

# PACIFIC UNION COLLEGE SYLLABUS

## MATH 341

## GEOMETRIES I

Winter 2008

**COURSE DESCRIPTION:** The first of a two-quarter study of the development and history of Euclidean geometry, the discovery of non-Euclidean geometry, and the subsequent reformulation of the foundations of geometry. MATH 341 reviews basic Euclidean geometry and investigates geometric applications through problems and projects. MATH 342 focuses on the axiomatic method, logic, various axiom sets for Euclidean geometry, neutral geometry, history of the parallel postulate, discovery of non-Euclidean geometry, hyperbolic geometry, and philosophical implications. **Prerequisite:** MATH 275 or permission.

**STUDENT LEARNING OUTCOMES:** Although this course is appropriate for all students of mathematics, it is designed especially for future teachers of geometry. Students who complete MATH 341 should be competent to deal with the geometry encountered in the high-school curriculum. Students who also complete MATH 342 will have a background appropriate for relating and interpreting the significance of the geometric revolution.

When you are finished with this class, you should be able to (1) explain the use and purpose of axiomatic systems, (2) derive and prove simple theorems for basic finite geometries, (3) use correctly the vocabulary of basic euclidean geometry, (4) explain the essential differences between euclidean and non-euclidean geometries, (5) prove the basic theorems of high school geometry and solve standard problems encountered there, and (6) use a common form of dynamic geometric software.

**TEXT:** I. Edward C. Wallace and Stephen F. West, *Roads to Geometry*, third edition, Pearson Education, 2004.

**INSTRUCTOR:** Lloyd Best (Lbest@puc.edu). Phone: office/965-6591; home/942-9680. Fax: office/965-7135.

**OFFICE:** CSH 238G. **OFFICE HOURS:** Mon: 9-10, 2-4; Tues: 9-10, 11-12, 2-4; Wed: 9-10; Thurs: 11-12; Fri: 9-10.

**ATTENDANCE:** Previous students have discovered that missing three or more class presentations makes it very difficult to pass the course. Announcements made during classes have the same force as statements in this syllabus.

**STUDYING WITH OTHERS:** You are encouraged to study with other classmates. Be sure that your written assignments reflect your own understanding and not just what someone else figured out. You probably don't really "know" it if you can't write it out yourself.

**LEARNING DIFFERENCES:** PUC strives to accommodate students with documented learning differences. If you have a learning disability, or think you might have one, please check with Teaching and Learning Center personnel. The TLC staff will provide a diagnosis and will work with us to accommodate your situation.

**GRADING:** The final grade will be based on Homework (25%), Project (10%), and Tests (65%).

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
92%	88%	84%	80%	75%	70%	65%	60%	57%	53%	50%

**HOMEWORK:** Assignments will be announced in class. Extra-credit problems must be done on your own without help or consultation. Please show your work. Late work is not accepted unless delayed by illness or other emergency. Any late work must be submitted directly to me the day you return to class.

Preparation for doing the homework problems will require more than careful attention and participation in class. Before working on the assignment you will need to carefully read the textbook and rework the textbook examples. Many students find it very useful to study with other classmates.

**PROJECT:** Your project should involve the study of a geometric problem or topic not solved or studied in class. Please choose a project in consultation with the instructor. The project must be printed (not hand-written). You will make a ten-minute class presentation of the project. The grade assigned to the project will be based on mathematical correctness, careful writing, and persuasive oral presentation.

**TESTS:** Tests must be taken at the scheduled time (see schedule below). Only tests which are missed due to illness or emergency circumstances may be made up. If you must miss a test, you must notify me in advance.

**ACADEMIC INTEGRITY:** You are encouraged to work with other students on assignments, but your work should reflect your own understanding. Extra-credit and test work must be completely your own. A student involved in cheating (or assisting another student in cheating) on a test should expect to be dismissed from the course with a failing grade. See PUC's Code of Academic Integrity (page 213 of the *General Catalog*) for details.

[This schedule is subject to revision]

<b>Date</b>	<b>Homework To Turn In This Day</b>	<b>Class Lecture/Discussion</b>
Jan 7	None	§1.1: Historical Background
Jan 9	H1.1: 1,2,4,5,7	§1.2: Axiomatic Systems and Their Properties
Jan 11	H1.2: 1,2,5,6,10,15,16,19,20,21	§1.3: Finite Geometries
Jan 14	H1.3: 1,4,5,7,13,14,17,22,23,26	§1.4: Axioms for Incidence Geometry
Jan 16	H1.4: 1-5	§2.1,2: Euclid's Geometry and Euclid's Elements
Jan 18	H2.2: 1,2,4,5,7,13	§2.3: Modern Euclidean Geometries
Jan 21	<i>Martin Luther King Jr. Day</i>	<i>No classes</i>
Jan 23	H2.3: 3-7,9,10	§2.4: Hilbert's Axioms for Euclidean Geometry
Jan 25	H2.4: choose any 6	§2.6: The SMSG Postulates for Euclidean Geometry
Jan 28	H2.6: 1,2,4,5,6,7,10,11	§2.7: Non-Euclidean Geometries
Jan 30	H2.7: 1-4	§3.1,2: Preliminary Notions
Feb 1	H3.2: 5-9	§3.3: Congruence Conditions
Feb 4	H3.3: 1,2,4,5,6,8,10	§3.4: The Place of Parallels
Feb 6	H3.4: 1,2,4,5,(6 or 7),11,12	Review
Feb 8	<i>Midquarter Vacation</i>	<i>No classes</i>
<b>Feb 11</b>	Study for Midterm Test	<b>Midterm Test Chapters 1-3</b>
Feb 13	<b>Deadline for Selecting Project Topic</b>	§4.1,2: The Parallel Postulate and Some Implications
Feb 15	H4.2: 1,4,8,9,10,11,12,22	§4.3: Congruence and Area
Feb 18	H4.3A: 1-4	§4.3: Congruence and Area, continued
Feb 20	H4.3B: 17-19, 22-26	§4.4: Similarity
Feb 22	H4.4: choose any 5	§4.5: Some Euclidean Results Concerning Circles
Feb 25	H4.5A: choose any 4 from 18-29	§4.5 (continued):
Feb 27	H4.5B: 30,31,32(Thm. 4.5.21),34,37	§4.6: Some Euclidean Results Concerning Triangles
Feb 29	H4.6: 3,5,7,8,9,18	§4.7: More Euclidean Results Concerning Triangles
Mar 3	<b>Projects Due Today</b>	Project presentations
Mar 5	H4.7: 2-8, 10	§4.8: The Nine-Point Circle
Mar 7	H4.8: 1,2,3,8,9	§4.9: Euclidean Constructions
Mar 10	H4.9A: 3,5,7,8,9,12,13,17	§4.9 (continued):
Mar 12	H4.9B: 19-25	§4.10: Laboratory Activities: Dynamic Geometry Software
Mar 14	H4.10: to be announced	Review
<b>Mar 19</b>	<b>Wednesday, 2:45 p.m.</b>	<b>FINAL CUMULATIVE TEST [150 points]</b>