Dakota County Technical College

MATS 1350: Math for Liberal Arts

A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 4

Lab Hours/Week: *.*

OJT Hours/Week: *.*

Prerequisites:
This course requires either of these prerequisites
MATS 0600 - Intermediate Algebra
A score of 76 on test Accuplacer Elementary Algebra

Corequisites: None

MnTC Goals: Goal 04 - Mathematical/Logical Reasoning

A college level course designed to build a student's appreciation of both the beauty and utility of mathematics as it is used in society. Topics include voting and apportionment, fair division, scheduling and route planning, patterns of growth, and basic probability and statistics concepts including the bell curve. NOTE that this course does not serve as a prerequisite for any other math course.
Meets MnTC Goal 4

B. COURSE EFFECTIVE DATES: 06/02/2003 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

D. LEARNING OUTCOMES (General)

1. analyze preference ballots using the plurality method
2. analyze preference ballots using the plurality-with-elimination method
3. analyze preference ballots using the method of pairwise comparison
4. analyze preference ballots using the method of pairwise comparison
5. explain the paradox of voting: Arrow's Impossiblity Theorem
6. analyze the power distribution in a weighted voting system using the Banzhaf power index C
7. analyze the power distribution in a weighted voting system using the Shapley-Shubik power index
8. apply the divide-chooser scheme of fair division
9. apply the lone-divider method of fair division
10. apply the lone-chooser method of fair division
11. apply the last-diminisher method of fair division
12. apply the method of sealed bids to fair-division problems
13. apply the method of markers to fair-division problems
14. explain the four assumptions underlying the above methods of fair division
15. explain the difference between a fair division and an envy-free division
16. apply Hamilton's method for apportioning representatives among the states
17. apply Jefferson's method for apportioning representatives among the states
18. apply Adams' method for apportioning representatives among the states
19. apply Webster's method for apportioning representatives among the states
20. apply Huntington-Hill method for apportioning representatives among the states
21. summarize the history of apportionment methods adopted by the U.S. Congress
22. explain Balinski and Young's Impossibility Theorem: why no method for apportioning representatives among the states can be perfect
23. apply Euler's theorems and Fleury's algorithm to traversal problems
24. find optimal eulerizations and semi-eulerizations of graphs
25. apply brute-force algorithm to traveling salesmen problems
26. apply nearest-neighbor and repetitive nearest neighbor algorithm to traveling salesman problems
27. apply cheapest link algorithm to traveling salesman problems
28. apply Kruskal's Algorithm to find minimum spanning trees
29. apply Torricelli's method for finding Steiner points and shortest networks
30. create a directed graph to map precedence relations in a project consisting of ten or more tasks
31. apply the decreasing-time algorithm to the scheduling of large projects with at least three processors
32. apply the critical-path algorithm to the scheduling of large projects with at least three processors
33. compute Fibonacci numbers using both the recursive definition and Binet's formula
34. explain the meaning and source of the golden ratio
35. explain what is meant by gnomonic growth
36. construct a Koch snowflake and a Sierpinski gasket
37. explain what is meant by symmetry of scale
38. describe the Mandelbrot set and its construction
39. explain the differences between Euclidean and fractal geometry
40. apply linear growth models to the analysis of practical problems and the prediction of future populations
41. apply exponential growth models to the analysis of practical problems and the prediction of future populations
42. calculate return on investments using interest formulas

43. apply logistical growth models to the analysis of practical problems and the prediction of future populations
44. summarize the historical context that led to the development of random sampling and doubleblind research studies
45. construct frequency tables and histograms from large sets of raw data
46. calculate the mean, median, mode, and midrange of data presented in a frequency table
47. calculate the range, inter-quartile range, and standard deviation of data presented in a frequency table
48. create box-and-whisker plots
49. calculate basic probabilities using the theoretical definition involving sample space and event space
50. use factorials, permutations, and combinations to count possibilities
51. explain the meaning and source of the normal distribution
52. calculate z-scores and percentiles

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 04 - Mathematical/Logical Reasoning

1. Illustrate historical and contemporary applications of mathematical/logical systems.
2. Clearly express mathematical/logical ideas in writing.
3. Apply higher-order problem-solving and/or modeling strategies.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted