Palm Springs Unified School District
Secondary Course Description

Please read: ***Sections 1 and 2 must be completed and submitted to the Director of Secondary Curriculum and Instruction for all courses seeking PSUSD Cabinet and Board approval. Sections 3 and/or 5 must be completed if the course will be submitted to the University of California (UC) for placement on your school's a-g list and/or Career and technical educational (CTE).***

District Office Use Only

Transcript Title(s)/Abbreviation: MRWC

Transcript Course Code(s)/Number(s): 2240

Cabinet/ BOE Approval Date: Jan 24, 2017

Section 1: Course Content

1. Course Title: Mathematical Reasoning with Connections (MRWC)

Date this course was first submitted to the Curriculum Advisory: 11/16/16

2. Is this a re-write of an existing course? No If "Yes," what is the District Course Code:

3. CALPADS Code : 2414

4. PSUSD graduation requirement subject area: Math

5. Unit Value for complete course: 10 PSUSD credits (one year/two semesters)

Course can be repeated for Credit? ☐

6. Grade Level: -- -- 11 12

Note: Grade level pertains to which grades the course has been designed.

7. PSUSD Department: Mathematics

8. PSUSD weighted GPA? No

9. Is this an "online" learning course? No

If "Yes," list the online provider:

Note: If "Yes," an additional course code will be created by ETIS with a virtual designation.

10. Will this course be offered only through the Alternative Education Program? No

11. Career Pathway Relationship

Note: Refer to the list of Industries and their associated Pathways in Section 5, Item #38

Is this course an Industry and Career Pathway-related Course? No

If "Yes," which Industry? --

Which Pathway?

What sequence level? --

12. Is this course an Academy-related Course? No

If "Yes," which Academy?

13. Course Content:

For each unit of the course, provide:

1. A brief description (5-10 sentences) of topics to be addressed that demonstrates the critical thinking, depth and progression of content covered.
2. A brief summary (2-4 sentences) of at least one assignment that explains what a student produces, how the student completes the assignment and what the student learns.

Course Purpose: MRWC is designed for any student who earns a minimum grade of C in Integrated Math 3 or Algebra 2. This includes EAP Conditional (Level 3) students who do not necessarily intend to pursue calculus. These students need a 4th year course to fulfill college readiness status and are seeking an option other than statistics. It also includes EAP Not Ready (Level 2) students who are looking to improve their chances of successfully passing college and university placement exams. MRWC will also provide a good option for EAP Ready (Level 1) students who plan to continue studies in mathematics into calculus, but are looking to consolidate and strengthen foundational skills in a 'bridge' course before entering precalculus and/or calculus.

Course Outline: The instructional design of the MRWC curriculum uses an innovative approach that provides a cohesive, conceptual, and integrated view of mathematics. Its primary design goal is to get students to reason with and make sense of mathematics, in addition to cementing mathematics fluency. It follows the ICAS[1] model for expectations of entering freshmen for in-depth factual knowledge embedded within a conceptual framework and for the ability to organize knowledge to ensure the retrieval and application of that knowledge. These ICAS expectations align with the goals and expectations of the CCSS, and the MRWC curriculum will meet the CCSS for Advanced Mathematics Content and the CCSS for Literacy in the Sciences and Technical Subjects.

MRWC seamlessly interweaves the CCSS Mathematical Practices throughout the curriculum and develops key 'habits of mind' and a mathematical disposition required for attaining high-level content knowledge. It emphasizes discussion and analysis of alternative representations and multiple perspectives for approaching and understanding content. It is designed to encourage strategic and flexible thinking as well as to enable students to become self-reflective learners.

MRWC provides an in-depth, cognitively challenging and integrated exploration of familiar and new content material. It builds on and reinforces previous content and is designed and organized to highlight similarities and common themes among previously studied content topics. These similarities and common themes are then used to extend and connect understanding to new content topics. The themes are designed to enable students to see mathematics as an integrated and cohesive body of conceptual understanding and procedural knowledge. They provide a consistent structure to mathematics that helps students grasp why the 'rules' are the way they are as well as the constraints under which those 'rules' operate.

Theme 1: Reasoning with Numbers. Students will explore the development of the Number System up through complex numbers. The mathematical idea of closure will provide a logical structure for the construction, expansion, and organization of the sets of numbers.

Students will gain a deeper, more conceptual interpretation of each major subset (Natural, Integers, Rationals, Irrationals, Real, and Complex) of the Number System by considering three questions:

1. What evidence is there that these numbers exist and are needed for subsequent understanding and production in mathematics?
2. If these numbers exist, where are they positioned on the real number line or in the complex plane?
3. How do the standard operations change in meaning and properties as the set of numbers is expanded?

