

# COURSE REVISION

Northwest Indian College Curriculum Committee

## COURSE INFORMATION BEFORE PROPOSED CHANGE

Department and Number: MATH 107 Course Title: Elementary Statistics I

**Rationale:** Currently, students fulfill the prerequisite for Math 107 with any passing grade (D- or better) in Math 099. This means that students can enroll in Math 107 even though they have not necessarily demonstrated satisfactory competency in achieving the course outcomes. This increases the likelihood of students being unprepared to be successful in this class. Additionally, the new NWIC General Education and College Requirements guidelines specify that courses that satisfy the NWIC quantitative skills requirement, including Math 107, will have a prerequisite of Math 99 with a grade of C or better. The course catalog description and course outcomes have been updated to conform to current approaches in teaching elementary statistics.

## PROPOSED REVISIONS TO THE COURSE – FILL IN CHANGES ONLY

Course Title (60 character maximum): \_\_\_\_\_

Short title if proposed title is over 25 characters: \_\_\_\_\_

Credits: \_\_\_\_\_

Course Catalog Description (50 word maximum): Develops the tools to describe and interpret the main features of a collection of quantitative data: histograms, boxplots and scatterplots; the median, mean, standard deviation and correlation of a dataset; and the normal approximation. Introduces the concepts of sampling and experiments. Relates these concepts to current issues confronting tribes.

Prerequisites, if any: C or better in Math 099 or test above intermediate algebra

Form of Grading:  A-F  S/U

Course Type:  Lecture only  Lab only  Lecture and lab  Phys. Ed.  Internship/Practicum

Allow course to be taught in separate modules?  Yes  No

Indicate number of credits for each module:

A  credits B  credits C  credits D  credits E  credits F  credits

Designed to meet the following general education and related requirements:

(Basic Skills) (Distribution) (Other) (NWIC)  
 CS  QS  HP  HT  SS  NS  NSL  TE  NE  NASD

Designed to meet the following program requirements:

NWIC Requirements  Program Core Requirements  Electives

Name(s) of the program(s) if the course satisfies program core requirements: \_\_\_\_\_

For the following type(s) of program (check all that apply):

Program of Study:  BS  AAS  AST  AAS-T  ATA  Certificate  
Other Program Type:  Award of Completion  Training Program

Add course to the published NWIC catalog?  Yes  No

Required attachments: (Templates for required attachments are available on the Curriculum Committee web site.)

Course Outcomes Form  Course Syllabus

Matteo Tamburini \_\_\_\_\_

Proposed by (type name)

June 1, 2014

Date

## APPROVAL SIGNATURES

\_\_\_\_\_  
*Dean of Academics and Distance Learning – approved to present*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Curriculum Committee Chair – approved by Curriculum Committee*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Vice President for Instruction and Student Services – approved to implement*

\_\_\_\_\_  
*Date*



# Course Outcomes Form

## Northwest Indian College

Follow the *Instructions for Completing the Course Outcomes Form*, which is available on the *NWIC Assessment Website* at <http://www.nwic.edu/assessment/course-outcomes>  
 Please submit this form electronically to the chair of the Curriculum Committee

It is important to keep the following principles in mind when completing this form:

- Regardless of the mode of learning (i.e., face-to-face, Independent learning, ITV, online, etc.) or the location of a course, only one course outcomes form is to be created for each course.
- Regardless of the mode of learning or the location of a course, the **NWIC outcomes** and the **Course outcomes** must be the same for each course.
- The **Instructional activities** and the **Assessment/evaluation strategies** may differ depending on the mode of learning. Please indicate the **Instructional activities** and the **Assessment/evaluation strategies** that are different from the face-to-face class (e.g., “IL: Essay”).

<b>Last date this form was updated or edited</b>	6/1/2014
<b>Course Number (e.g., ENGL 101)</b>	MATH 107
<b>Course Name (e.g., English Composition I)</b>	Elementary Statistics I
<b>List the names of all instructor(s) who participated in creating and approved these course outcomes (please consult with at least one other person)</b>	Matteo Tamburini, Amy Anderwon (WWU)
<b>List the main textbooks, readings or other resources used in this course (including title, year and publisher)</b>	Statistics (4 <sup>th</sup> edition), By Freedman, Pisani and Purves; Norton, 2007

**A. NWIC outcomes:** From the *List of NWIC Outcomes*, select the most important outcomes you assess in this course (at least one NWIC outcome must be chosen- **maximum of four**).

<b>NWIC outcome # (e.g., “Written communication: 2a. Write Standard English”)</b>	<b>Instructional Activities: How will students master this outcome? (e.g., solving problems, group activity)</b>	<b>Assessment/Evaluation Strategies: How will you measure this outcome? (e.g., student presentations, essays)</b>
Use analytical and critical thinking skills to draw and interpret conclusions from multiple perspectives including indigenous theory and methods	Ongoing classroom discussions, individual and group problem solving sessions, reflecting on the feedback from their assignments	Exams, classroom observations, ongoing formative assessments

**B. Course outcomes:** In order of priority, list the most important other learning outcomes for this course that you assess (a maximum of 10).

<b>Other course outcomes: Complete the sentence – As a result of this course, students will be able to...</b>	<b>Instructional Activities: How will students master this outcome? (e.g., solving problems, group activity)</b>	<b>Assessment / Evaluation Strategies: How will you measure this outcome? (e.g., student presentations, essays)</b>

Describe the differences between observational studies and designed, controlled experiments	Reading the textbook, asking questions during lecture, completing assignments, reflecting on feedback on assignments	Exams, classroom observations, ongoing formative assessments
Describe the characteristics of a sample that is representative of a population, and evaluate whether a given sample is likely to be representative.	Reading the textbook, asking questions during lecture, completing assignments, reflecting on feedback on assignments	Exams, classroom observations, ongoing formative assessments
Construct and interpret graphical representations of data, such as bar graphs, histograms, boxplots and scatterplots, by hand, using a graphing calculator and/or an electronic spreadsheet.	Ongoing guided practice	Exams, classroom observations, ongoing formative assessments
Compute or reasonably estimate the mean, median and standard deviation of a dataset using a graphing calculator and/or an electronic spreadsheet, and interpret them; compare and contrast the properties of various measures of center and spread.	Ongoing guided practice; reading the textbook, asking questions during lecture, completing assignments, reflecting on feedback on assignments	Exams, classroom observations, ongoing formative assessments
Explain the importance of calculating and reporting measures of spread along with measures of center.	In-class discussion	Exams, classroom observations, ongoing formative assessments
Define and use the concept of correlation between two quantities	Reading the textbook, asking questions during lecture, completing assignments, reflecting on feedback on assignments	Exams, classroom observations, ongoing formative assessments
Calculate a linear regression model using a graphing calculator and/or an electronic spreadsheet; interpret the meaning of the coefficients; use it to make predictions and discuss their accuracy.	Ongoing guided practice	Exams, classroom observations, ongoing formative assessments
Use a normal curve to estimate the likelihood of events that are approximately normally distributed	Reading the textbook, asking questions during lecture, completing assignments, reflecting on feedback on assignments	Exams, classroom observations, ongoing formative assessments
Describe the ways in which the concepts described in the class could be applied to situations appropriate to the students' field of study.	In-class discussions	Exams, optional presentation, ongoing formative assessments

**C. List the NWIC outcomes and course outcomes from above on your syllabus.**

**D. Assess the NWIC outcomes and course outcomes, which are listed above, in your classes.**

MATH 107 – ELEMENTARY STATISTICS 1 (5CR): **Fall 2014**

**Class time and location:** Monday, Tuesday and Friday, 3:00 – 4:30pm, NE 114

**Instructor Information:**

**Matteo Tamburini**

**Office:** FAC (two-story building) 205

**Office Hours:** MWF: 1 – 2, TR: 10 – 12, W: 4 – 6

**Phone:** (360) 392 4348   **Math and writing Center:** (360) 392 4235

**Fax:** (360) 647 7084

**Email:** mtamburini@nwic.edu

**Course Description:** Develops the tools to describe and interpret the main features of a collection of quantitative information: histograms, boxplots and scatterplots; the median, mean, standard deviation and correlation of a dataset; and the normal approximation. Introduces the concepts of sampling and experiments. Relates these concepts to current issues confronting tribes.

**Course Prerequisites:** C or better in MATH 099 or test above Intermediate Algebra.

**Textbook:** Statistics (4<sup>th</sup> edition), by Freedman, Pisani and Purves; publisher: Norton. ISBN: 0-393-92972-8.

**Attendance:** Your presence in this class will be crucial to your success. You will be expected to be in class every day. I understand that life may bring unexpected complications, but understanding math involves participation and time, both in and out of class. If you must miss class for any reason (personal, health-related, or cultural) you will be expected to contact me ahead of time and stay current on class assignments.

**Student Email:** All students receive an <nwic.edu> email account upon enrollment. All official notifications about your bookstore voucher code, Moodle, financial aid, scholarship and internship opportunities, etc. are done through your <nwic.edu> email account.

You can access your <nwic.edu> email account from any browser by going to the [www.nwic.edu](http://www.nwic.edu) website and clicking “email login.” If you have questions, you can contact Tony Finkbonner at (360) 392 4342. His office is in the library.

**Course Requirements, Assignments and Assessments:**

- There will be several homework assignments.
- There is an optional assignment to collect and display some data, and present it to the class using the concepts discussed in class.
- There will be five exams and a cumulative final exam.

**Course Policies:**

- I strongly recommend that you purchase a three-ring binder, and use graph paper to take notes.
- As a courtesy to your fellow students and the instructor, refrain from using headphones and cell phones (including text messaging) in class. Make sure your cell phone is silenced before coming to class.
- During the course of the class, we will make extensive use of the TI-83 graphing calculator. I will have some available in class, but you will need to use them for your assignments as well. You may either purchase them or speak with someone at student services about checking one out for the duration of the quarter.
- Late homework assignments or exams will not be accepted for credit.

### Course Outcomes:

As a part of the expectations for this class, by the end of the quarter you should be able to:

- describe the differences between observational studies and designed, controlled experiments;
- describe the characteristics of a sample that is representative of a population, and evaluate whether a given sample is likely to be representative;
- construct and interpret graphical representations of data, such as bar graphs, histograms, boxplots and scatterplots, by hand, using a graphing calculator and/or an electronic spreadsheet;
- compute or reasonably estimate the mean, median and standard deviation of a dataset using a graphing calculator and/or an electronic spreadsheet, and interpret them; compare and contrast the properties of various measures of center and spread;
- explain the importance of calculating and reporting measures of spread along with measures of center;
- define and use the concept of correlation between two quantities;
- calculate a linear regression model using a graphing calculator and/or an electronic spreadsheet; interpret the meaning of the coefficients; use it to make predictions and discuss their accuracy;
- use a normal curve to estimate the likelihood of events that are approximately normally distributed;
- describe the ways in which the concepts described in the class could be applied to situations appropriate to your field of study.

### Grading:

In order to pass this class, you must demonstrate that you have understanding the material covered in the class, and have mastered the course outcomes.

You will have multiple opportunities to demonstrate your understanding of each outcome: through exams, homework, in-class activities, and by completing the optional presentations.

I will assess whether you understand each course outcome based on the following rubric:

Accomplished	Developing	Beginning	Incomplete
Demonstrate a thorough understanding of the concept in a variety of contexts.	Consistently demonstrate a understanding of the fundamental aspects of the concept	On at least one occasion you demonstrate that you understand <u>some</u> of the important features of the concept	There is insufficient evidence to assess your understanding of the course outcome.

