JOLIET JUNIOR COLLEGE 1901
DEPARTMENT OF MATHEMATICS

Math 137
Introduction to Discrete Mathematics

Course Description
This is an introduction to analysis of finite collections and mathematical foundations of sequential machines, computer system design, data structures and algorithms. It includes 6 of the following: sets, counting, recursion, graph theory, trees, Boolean algebra, automata, and formal grammars and languages.

Illinois Articulation Initiative (IAI) number: M1905

Credit and Contact Hours:

Lecture	**4**
Lab	**0**
Credit Hours	**4**

Prerequisites: Minimum grade "C" in MATH 131 or equivalent.

Books, Supplies, and Supplementary Materials

A. **Required Textbooks**

Cengage Unlimited Subscription. WebAssign will be used for online coursework (homework, quizzes, tests, etc.) and can be accessed by logging into iCampus/Canvas and selecting this course. If you are comfortable reading the textbook on the computer, you may use the eText alone. **There is no need to purchase a physical textbook for this course; the Cengage Unlimited Subscription for the eText and WebAssign was included in your course fees. Registration instructions are posted in our iCampus/Canvas site.**

B. **Other Required Materials**

TI-83+ or TI-84+ graphing calculator is recommended.

C. **Methods of Instruction:**

Lecture, Hybrid, or Online

General Education Student Learning Outcome

1. Quantitative Literacy: Students possess the ability to reason and solve quantitative problems from an array of contexts.

Course Learning Outcomes (CLOs)

1. Students investigate set theory.
2. Students investigate Boolean algebra.
3. Students examine recursion.
4. Students investigate counting principles and calculations.

5. Students investigate graph theory.
6. Students examine mathematical trees.

Lesson Learning Outcomes (LLOs)

1. Classify statements, compound statements and conditional statements.
2. Identify subsets using universal sets.
3. Discover representations of functions including diagrams, equations, and machines.
4. Create a Venn Diagram to represent a set and subsets.
5. Compute operations on sets using proper notations.
6. Apply proofs of set identities.
7. Investigate applications of sets.

8. Evaluate the truth value for a statement or compound statement.
9. Create truth tables using proper notations.
10. Summarize features of logical equivalences.
11. Differentiate inverse, converse, and contrapositive statements.
12. Identify modus ponens and modus tollens.
13. Evaluate a statement to check for fallacy or valid argument.
14. Identify universal and existential quantifiers.
15. Perform negations of quantified statements.
16. Perform negations of universal conditional statements.

17. Evaluate summation notation.
18. Identify properties of summations and products.
19. Compute factorial value.
20. Perform steps for mathematical induction.
21. Discover applications with mathematical induction.
22. Evaluate a formula using mathematical induction.
23. Investigate sequences, including recursive sequences.
24. Apply properties of recursively defined sets.

25. Count the number of elements in a list.
26. Apply the multiplication rule.
27. Compute using permutations and combinations.
28. Compute combination with repetition allowed.
29. Apply the addition rule.
30. Apply the Pigeonhole Principle.
31. Apply Pascal's Formula.
32. Apply the Binomial Theorem.
33. Compute the expected value of a distribution.
34. Compute conditional probabilities.

35. Discover trails, paths, and circuits.
36. Define vertex, edge, adjacent, and transverse.
37. Calculate the degree of a circuit.
38. Identify Euler and Hamiltonian circuits.
39. Create a matrix representation of a graph.
40. Compute scalars and products of matrices.
41. Define isomorphisms for simple graphs.

42. Discover properties of trees.
43. Characterize trees by edges and vertices.
44. Identify rooted and binary trees.

45. Define spanning trees.
46. Compute a minimum spanning tree.
47. Apply Kruskal's and Prim's Algorithms.

Final Course Grading Scale

Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	lower than 60%

Faculty Commitment

Faculty members are committed to providing a quality learning experience through thoughtful planning, implementation, and assessment of course activities. They are also committed to being readily available to students throughout the semester by returning e-mails and phone calls within 48 hours and to returning graded course work within a week. Furthermore, they are committed to selecting appropriate course materials and making them available in an organized and timely manner.

Student Commitment

For every credit hour a student is enrolled in, they should expect to spend at least 2 hours outside of class studying, working on assignments, and preparing for class each week of the fifteen-week semester. For example, for this four credit-hour class, students can expect to spend four hours per week in class actively engaged in learning the material by participating in face-to-face classes or viewing lectures and instructional material online. In addition, students should expect to spend another eight hours per week outside of class completing homework and assignments, posting to discussion boards online, or studying for quizzes and tests. This means students should spend a minimum of 12 hours per week engaged in achieving the learning outcomes for this course. If you are not achieving your desired results in this class, you should consider increasing your prep time outside of class, in addition to using available resources such as instructor office hours and tutoring services.

By registering for this course, you commit yourself to active participation in course activities as well as the submission of all assignments and exams on time. Furthermore, you commit to accessing the course site and checking your JJC e-mail several times a week.