ARIZONA WESTERN COLLEGE
SYLLABUS

MAT 227 DISCRETE MATHEMATICS
Credit Hours: <u>3</u> Lec <u>3</u>

PREREQUISITE: MAT 151 or 187 or approved higher level math or an acceptable score on the Computerized Placement Test (CPT)

<u>COURSE DESCRIPTION</u>.
An introduction to formal proof techniques, propositional logic, set theory, relations and functions, combinatorics, elementary number theory, graph theory, algorithms, and applications.

1.   <u>COURSE GOAL</u>
Provide the student with the opportunity to use non-continuous approaches (including digital) to solve problems in the areas of mathematics, engineering, and computer science

2.   <u>OUTCOMES</u>
Upon satisfactory completion of this course, students will be able to:
2.1   construct and evaluate arguments using axioms, definitions, previous theorems, and logical operators and quantifiers in the following kinds of proofs: direct, by contraposition, by contradiction, by case break-up, by inductive methods, and by counterexample
2.2   use appropriate logic techniques such as Venn diagrams, logic connectors and quantifiers, binary arithmetic, Boolean algebra, and truth tables
2.3   perform operations to solve problems with discrete structures such as sets and their cardinalities, relations (including equivalence relations, partially ordered sets, and recurrence relations), functions (both recursive and closed-form), sequences, and series
2.4   construct, program, and prove algorithms, and analyze their order of growth and data structures
2.5   demonstrate basic counting principles (including the Pigeonhole Principle, multiplication vs. addition of options, replacement vs. non- replacement, and correcting for double counting) in arrangements, permutations, combinations, and bags
2.6   demonstrate proficiency with divisibility tests and their proofs, modular arithmetic and its applications, and prime number concepts (Fundamental Theorem of Arithmetic, greatest common factors, least common multiples, and Diophantine equations)
2.7   use graphs (including trees and digraphs) and their matrix representations to visualize problems and understand Turing machines and stochastic processes

3.   <u>AWC GENERAL EDUCATION (GE) OUTCOMES</u>
3.1   DIGITAL LITERACY
- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Use information effectively to accomplish a specific purpose
- Create content in a digital environment

3.2   COMMUNICATION
- Construct and write up sound mathematical arguments
- Translate prose description of a mathematical problem to the appropriate model and viceversa

3.3   QUANTITATIVE ANALYSIS
- Identify and extract relevant data from given mathematical or contextual situations
- Select known models or develop appropriate models that organize the data into: tables or spreadsheets (with or without technology);   graphical representations (with or without technology); symbolic/equation format

- Obtain correct mathematical results and state those results with appropriate qualifiers and use the results to: determine whether they are realistic in terms of original data/problem; determine whether the mathematical model/representation of data is appropriate; describe trends in a table, graph, or formula and make predications based on these trends; draw qualitative conclusions in written form; apply them to real world problems

3.4   SCIENTIFIC LITERACY
- Utilize data to communicate and apply an understanding of scientific logic and/or quantitative reasoning
- Gain an appreciation for discrete math applications in biology, chemistry, physics, engineering, and computer science

3.5   CIVIC DISCOURSE
- Gain historical awareness of the major contributions and contributors to discrete mathematics
- Understand the social and environmental impacts of results in discrete mathematics

4.   METHODS OF INSTRUCTION
4.1   Lecture style
4.2   Visual aid instruction such as overheads, computer and graphing calculator demonstrations
4.3   Labs and manipulatives where appropriate
4.4   Software applications where appropriate

5.   LEARNING ACTIVITIES
5.1   Solving problems and applications in the areas of math, science, engineering, and computers
5.2   Participation in classroom lectures
5.3   Using computers and/or graphing calculators
5.4   Projects, reports, labs, and programs where appropriate

6.   EVALUATION
Grade may be based on any or all of the following: tests, homework assignments, lab assignments, programs, reports, class participation and a final

7.   STUDENT RESPONSIBILITIES
7.1   Under AWC Policy, students are expected to attend every session of class in which they are enrolled.
7.2   If a student is unable to attend the course or must drop the course for any reason, it will be the responsibility of the student to withdraw from the course. Students who are not attending as of the 45th day of the course may be withdrawn by the instructor. If the student does not withdraw from the course and fails to complete the requirements of the course, the student will receive a failing grade.
7.3   Americans with Disabilities Act Accommodations: Arizona Western College provides academic accommodations to students with disabilities through AccessABILITY Resource Services (ARS). ARS provides reasonable and appropriate accommodations to students who have documented disabilities. It is the responsibility of the student to make the ARS Coordinator aware of the need for accommodations in the classroom prior to the beginning of the semester. Students should follow up with their instructors once the semester begins. To make an appointment call the ARS front desk at (928) 344-7674 or ARS Coordinator at (928) 344-7629, in the College Community Center (3C) building, next to Advising.
7.4   Academic Integrity: Any student participating in acts of academic dishonesty—including, but not limited to, copying the work of other students, using unauthorized "crib notes", plagiarism, stealing tests, or forging an instructor's signature—will be subject to the procedures and consequences outlined in AWC's Student Code of Conduct.
7.5   Texts and Notebooks: Students are required to obtain the class materials for the course.