### A “C” grade in this class means

That you demonstrate at least a **developing** understanding of **each** of the course outcomes.

### A “B” grade in this class means that you have fulfilled the requirements for a “C” grade and:

- |   |    |  |    |   |
|---|----|--|----|---|
| <ul style="list-style-type: none"> <li>• Demonstrate an <b>Accomplished</b> understanding of more than half of the course outcomes</li> </ul> | OR | <ul style="list-style-type: none"> <li>• Demonstrate an <b>Accomplished</b> understanding of several course outcomes</li> <li>• Consistently turn in homework assignments that have been completed thoughtfully</li> </ul> | OR | <ul style="list-style-type: none"> <li>• Demonstrate an <b>Accomplished</b> understanding of several course outcomes</li> <li>• Complete the optional presentation scoring "developing" on the rubric.</li> </ul> |
|---|----|--|----|---|

### An “A” grade in this class means that you have fulfilled the requirements for a “C” grade and:

- Demonstrate an **Accomplished** understanding of almost all of the course outcomes
- Consistently turn in homework assignments that have been completed thoughtfully
- Complete the optional presentation scoring "accomplished" on the rubric.

<b>MATH 107</b> Data Assignment	<b>DATA</b>	<b>ANALYSIS</b>	<b>COMMUNICATION</b>
Accomplished	Student selects and researches their own relevant, rich dataset, and includes all relevant metadata (source, date, units, etc.)	Summarizes the data effectively (incl. normality, outliers); Uses hypothesis and comparison as the basis for analysis; is able to answer impromptu directed questions	Starts by clearly stating their hypothesis. Presents conclusions that are clearly supported by the data. Definitions are clear; appropriate graphs and charts are used; they are clearly labeled and facilitate the relevant comparisons.
Developing	Student provides some input on the data to select and participates in some part of the process of finding the data. Includes <b>some</b> relevant metadata (source, date, units, etc.)	Student summarizes the data effectively; makes a relevant comparison and a hypothesis about some aspect of the data; is able to answer impromptu questions directed specifically at the work they have shared.	Student uses appropriate charts but perhaps does not label them thoroughly; definitions/labels are slightly imprecise; their hypothesis and comparisons are clear.
Beginning	Student provides some input on the data to select and participates in some part of the process of finding the data.	Student makes some effort at summarizing the data; includes some graphics, though possibly used inappropriately; answers only basic questions about their data.	Presents the data demonstrating some level of preparation and gives a clear picture of the data they are sharing.
Incomplete	The dataset is very narrow or inappropriate.	Student provides little or no analysis of the data, or cannot justify their analysis.	Student's presentation lacks clarity and focus; evidence of preparation is minimal.
Comments			

**Tentative Schedule:**

	Mon	Tues	Wed	Thu	Fri
Apr	7	8	9	10	11 <b>Last day for late registration</b>
	14	15	16	17	18 EXAM 1 DUE
	21	22	23	24 <b>Last day to withdraw (full refund)</b>	25
Apr/ May	28	29	30 EXAM 2 DUE	1	2
	5	6	7	8	<b>9</b>
	12	13	14	15	16
	19	20	21	22	<b>23</b>
	26 NO SCHOOL	27	28	29	30 <b>Last day to withdraw (no refund)</b>
June	2	3	4	5	<b>6</b>
	9	10	11 EXAM 5 DUE Review/ Presentations	12	<b>13</b> Review/ Presentations
	16 FINAL EXAM (in class)	17	18 FINAL EXAM (take-home) DUE	19	<b>20</b> NO CLASS

