

El Monte Union High School District

Course Outline

School: District
Developed: Rosemead HS

Title: Finite Mathematics P

Transitional* _____ (Eng. Dept. Only)

Sheltered (SDAIE)* _____ Bilingual* _____

AP** _____ Honors** _____

Department: Mathematics

Grade Level (s): 12

Semester _____ Year X

Year of State Framework Adoption _____

This course meets graduation requirements:	
<input type="checkbox"/>	English
<input type="checkbox"/>	Fine Arts
<input type="checkbox"/>	Foreign Language
<input type="checkbox"/>	Health & Safety
<input checked="" type="checkbox"/>	Math
<input type="checkbox"/>	Physical Education
<input type="checkbox"/>	Science
<input type="checkbox"/>	Social Science
<input type="checkbox"/>	Elective

Department/Cluster Approval Date	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

*Instructional materials appropriate for English Language Learners are required.

**For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class.

1. Prerequisite(s): Successful completion of IM3.
2. Short description of course which may also be used in the registration manual: Finite math is an applied math course comparable to the Finite Math courses taught at the college level. We will use algebra to solve real world problems in business, economics, life sciences, and the social sciences. The course consists of units in the study of Linear Functions, Matrices, Linear Programming, Finance, Counting Techniques, Probability and Statistics. Concepts are introduced with concrete, real-life examples, chosen from current topics and issues in the media. Special emphasis is placed on helping students formulate, solve, and interpret the results of applied mathematics problems. A graphing calculator (TI-83+ or higher) is recommended, but at a minimum, a scientific calculator is required.

3. Describe how this course integrates the school's ESLRs (Expected School-wide Learning Results):

The following ESLR's will be integrated:

ACADEMIC SKILLS: Students will seek, access, analyze, and creatively use information to demonstrate effective communication, computation, critical thinking and technological skills by solving problems in assignments, labs and other assessments that are aligned to the CCSS and the 8 Mathematical Practices.

INTERPERSONAL SKILLS: Students will be productive community members by learning to respect diversity, exercise rights, accept responsibility, and work cooperatively with others while doing work for the class and while working cooperatively in labs.

PERSONAL SKILLS: Students will make informed decisions, set goals, take actions, and evaluate results while exhibiting honesty, integrity, and personal accountability as they complete the work for this course.

CAREER SKILLS: Students will explore a variety of career options and develop personal attributes and skills that lead to the pursuit of a post-secondary education and/or a productive work life as they complete work for the course, perform labs and do research on computers.

4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:

The special needs of English language learners are met throughout the course in a number of ways:

- By using the SIOP (Sheltered Instruction Observation Protocol) or other researched based strategies that engage students in learning and communicating their thoughts in the four language domains.
- By probing prior knowledge to connect existing knowledge with knowledge to be learned.
- By teaching concepts for which EL's may not have a cultural reference, including obscure terms, and academic vocabulary.
- By defining abstract concepts in concrete terms, and using specific examples
- By using graphic organizers and rubrics to set expectations and facilitate organization of thought.
- By using a variety of other visual aids during instruction, such as pictures, films, and realia.
- By encouraging students to express themselves in a variety of modalities.

Furthermore, the textbook is written in a simple style that doesn't rely on idioms or other colloquial language. Definitions, How-To boxes, and Summary boxes are clearly set apart so students can quickly identify the major ideas in each lesson. Furthermore, for Spanish-speaking students, a Spanish glossary is available online.

5. Describe the interdepartmental articulation process for this course:

The study of mathematics in each year of high school leads directly to preparedness for college and career readiness. The skills learned in finite math are applied to other courses of study including science, social science, psychology, art, and Career Technical Education (CTE). Problem solving, communicating reasoning, modeling and data analysis that are used in statistics prepare students to apply those same skills in all courses and in real-world scenarios.

