Department: Psychology**

**Department Chair Name and Contact Information** (phone, email): **Paul Andronis, pandroni@nmu.edu**

**Expected frequency of Offering of the course** (e.g. every semester, every fall): **Offered every semester**

**Official Course Status**: Has this course been approved by CUP and Senate? **YES**

*Courses that have not yet been approved by CUP must be submitted to CUP prior to review by GEC. Note that GEC is able to review courses that are in the process of approval; however, inclusion in the General Education Program is dependent upon Senate and Academic Affairs approval of the course into the overall curriculum.*

**Overview of course** (please attach a current syllabus as well): *Please limit the overview to two pages (not including the syllabus)*

1. Overview of the course content  
     
   PY305 Psychological Statistics teaches students to apply statistical methods to Psychological research. Students learn how to organize, summarize, and display data and they learn how to make inferences about future outcomes, using probabilities, based on past observations. Students also learn to apply the appropriate inferential statistical analysis for a given research study, based on the research design used in the study. After conducting a statistical analysis, students learn to draw conclusions about how statistical findings address a research question.

B. Explain why this course satisfies the Component specified and significantly addresses both learning outcomes

**Learning Outcome: Demonstrates critical thinking**

Evidence: For the “evidence” dimension of this learning outcome, students must be able to assess the quality of information that may be integrated into an argument. For this course, students read detailed questions provided in the textbook, class assignments, and exams to select relevant information and ignore irrelevant information as a first step toward developing a strategy for answering the questions. In addition, students review descriptions of research studies and data gathered from these studies. Students must carefully evaluate these descriptions before attempting to analyze data.

Integrate: For the “integrate” dimension of this learning outcome, students must be able to integrate insight and/or reasoning with existing understanding to reach informed conclusions and/or understanding. Once students identify the correct evidence in a question, students must use their knowledge of statistical methods and apply this knowledge to the available evidence in order to develop a solution.

Evaluate: For the “evaluate” dimension of this learning outcome, students must be able to evaluate information, ideas, and activities according to established principles and guidelines. After integrating the evidence from statistical questions and knowledge of statistical methods to solve the statistical questions, students must draw conclusions about these solutions. These conclusions must relate the solution to the description of the problem. For example, determining that a statistical analysis revealed that the likelihood of obtaining a group average by chance is less than 0.05 would be the result of “integration,” and concluding that the result indicates that a treatment is effective (i.e., too unlikely to occur by chance) would be evidence of “evaluation.”

**Learning Outcome: Demonstrates interpretation of quantitative data leading to conclusions**

Calculation: For the “calculation” dimension of this learning outcome, students must be able to perform mathematical/numerical operations. In this course, students will use mathematical formulas to develop summary statistical values (e.g., a mean) and to calculate inferential statistical values (e.g., a t-test statistic).

Analysis/Application: For the “analysis/application” dimension of this learning outcome, students must be able to manipulate quantitative data to produce new data and must be able to use data to make judgments and draw conclusions. Students will learn to transform data into standard scores, such as z scores, describe data in various ways, including frequencies of scores and the percent ranks of scores. Students will determine the probability of outcomes and draw inferences about the effectiveness of study conditions.

Interpretation: For the “interpretation” dimension of this learning outcome, students must be able to explain information presented in mathematical forms (e.g, equations, graphs, diagrams, tables, and words). Students must be able to interpret and explain summary statistical values, such as means and standard deviations, and interpret and explain numerous equations, and symbols used in the equation, in order to solve statistical problems. Students learn to interpret and explain data given in table form, including the expression of these data in different forms, and interpret and explain data presenting in graphs. Students also learn how to explain the results of statistical analyses when expressed using statistical notation.

C. Describe the target audience (level, student groups, etc.)

The target audience for this course is Junior level students who have taken PY100 Introduction to Psychology.

D. Give information on other roles this course may serve (e.g. University Requirement, required for a major(s), etc.)

This course is required for students majoring in Psychology - Graduate School Preparation and it can be used as an elective in the other majors in Psychology.

