SULTAN QABOOS UNIVERSITY

COURSE OUTLINE

PROGRAM: Bachelor of Education

1. Course Code	MATH3212	
2. Course Title	Mathematics for Teachers II - Geometry	
3. Credits	Credits: 4 Workload: 10 hours (5 contact hours in classroom and 6 hours self-study)	
4. Pre-requisite Course(s)	MATH2107	
5. Co-requisite Course(s)		
6. Equivalent Course(s)		
7. Incompatible Course(s)		
8. Course Category	☐ University Requirement	☐ University Elective
	☐ College Requirement	☐ College Elective
	☐ Department Requirement	☐ Department Elective
	☐ Specialization Requirement	☐ Specialization Elective
	☒ Other (specify): Service Course	
9. Course Owner	College: Science	Department: Mathematics
10. Course Type	☐ Lecture	☐ Lecture/Lab
	☐ Lecture/Seminar	☐ Lecture/Studio
	☒ Lecture/Tutorial	☐ Lecture/Lab/Tutorial or Seminar
	☐ Tutorial	☐ Laboratory (Practical)
	☐ Field or Work Placement	☐ Studio
	☐ Seminar	☐ Internship
	☐ Workshop	☐ Project
11. Language of Instruction	English	

12. Course Description

In this course, students will learn geometry as an axiomatic development of a subject. This course introduces the geometric concepts with emphasis on the contrast between the traditional and modern approaches to geometry. Topics include basic theorems in Euclidean geometry such as properties of triangles, circles and parallelograms, elementary constructions, and in non-Euclidean geometry, some models of the hyperbolic space and theorems. In coordinate geometry, important theorems in Euclidean geometry and many other results are proved through coordinate representations. In transformation geometry, analytic models of Euclidean plane, translations and rotations, isometries. In addition it introduces new geometric topics such as fractals.

13. Teaching/Learning Strategies

Students will learn a blief history of geometry and school geometry, solids and conics, non-Euclidean geometries, transformations of the plane and finally Fractal Geometry.

The students will be familiar with theorems of school geometry and other geometries through proving theorems, writing report on geometry problems and oral presentations.

14. Assessment Components and Weight [%]

☒ Quizzes 15%	☐ Practical	☐ Other (specify):
☐ Homework assignments 5%	☒ Mini Project 10%	
☒ In-term examination(s) 25%	☒ Final examination 45%	

15. Grading Method

☒ A-F Scale ☐ Pass/Not passed

16. Textbook(s) and Supplemental Material

Lecture Notes on Geometry, Tsukasa Yashiro

- Modern Geometry (2001), David A. Thomas, Brooks/Cole.
- Linear algebra through geometry, second edition, (1991), T. Banchoff and J. Werner, Springer.
- J. Stillwell, Mathematics and Its History, Third Edition, Springer (2010).
- Algebra, S. MacLane, G. Birkoff, (1968), The Macmillan Company, New York, Collier-Macmillan Limited, London.

17. Matching Course Objectives with Program Outcomes and SQU Graduate Attributes

SQU Graduate Attributes

A. SQU graduates should be able to:	**B. SQU graduates possess**	**C. SQU graduates should**
1. apply the knowledge and skills relevant to the specialization 2. communicate effectively and use information and communication technologies 3. critically analyze complex information and present it in simple clear manner	1. interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully 2. skills and motivation for independent learning and engagement in lifelong learning and research 3. work ethics and positive values, and intellectual independence and autonomy 4. teamwork skills and display potential leadership qualities	relish good citizenship qualities, be conscious of their national identity and be socially responsible, engage in community affairs and be mindful of contemporary issues.

#	Intended Student Learning Outcome /Course Learning Objective	Relevant Program Outcome(s)	Applicable Attribute(s)
1.	Know a general history of geometry		A1
2.	Recognize historical events in geometry and names of mathematicians who made significant contribution to geometry.		A1, B1
3.	Know properties of triangles and circles.		A1,A3

4.	Prove theorems in elementary geometry.		A1-A3
5.	Understand geometric concepts of transformations		A1,A3
6.	Compare Euclidean and non-Euclidean geometries.		A1,B2
7.	Understand properties of isometries in geometric sense.		A1,A3,B2
8.	Know new geometric topics (fractal geometry).		A1,B2
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16. Student Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirement and students` academic code of conduct.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty and avoid any academic misconduct, which is defined as the use of any dishonest or deceitful means to gain some academic advantage or benefit. This can take many forms, including but not limited to, the following: copying, plagiarism, collusion and forging documents. For full details, please refer to the Undergraduate Academic Regulations and to the Student Academic Misconduct Policy.