In answering these questions, students will explore the link between numerical symbols, algebraic representations, geometric construction, transformations, and concepts of limits as tools for understanding numbers and their behaviors and the rules that govern their use.

Theme 2: Reasoning with Functions. Students will explore commonalities across families of functions that include algebraic functions such as absolute value, root, polynomial, rational, and reciprocal, as well as transcendental functions such as exponential, logarithmic, and trigonometric. They will develop fluency and flexibility with both the algebraic and geometric meaning and interpretation of functional notation.

In comparing the families of functions, students will

1. Link patterns of real numbers to discrete functions, including arithmetic and geometric sequences and series.

[1] *Statement on Competencies in Mathematics Expected of Entering College Students*. Intersegmental Committee of the Academic Senates of the University of California, the California State University, and the California Community Colleges (ICAS), 2013

2. Study key concepts related to functions including advanced study of domain and range, roots, symmetries and periodicity, positive/negative and increasing/decreasing, and asymptotic/end behaviors.
3. Make connections between geometrical transformations (such as translation, rotation, reflections, dilations and stretches of graphs) and the algebraic process of function composition.
4. Use transformations to study the graphs of reciprocal and inverse functions and relations.
5. Study matrices and vectors as a means to represent transformations.
6. Relate finding solutions of equations and inequalities to the process of comparing functions.
7. Strategically select among various representations of functions based on the particular problem under consideration.
8. Use functions (including probability functions) to understand, interpret, make decisions, and model real world situations.

Theme 3: Reasoning with Equivalences. Students will explore mathematical properties and characteristics of basic algebraic and geometric entities in order to develop generalizations that can be applied to more complex situations. The mathematical idea of equivalence will provide the logical structure for manipulating expressions, solving equations and inequalities, and studying geometrical figures.

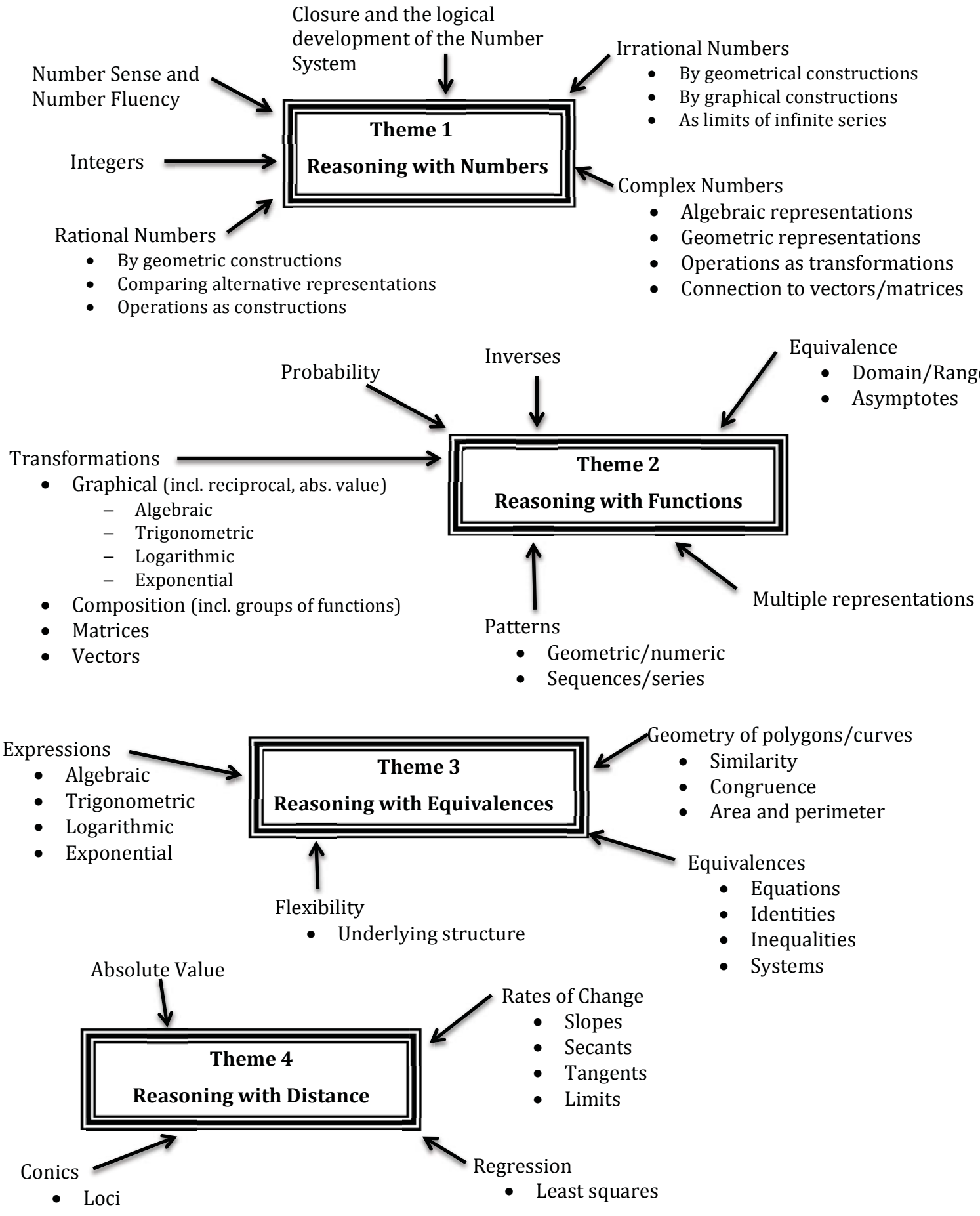
Building on the notion of functions studied in Theme 2, students will

