J. Sargeant Reynolds Community College
Course Content Summary

Course Prefix and Number: MTH 170 **Credits:** 3

Course Title: Foundations in Contemporary Mathematics

Course Description: Covers topics in the mathematics of social choice, management sciences, statistics, and growth. Uses physical demonstrations and modeling techniques to teach the power and utility of mathematics. Prerequisite: Competency in Math Essentials MTE 1-5 as demonstrated through the placement and diagnostics tests, or by satisfactorily completing the required MTE units or equivalent. Lecture 3 hours per week.

General Course Purpose: To introduce students to the importance of the mathematics involved in social choice, management sciences, statistics, and growth.

Course Prerequisites and Co-requisites:
Prerequisite: Competency in Math Essentials MTE 1-5 as demonstrated through the placement and diagnostics tests, or by satisfactorily completing the required MTE units or equivalent

Course Objectives:
Upon completing the course, the student will be able to
a. Use fours methods to compute a preference ballot winner;
b. Discuss Arrow's Impossibility Theorem;
c. Use the Banzhaf Power Index for a weighted voting system;
d. Use the Shapley-Shubik Power Index for a weighted voting system;
e. Use six different methods for fair division;
f. Construct a graph as mathematical model;
g. Use Euler's theorems and Fleury's algorithm to find Euler circuits of graphs;
h. Eulerize a graph;
i. Use three algorithms to find Hamilton circuits for a graph;
j. Use Kruskal's Algorithm to find minimum spanning trees;
k. Understand Steiner points and trees;
l. Discuss the Fibonacci numbers;
m. Use linear growth, exponential growth, and logistic growth;
n. Know the difference between surveys and clinical studies; and
o. Discuss the issues involved with the systematic collection of data.

Major Topics to Be Included:
a. Preference ballots
b. Weighted voting systems
c. Fair division
d. Euler circuits
e. Hamilton circuits
f. Minimum networks
g. Scheduling problems
h. Fibonacci numbers
i. Population growth
j. Surveys and clinical

Effective Date of Course Content Summary: January 2016