**Tentative Outline/Schedule of Topics:**

UNIT 1	Chapters 1, 2, 19: experiments and observational studies; sampling	<ul style="list-style-type: none"> <li>• Due Wednesday Apr. 9<sup>th</sup>: Write a summary of Chapter 1, Section 1</li> <li>• Due Friday Apr. 11<sup>th</sup>: “Salt” handout</li> <li>• Due Monday Apr. 14<sup>th</sup>: Write a summary of chapter 19 that highlights the reasons given for why you should take random samples</li> <li>• Due Wednesday Apr. 16<sup>th</sup>: <b><u>Page 24: #1, 4, 7, 9, 11</u></b>      <b><u>Page 351: # 2, 12</u></b></li> </ul>
UNIT 2	Chapter 3: organizing data/ histograms	<ul style="list-style-type: none"> <li>• Due Mon Apr. 21<sup>st</sup>: Construct a histogram of one month of Bellingham’s historical temperature data (on blog)</li> <li>• Due Wed Apr 23<sup>rd</sup>: Read Chapter 3, Section 2: What is the problem with Figure 3 (page 36)?</li> <li>• Due Friday Apr 25<sup>th</sup>: <b><u>Page 50: #1, 2, 4, 6, 7, 9</u></b></li> <li>• Due Monday Apr 28<sup>th</sup>: make histograms for TWO months of rainfall in Bellingham (on blog)</li> </ul>
UNIT 3	Chapter 4: descriptive measures	<ul style="list-style-type: none"> <li>• Describe the significance of Figures 8 and 9 (pages 68, 69)</li> <li>• Center and Spread Handout (1)</li> <li>• <b><u>Page 74: #2, 3, 5, 6, 9</u></b></li> </ul>
UNIT 4	Chapter 5: the normal approximation for data	<ul style="list-style-type: none"> <li>• Center and Spread Handout (2)</li> <li>• <b><u>Page 82 #1, 2</u></b>      <b><u>Page 84: #1ace, 2, 4</u></b>      <b><u>Page 88#1a, 2a</u></b></li> <li>• <b><u>Page 84 #1bdf, 3, 5</u></b>      <b><u>Page 88# 1bc, 2b, 3</u></b></li> <li>• <b><u>Page 89: #1 to 4</u></b>      <b><u>Page 94#3,5</u></b>      <b><u>Page 107 # 13, 14</u></b></li> </ul>
UNIT 5	Chapter 8 to 12: regression and correlation	<p>READ sections 8.3, 8.4, 9.1 (you may want to try exercises 2, 3 ,4 ,5 in excel), 9.2, 9.3, 9.4, and sections 12.2, 12.3;            SKIM chapters 10, 11;            STUDY sections 8.1 (you may want to do the exercises), 8.2, 9.5, and 12.1</p> <ul style="list-style-type: none"> <li>• Bivariate Handout (1)</li> <li>• Write a summary of Example 3 on page 152, in section 9.5. What is its significance?</li> <li>• <b><u>Page 134 (review exercises) # 1, 2, 5, 7, 8abc;</u></b></li> <li>• <b><u>Page 153# 1, 2, 9;</u></b></li> <li>• Describe the slope and y-intercept of the graph in figure 1, chapter 12</li> <li>• <b><u>Page 207 #2; Page 214 #3</u></b></li> </ul>



## **Why study statistics?**

Consider the following questions:

- NWIC Science student Sheila McCoy worked on a community garden at the Tulalip site in the summer of 2013. She had heard that traditionally Coast Salish people used fish guts as a fertilizer for a certain kind of plant, and it helped the plants grow. How could we decide if the fish guts do in fact help the trees grow, and how much they actually help?
- Scott, the manager of the NWIC Bookstore, wants to convince the administration that they should invest \$5,000 to \$10,000 on a new fridge display so that he can store and sell fresh fruit. In order to convince them, he needs to collect data on how much revenue the bookstore could make by selling the fruit. What kind of data should he collect, and how should he do it?
- As someone in a position of leadership in a tribe, one of your responsibilities would be to apply for grants and write reports for them. Suppose that you wanted to apply for a grant in order to provide or expand some services for Native children in foster care, and you need to provide some evidence that the program is actually working. What kind of evidence could you collect, and how could you illustrate your findings to the granting agency?
- Doctors and scientists need to decide if a new vaccine is effective. How could they do it?