1. Identify equivalent and non-equivalent expressions involving polynomial, rational, root, trigonometric, exponential, and logarithmic terms.
2. Develop fluency and flexibility in manipulating complex forms of expressions (including advanced factoring) by identifying and strategically using the idea of underlying structure.
3. Solve complex equations, inequalities, and systems of equations and inequalities involving polynomial, rational, root, absolute value, trigonometric, exponential, and logarithmic expressions by identifying and strategically using the ideas of underlying structure and alternative representations.
4. Explore the geometry of polygons, curves, perimeter and area through equivalences such as similarity and congruence and transformations that preserve perimeter and/or area.
5. Study parallelism as an equivalence relation as a means of understanding vectors in two- and three-dimensions.

Theme 4: Reasoning with Distance. Starting with the notion of distance as a function, students will

1. Study distance between two real numbers in a line as absolute value and use the Pythagorean theorem to extend this concept to distance of points in space.
2. Use the concept of loci to explore conics and other curves in algebraic and polar form.
3. Use real world data sets to connect the least square method of linear regression to the measurement of residuals as distances.
4. Extend the concept of distance to study slope, rate of change, secant lines, limits, and tangent lines of functions.

Concept Map of Mathematical Reasoning With Connections



14. Course Overview [Provide a brief summary/snapshot (3-5 sentences) of the course's content]:

The MRWC is designed as a 4th year mathematics course following Math I - III (or Alg I - II and Geometry) that will provide a bridge into multiple college and career options, including STEAM, CTE, and non-technical pathways. Students successfully completing MRWC will have acquired content skills and attitudes towards learning that will be expected in entry-level college mathematics.
MRWC addresses the full scope of advanced mathematical topics in a way that is substantively different from the traditional curriculum. The distinctiveness of MRWC lies in its unique design and topic sequencing, and in the emphasis on instructional delivery that promotes exploratory and collaborative student engagement.

Based on the Common Core State Standards viewpoint that mathematics is a cohesive and connected body of work, the MRWC is structured to highlight overarching themes in mathematics that are intrinsic to and underlie many topics in the high school curriculum. The themes provide a mechanism for expanding existing content into new, advanced areas in a way that makes explicit the connectedness between old and new topics that might otherwise appear to students to be unrelated. They provide consistent threads that help students grasp why the 'rules' are the way they are as well as the constraints under which those 'rules' operate. The themes are:
1. Reasoning with Numbers
2. Reasoning with Functions
3. Reasoning with Equivalences
4. Reasoning with Distance

MRWC seamlessly interweaves the CCSS Mathematical Practices throughout the curriculum and develops key Habits of Mind and a mathematical disposition required for attaining high-level content knowledge. A distinctive aspect of MRWC is a consistent emphasis on discussion and analysis of alternative representations and multiple perspectives for approaching and understanding content. It is designed to encourage strategic and flexible mathematical thinking as well as to enable students to become self-reflective learners.