6. Describe how this course will integrate academic and vocational concepts, possibly through connecting

activities. Describe how this course will address work-based learning/school to career concepts:

Students learn math best by doing math. Each chapter contains several activities that have students explore new content and investigate important concepts. In addition, students will complete real-world applications at the end of each lesson and at the end of each chapter. Students will also complete at least one major project each semester where they design a study, collect data, and analyze the results.

Learning targets are presented at the end of each lesson so students know what they are expected to learn. These targets are repeated at the end of each lesson in a grid that matches each target with a set of exercises and examples in the text and/or notes.

Examples and exercise contexts are chosen to pique students' interest with statistical studies on popular topics. Each example is written in a problem/solution format with a model student response displayed in a special font. Step and comment bubbles guide students through the examples by mirroring the instructor's voice in the classroom. Each example concludes with a link to an odd-numbered exercise, and these odd-numbered exercises include a reference back to the corresponding example, making it easy for students to use the textbook as a resource.

7. Materials of Instruction (Note: Materials of instruction for English Language Learners are required and should be listed below.)
 - A. Textbook(s) and Core Reading(s): Finite Mathematics For the Managerial, Life, and Social Sciences, 11th Edition, Soo T. Tan, Cengage, 2015.
 - B. Supplemental Materials and Resources: Document reader, graphing calculator, Chromebook...
 - C. Tools, Equipment, Technology, Manipulatives, Audio-Visual: Document reader, graphing calculator, Chromebook...

EXPECTED OUTCOMES

Students are expected to perform at a proficient level on a variety of tasks and assessments addressing the Common Core Standards for Mathematical Practice and the Common Core State Standards addressed in Finite Mathematics. Levels of proficiency are defined near the end of this course outline under Performance Criteria.

Common Core State Standards for Mathematical Practice (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Common Core State Standards for Mathematical Content (CCSS – M)

Number and Quantity**Vector & Matrix Quantities**

N-VM

N-VM.C Perform operations on matrices and use matrices in applications.

- N-VM.6 (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
- N-VM.7 (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
- N-VM.8 (+) Add, subtract, and multiply matrices of appropriate dimensions.
- N-VM.9 (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
- N-VM.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Algebra**Creating Equations***

A-CED

A-CED.A Create equations that describe numbers or relationships.

- A-CED.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.**
- A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
- A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

Reasoning with Equations and Inequalities

A-REI

A-REI.B Solve equations and inequalities in one variable.

- A-REI.3 Solve one-variable equations and inequalities graphing the solutions and interpreting them in context.

A-REI.C Solve systems of equations.

- A-REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

A-REI.D Represent and solve equations and inequalities graphically.

- A-REI.11 Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and log functions.*
- A-REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Functions**Interpreting Functions**

F-IF

- F-IF.B Interpret functions that arise in applications in terms of the context.
- F-IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.**
- F-IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function gives the number of person-hours it takes to assemble engines in a factory, then the positive integers would be an appropriate domain for the function.”

Linear, Quadratic, and Exponential Models

F-LE

- F-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.**
- F-LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.*
- Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.*
 - Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*
- F-LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
- F-LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.*
- F-LE.B Interpret expressions for functions in terms of the situation they model.**
- F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context.*

Statistics and Probability***Interpreting Categorical and Quantitative Data**

S-ID

- S-ID.A Summarize, represent, and interpret data on a single count or measurement variable.**
- S-ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.*
- S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- S-ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
- S-ID.B Summarize, represent, and interpret data in two categorical and quantitative variables.**
- S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- Fit a function to the data; use functions fitted to data to solve problems in the context of the data.
Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
 - Fit a linear function for a scatter plot that suggests a linear association.
- S-ID.C Interpret linear models.**
- S-ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- S-ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S-ID.9 Distinguish between correlation and causation.