E. Provide any other information that may be relevant to the review of the course by GEC

**PLAN FOR LEARNING OUTCOMES  
CRITICAL THINKING**

*Attainment of the CRITICAL THINKING Learning Outcome is required for courses in this component. There are several dimensions to this learning outcome. Please complete the following Plan for Assessment with information regarding course assignments (type, frequency, importance) that will be used by the department to assess the attainment of students in each of the dimensions of the learning outcome. Type refers to the types of assignments used for assessment such as written work, presentations, etc. Frequency refers to the number of assignments included such as a single paper or multiple papers. Importance refers to the relative emphasis or weight of the assignment to the entire course. For each dimension, please specify the expected success rate for students completing the course that meet the proficiency level and explain your reasoning. Please refer to the Critical Thinking Rubric for more information on student performance/proficiency in this area. Note that courses are expected to meaningfully address all dimensions of the learning outcome.*

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| **DIMENSION** | **WHAT IS BEING ASSESSED** | **PLAN FOR ASSESSMENT** |
| **Evidence** | Assesses quality of information that may be integrated into an argument | Course instructors differ in their approach to evaluating students in PY305 Psychological Statistics. All instructors assign exams, however, and selected questions from these exams can be used to evaluate the “evidence” dimension for students. Two to three exams will be evaluated during the semester, again depending on the instructor, and these exams, combined, will vary from half of a final course grade to the majority of a final course grade. We expect 70% of students will be rated as “proficient” given that the average final grade for this course varies, from instructor to instructor and semester to semester, around a C. |
| **Integrate** | Integrates insight and or reasoning with existing understanding to reach informed conclusions and/or understanding | The same exams will be used to evaluate the “integrate” dimension of this learning outcome for reasons stated above. The instructor will select questions on these exams that are appropriate for evaluating this dimension. Again, based on past courses, we expect that 70% of students will be rated as “proficient.” |
| **Evaluate** | Evaluates information, ideas, and activities according to established principles and guidelines | The same exams will be also used to evaluate the “evaluate” dimension of this learning outcome. Again, the instructor will select questions on these exams that are appropriate for evaluating this dimension, and we expect that 70% of students will be rated as “proficient.” |

**PLAN FOR LEARNING OUTCOMES  
QUANTITATIVE REASONING AND ANALYSIS**

*Attainment of the QUANTITATIVE REASONING AND ANALYSIS Learning Outcome is required for courses in this component. There are several dimensions to this learning outcome. Please complete the following Plan for Assessment with information regarding course assignments (type, frequency, importance) that will be used by the department to assess the attainment of students in each of the dimensions of the learning outcome. Type refers to the types of assignments used for assessment such as written work, presentations, etc. Frequency refers to the number of assignments included such as a single paper or multiple papers. Importance refers to the relative emphasis or weight of the assignment to the entire course. For each dimension, please specify the expected success rate for students completing the course that meet the proficiency level and explain your reasoning. Please refer to the Rubric for more information on student performance/proficiency in this learning outcome. Note that courses are expected to meaningfully address all dimensions of the learning outcome.*

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| **DIMENSION** | **WHAT IS BEING ASSESSED** | **PLAN FOR ASSESSMENT** |
| **Calculation** | Ability to perform mathematical/numerical operations. | As noted for the previous learning outcome, course instructors differ in their approach to evaluating students in PY305 but all instructors provide exams. The course instructors will select questions on these exams that can be used to evaluate the “calculation” dimension for this learning outcome. Two to three exams will be evaluated during the semester, again depending on the instructor, and these exams, combined, will vary from half of a final course grade to the majority of a final course grade. We expect 70% of students be rated as “proficient” given that average grade for this course is around a C. |
| **Analysis/Application** | Ability to manipulate quantitative data to produce new data.  Ability to use data to make judgments and draw conclusions. | The same exams will be used to evaluate the “analysis/application” dimension of this learning outcome for reasons stated earlier. The instructor will select questions on these exams that are appropriate for evaluating this dimension. Again, based on past courses, we expect that 70% of students will be rated as “proficient.” |
| **Interpretation** | Ability to explain information presented in mathematical forms (e.g. equations, graphs, diagrams, tables, and words) | The same exams will be also used to evaluate the “interpretation” dimension of this learning outcome. Again, the instructor will select questions on these exams that are appropriate for evaluating this dimension, and we expect that 70% of students will be rated as “proficient.” |