15. Texts and Supplemental Instructional Materials *(all non-core instructional materials are the responsibility of individual schools to purchase.)*

Texts: MRWC Curriculum Materials

Supplemental Materials: _____

16. Will this course be submitted for approval by UC? Yes

Section 2: School and District Information

School Information

1. School Name: _____

School District: Palm Springs Unified School District

City and State: Palm Springs, California District Web Site: http://www.psusd.us

School Course List Contact Information (Name of AP of Curriculum or Principal)

2. Name: Anne Kalisek

Position/Title: Director of Secondary C and I Email: akalisek@psusd.us

Phone #: 760-416-6068 Ext: _____

Teacher Contact Information (Name of teacher/administrator who authored this course)

3. Name: _____

Position/Title: _____ Email: _____

Phone #: _____ Ext. _____

Palm Springs Unified School District
Secondary Course Description

Section 3: Course Information

1. Was this course "Previously Approved" by UC? No

Note: if this course is to be submitted to UC and it was "Previously Approved," the exact same course title as the previously approved course must be used. Compete outlines are not needed for courses previously approved by UC. Courses that are defined as "previously approved" are courses from the following programs (Advanced Placement, International Baccalaureate, ROP courses, etc.), or courses from within the same district, or courses that have been removed within a three-year window are being reinstated, and/or courses from UC-approved online providers. Courses modeled after courses from outside the school district are also defined as "previously approved" but a complete course description will be required for submission to UC. Each section below represents an individual page on the UC electronic submission site.

If "No," proceed to the Course Description Section (Section 4).

If "Yes," indicate which category applies:

2. Is this course modeled after a UC-approved course from another high school outside of our district? No

Note: If "Yes," you will be required to submit a complete course description. UC will review the previous submission, if it is available, to assist them in their review process.

If "Yes," list which school: _____

Exact Course Title: _____

3. Is this course modeled after an identical course approved by UC for the current year at another high school in PSUSD: No

If "Yes," what school? _____

Exact Course Title: _____

4. Is this course being reinstated after removal within 3 years: No

If "Yes," what year was the course removed from the list? _____

Exact Course Title: _____

5. Has this course been provided program status, is not an online course, and is it listed below? No

If "Yes," select an option from the Program Status list: -- _____

6. If "Advanced Placement," has it been authorized by the College Board through the AP audit process? --

Note: UC will only allow Advanced Placement courses that have passed or are in the AP audit process. UC requires all AP courses on your list, including those approved in prior years, to be verified via the College Board AP audit process. UC will run quarterly reports based on AP Audit data. AP courses not listed on the AP audit list will be removed.

If "In Progress," date submitted to AP: _____

MM/DD/YYYY

Exact Program Course Title: -- _____

7(a). Is this course provided by one of the UC-approved online curriculum providers listed in #8? No

7(b). Have you signed the appropriate partnership agreement with the provider regarding methods of delivery and instruction? No

Note: You must have signed an agreement with the appropriate provider and filed with UC in order to use their courses.

8. If the answer to either 7(a) or (b) is "No," UC will not approve this course. If "Yes" to both 7(a) and (b)., then select the appropriate option from the Online Provider List below:

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9. Seeking "Honors" Distinction

Note: To receive "Honors" distinction for both UC and PSUSD, the course content must satisfy certain requirements. For information about these requirements, refer to the a-g Guide: http://www.ucop.edu/a-gGuide/ag/a-g/honors.html. For "Previously Approved" courses (including AP and IB), the honors information will be pre-populated as applicable on your UC submission template.

No

Note: "Other Honors" is defined by UC as a course specifically designed with distinctive features which set it apart from regular high school courses in the same discipline areas. The course should be seen as comparable in terms of workload and emphasis to AP, IB or introductory college courses in the subject. Honors courses must be designed for the 11th and 12th grade level to be UC approved and require a comprehensive, year-long written final exam. In addition to AP and IB higher level courses, ***high schools may certify not more than one honors level course per grade level in each of the following subject areas only: history, English, advanced mathematics, each laboratory science course, each language other than English, and each of the four VPA disciplines.*** *If there are no AP or IB or higher level courses in a given subject area, the high school may certify up to, but not more than two honors level courses in that area.*

10. Subject Area and Category

"a"- History/Social Science

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"b"- English

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"c"- Mathematics

Advanced Math

"d"- Laboratory Science

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Note: Students electing to enroll in an integrated-science program (ISP) are strongly advised by UC to complete the entire three-year sequence. In most cases, the first year of an integrated science sequence fulfills only the "g" elective requirement: the second and third years of the sequence then fulfill the two-year "d" laboratory science requirement. Accordingly, if only ISP 1 and only one of ISP 2 or ISP 3 are completed, then one additional course from the categories of Biology, Chemistry, or Physics from the "d" subject area must be taken to fulfill the "d" requirement.

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Note: This category demonstrates that the course is cross-disciplinary and is often used for advanced science courses such as AP Environmental Science or Biochemistry

"e"- Language Other than English

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Language --

"f"- Visual and Performing Arts

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"g"- Elective

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