HIBBING COMMUNITY COLLEGE
COURSE OUTLINE

COURSE NUMBER & TITLE: MATH 2010 - Statistics
CREDITS: 4   (4 Lec/0 Lab)
PREREQUISITES: MATH 1020: Advanced Algebra with a grade of "C" or better, or Placement Exam

CATALOG DESCRIPTION:
Statistics is a course designed to study descriptive statistics, probability, probability distributions, the normal distribution, sampling distributions, the central limit theorem, hypothesis testing, analysis of variance, correlation analysis, regression analysis, multiple regression analysis, chi-square distributions, nonparametric hypothesis testing, and quality charting. A statistical software package will be used by the student. MNTC goal area: (4)Math & Logical Reasoning.

OUTLINE OF MAJOR CONTENT AREAS:
I.   Descriptive statistics
        A.   Organization and presentation of data
        B.   Measures of center
        C.   Measures of variation and skewness
        D.   Measures of relative standing
II.   Probability
        A.   Counting
        B.   Classical probability
        C.   Addition and multiplication rules
        D.   Complements
        E.   Conditional probability
III.   Discrete probability distributions
        A.   Binomial
        B.   Poisson
        C.   Poisson as approximation to binomial
IV.   Normal probability distribution
        A.   Standard normal distribution
        B.   Other normal distributions
        C.   Central Limit Theorem
        D.   Normal approximation to binomial and poisson
V.   Estimates and sample size
        A.   Estimating population mean
                1.   Known variance

       2.   Unknown variance
  B.   Estimating population variance
VI.   Hypothesis testing
  A.   Null and alternate hypotheses
  B.   Population means, large samples
       1.   One population
       2.   Two populations
  C.   Population proportions
       1.   One population
       2.   Two populations
  D.   Population means, small samples
       1.   t distribution
       2.   One population
       3.   Two populations
       4.   Paired observations
VII. Correlation and regression analysis
  A.   Testing significance of coefficient and correlation
  B.   Linear regression
  C.   Standard error of estimate
  D.   Confidence interval estimates of Y
  E.   Multiple regression and correlation
VIII. Chi-square and other multinomial experiments
  A.   Chi-square distribution
  B.   Goodness-of-fit
  C.   Contingency table analysis
IX.   Analysis of variance
  A.   F distribution
  B.   One- and two-way ANOVA tests
X.   Other nonparametric tests
  A.   Sign test
  B.   Wilcoxon signed-rank test
  C.   Wilcoxon rank-sum test
  D.   Kruskal-Wallis Test
XI.   Control Charts and Methods
  A.   Control charts for variation and mean
  B.   Control charts for attributes

COURSE GOALS/OBJECTIVES/OUTCOMES:
Students will
1.   identify and apply the standard techniques of descriptive statistics.
2.   develop and analyze a descriptive statistics model based on observations collected by students.
3.   apply rules of counting and probability.
4.   describe and utilize probability distributions including the binomial, Poisson, normal, t, F, and chi-square.

5.	design a sample experiment.
6.	describe and determine the sampling distribution of the sample means.
7.	apply The Central Limit Theorem.
8.	determine confidence intervals.
9.	apply hypothesis testing procedures.
10.	utilize spreadsheets or other software packages in statistical computations.
11.	test a hypothesis about
   A.	a population mean or proportion.
   B.	two population means or proportions.
   C.	paired observations.
12.	use analysis-of-variance to test for a difference among two or more population means.
13.	determine coefficients of correlation and test the significance.
14.	determine a regression line, the standard error of estimate, and confidence intervals for predictions.
15.	analyze multiple regression and correlation output from a computer software package.
16.	perform a goodness-of-fit test and contingency table analysis.
17.	use the sign test with paired observations.
18.	apply the Wilcoxon signed-rank test, the Wilcoxon rank-sum test and the Kruskal-Wallis analysis of variance test.
19.	develop and test hypotheses based on observations collected by students.
20.	construct and interpret a Pareto chart and a fishbone diagram.
21.	construct and interpret distribution charts such as X-, R-, P-charts.

MNTC GOALS AND COMPETENCIES MET:
Mathematical/Logical Reasoning

HCC COMPETENCIES MET:
Communicating Clearly & Effectively
Thinking Creatively & Critically

STUDENT CONTRIBUTIONS:
The student will attend class regularly, participate in class discussion, complete daily assignments, in class exercises, exams, and a comprehensive final examination. The student will spend a minimum of two hours completing assignments for every hour in class. These must be accomplished in such a way that they meet minimum standards set by the instructor.

STUDENT ASSESSMENT SHALL TAKE PLACE USING INSTRUMENTS SELECTED/DEVEOPED BY THE COURSE INSTRUCTOR.

SPECIAL INFORMATION: (SPECIAL FEES, DIRECTIVES ON HAZARDOUS MATERIALS):
The student may be required to provide a calculator for this course. If a specific calculator model is required, this model will be specified by the instructor on the course syllabus. Examples of calculators which may be required include but are not limited to the following: the TI89 and the TI Voyage 200.

AASC APPROVAL DATE: January 18, 2012

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MATH2010: so
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