COURSE INFORMATION			
Course Code	MATH3212	**Course Title**	Mathematics for Teachers II (Geometry)
Semester/ Year	Spring 2020	**Section**	1
Day, Time, and Place	SUN, THU 10:00-11:20am, WED 4:15-6:05pm		

Course Coordinator	Dr. Haniffa M. Nasir		
Office Location	1069-1F	**Office Hours**	MON, WED 10:30--12:00n
Office Tel. Ext.	2257	**Email**	nasirh@squ.edu.om

Tentative Schedule			
Week	**Lecture/Topic**	**Material to be covered**	**Assessment**
1	1. History	1.1,1.2 Geometry before Greeks, 1.3 Greek Geometry, The Elements 1.4 Medieval Geometry, 1.5 Modern Geometry	
2	2. The Elements	2.1 Some Geometric Theorems and Proofs by Euclid Introduction to Geometry Software (Geogebra, Cinderella)	
3	3. Plane Geometry (School Geometry)	3.1 Definitions and Axioms 3.2 Parallel Lines 3.3 Triangles 3.4 20 Basic Theorems	
4		3.5 Menelaus Theorem and Applications 3.6 Ceva's Theorem and Applications	Quiz 1
5		3.7 Circles and Chords 3.8 Circles and Triangles 3.9 Cyclic Quadrilaterals 3.10 Tangents of Circles 3.11 Inscribed Circles and Incenters	
6		3.13 Power of a Point Theorem 3.14 Two Circles 3.15 Common Tangents 3.16 Circular inversion	
7	Ch4 Non-Euclidean Geometry	4.1 Introduction 4.2 Concept of parallelism 4.3 Hyperbolic Geometry, Definitions of h-point and h-lines, parallel h-lines, h-circles	Mid-Semester Test
8 **12.04.2020**		4.4 Construction of h-lines 4.5 Hyperbolic distance 4.6 Construction of parallel h-lines, orthogonal h-lines	
9	Ch5	5.1 Representation of Euclidean Plane and Space	Quiz 2

19.04.2020	Coordinate Geometry	5.2 Representation of Points, Vector operation on Points Euclidean distance, Dot products of two directed line segments, Perpendicular line segments	
10		5.3 Representation of angles, Cosine and Sine laws 5.4 Barycentric Coordinates 5.5 Centers of Triangles	
11	Ch6: Analytical Geometry	6.1 Determinants of three points, Area of triangle, 6.2 Representation of lines by determinants	Quiz 3
12		6.3 Circles and Properties: Determinant of four Co-circular points, Equation of Circle by a determinant, 6.4 Properties of Circles through equations : Circumcenter, Tangents at a point and from an outside point, line and circles through two circle intersections, lines through two points on a circle and more	Homework assignments given
13	Ch7: Transformation Geometry	7.1 Matrix representation of transformations Translations, Scaling, Rotations, Reflections, Dilation, 7.2 Invariance under Transformations Strain, Shears, Affine Transformations.	
14	Ch8. Solid Geometry	Area of disc, sum of sectors, sum of annuli Volumes of cones, cylinders, parallelepiped, tetrahedron, Spheres and their surface areas Conic curves, ellipse, hyperbola, parabola and their Equations	HW Quiz Submission of homework
15	Ch 9. Fractal Geometry (If time permits)	Self-Similarity, Area of Fractal objects Koch's snow flake, Sierpinski Triangle, Fractal Dimension	.

APPENDIX A: INSTRUCTORS OF MULTIPLE SECTIONS					
Section	**Instructor**	**Day, Time, and Place**	**Office Location and Extension**	**Email**	**Office Hours**
10	Dr. H. M. Nasir	SUN 10:00 -11:20a, D15 THU10:00 -11:20a, D15 WED 4:15 – 6:05p, D15	1069-1F	nasirh	MON, WED 10:30 –12:00a