

Math 105 Course Outline:

1. Statistics (required)
 - a. Collecting Data
 - i. Sampling frame
 - ii. Polling
 - iii. Bias and Errors
 - iv. Clinical studies
 - v. Capture and recapture method
 - b. Displaying data
 - i. Bar graphs, pie chart, and histogram
 - ii. Relative frequency
 - iii. Assignment in excel making graphs
 - iv. Variables
 1. qualitative and quantitative
 2. Continuous and discrete
 - c. Data characteristics
 - i. Mean (Average)
 - ii. Median
 - iii. Mode
 - iv. Standard deviation
 - v. Percentile and quartiles
2. Finance (required)
 - a. Percentages
 - i. Markup
 - ii. Markdown
 - b. Interest
 - i. Simple
 - ii. Compound
 - iii. Continuous
 - c. Savings formula (periodic deposits)
 - d. Credit Card
 - e. Amortization formula
 - f. Affordability of buying a house
3. Voting Methods (topics selected from the following)
 - a. Preference schedule
 - i. Plurality, Plurality with elimination, Majority
 - ii. Borda Count
 - iii. Pair-wise competition, Condorcet competition
 - iv. 4 Fairness Criterion, Arrow's Impossibility Theorem
 - b. Weighted Voting System
 - i. Power: dictator, veto, dummy
 - ii. Banzhaf Power Index
 - iii. Shapley-Shubik Power Index
 - c. Apportionment
 - i. Hamilton Method
 - ii. Jefferson's and Adam's method
 - iii. Webster's Method
 - iv. Huntington-Hill's Method
 - v. Quota Rule and Paradoxes (Alabama, Population and New State)
4. Graph Theory (topics selected from the following)
 - a. General graph theory
 - i. Graph Models, Concepts, Usage
 - ii. Euler's Theorems
 - iii. Euler Graphs, Fluery's Algorithm
 - iv. Eulerization
 - b. Hamilton circuits and Hamilton paths
 - i. Brute Force
 - ii. Nearest neighbor algorithm (including repetitive nearest neighbor)
 - iii. Cheapest-link algorithm
 - c. Networks
 - i. Trees
 - ii. Kruskal's algorithm
 - iii. Prim's algorithm
 - d. Scheduling
 - i. Basic Elements of Scheduling
 - ii. Directional Graphs
 - iii. Critical Time and Critical path
5. Probability (optional)
 - a. Principles of counting
 - i. Multiplication principle
 - ii. Repetition
 - iii. Permutations
 - iv. Combinations
 - b. Probability distributions
 - c. Joint probabilities
 - i. Dependent events
 - ii. Independent events
 - d. Expected value
 - e. Risk analysis
6. Geometric Symmetry (optional)