Conditional Probability and the Rules of Probability

S-CP

- S-CP.A Understand independence and conditional probability and use them to interpret data.**
- S-CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).
- S-CP.2 Understand that two events and are independent if the probability of and occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
- S-CP.3 Understand the conditional probability of given as , and interpret independence of and as saying that the conditional probability of given is the same as the probability of , and the conditional probability of given is the same as the probability of
- S-CP.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite*

subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

- S-CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*
- S-CP.B Use the rules of probability to compute probabilities of compound events in a uniform probability model.**
- S-CP.6 Find the conditional probability of given as the fraction of outcomes that also belong to , and interpret the answer in terms of the model. *
- S-CP.7 Apply the Addition Rule, and interpret the answer in terms of the model.
- S-CP.8 (+) Apply the general Multiplication Rule in a uniform probability model, , and interpret the answer in terms of the model.
- S-CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Using Probability to Make Decisions

S-MD

- S-MD.B Use probability to evaluate outcomes of decisions.
- S-MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
- S-MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

EXPECTED INTEGRATED OUTCOMES

(From the California Career Technical Education Model Curriculum Standards, adopted by the California State Board of Education in January, 2013)

Students are also expected to proficiently apply common skills that are relevant across curriculum areas and career pathways.

Standards for Career Ready Practice (CR)

1. Apply appropriate technical skills and academic knowledge.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and performing other work-related practices.

2. Communicate clearly, effectively, and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others; they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.

3. Develop an education and career plan aligned with personal goals.

Career-ready individuals take personal ownership of their educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process, and they understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.

4. Apply technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks – personal and organizational – of technology applications, and they take actions to prevent or mitigate these risks.

5. Utilize critical thinking to make sense of problems and persevere in solving them.

Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to introducing solutions. They carefully consider options to solve a problem and, once agreed upon, follow through to ensure the problem is resolved.

6. Practice personal health and understand financial literacy.

Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.

7. Act as a responsible citizen in the workplace and the community.

Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them, and they think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.

8. Model integrity, ethical leadership, and effective management.

Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.

9. Work productively in teams while integrating cultural and global competence.

Career-ready individuals contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.

10. Demonstrate creativity and innovation.

Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace.

11. Employ valid and reliable research strategies.

Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of source when considering the use and adoption of external information or practices.

12. Understand the environment, social, and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new techniques, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

COURSE CONTENT AND SUGGESTED TIME ALLOTMENT:

Content sequencing, activities, and time allocations are only suggestions and may be adjusted to suit school site curriculum plans, available materials, and student needs.

INSTRUCTIONAL METHOD AND/OR STRATEGIES:

A variety of instructional strategies will be utilized to accommodate all learning styles. See the “Using Formative Assessment to Address the Specific Learning Needs of Low Achieving Students, High Achieving Students, Students with Disabilities and English Language Learners in K-12 MATHEMATICS” document.

COURSE MATERIALS:

Core Text: Finite Mathematics For the Managerial, Life, and Social Sciences, 11th Edition.
Soo T. Tan, Cengage, © 2015

Supplemental Materials: In addition to the basic text, a variety of instructional tools will be used to meet the needs of all students.

STANDARD GRADING SCALE:

A	90-100%
B	80 – 89.99%
C	70 – 79.99%
D	60 – 69.99%
F	0 – 59.99%

SUGGESTED GRADE WEIGHTING:

- | | |
|---|-----------------|
| <p>1. <u>Assessment</u>
Graded work assessing a student’s mastery of mathematics such as any of the following:</p> <ul style="list-style-type: none"> ○ Tests (district exams and classrooms tests) ○ Quizzes ○ Project work that assesses a student’s understanding | <p>60 – 80%</p> |
| <p>2. <u>Classwork/Activities</u>
Graded work completed in class such as any of the following:</p> <ul style="list-style-type: none"> ○ In class assignments ○ Project work completed in clas ○ Notes ○ Warm-ups ○ Graded participation | <p>10 – 25%</p> |
| <p>3. <u>Homework</u>
Graded work completed outside of class such as any of the following:</p> <ul style="list-style-type: none"> ○ Assignments ○ Project work completed outside of class | <p>5 – 15%</p> |