Course Specification
(Bachelor)

Course Title:	**Advanced Euclidean Geometry**
Course Code:	**MAT 1382**
Program:	**Bachelor of Science in Applied Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**08/10/2024**

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A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☒ Elective		
3. Level/year at which this course is offered:					
Level 6 / Year 3 or Level 7 / Year 4					
4. Course general Description:					
Advanced Euclidean Geometry is an elective course. This is a senior level class which is a comprehensive study of geometry. It includes the historical development of geometry, abstract and concrete treatments of the subject, examples of various geometries, proving fundamental geometric theorems as of: Ceva, Stewart, Ptolemy and of Miquel.					
5. Pre-requirements for this course (if any):					
MAT 1223					
6. Co-requisites for this course (if any):					
None.					
7. Course Main Objective(s):					
This course will be devoted to the Euclidean and Non-Euclidean geometry, and will begin where the high school geometry course leaves off. It will fill by providing a thorough review of the essentials of the high school geometry course and then expanding those concepts to advanced Euclidean geometry. This course will aim for a high level of competence in the fundamentals, a broad appreciation of the structure of the subject, and a robust ability to solve problems, write proofs and explanations, and explain mathematics verbally and in writing.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	0
4.	Tutorial	30
5.	Others (specify)	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To outline a core set of geometric facts and relationships about triangles, quadrilaterals, circles, congruence, and similarity.	K1, K2	3 lecture hours\week	Regular Exams
1.2	To recognize the basics concepts and results related to Euclidean Geometry.	K1, K2	2 tutorial hours\week	Assignments
1.3	To memorize the principal theorems of this course as: Ceva's theorem, Menelaus's theorem, Ptolemy's theorem, and Stewart's theorem.	K1, K2	Self-study	Short Quizzes
2.0	Skills			
2.1	To develop techniques of Euclidean geometry problems.	S1, S2	Real-life problems	Short Quizzes
2.2	To present main Euclidean geometry theorems clearly	S4	Self-study	Participations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	and precisely both orally and in writing.			
2.3	**To use Internet in searching for up-to-date results in Euclidean geometry.**	**S5**	**Real-life problems**	**Short Quizzes**
2.4	**To demonstrate some proofs in advanced Euclidean geometry.**	**S3**	**Self-study**	**Participations**
3.0	**Values, autonomy, and responsibility**			
3.1	**To work individually.**	**V1, V3**	**Personal questions**	**Participation**
3.2	**To show findings and discuss the results with others.**	**V1, V2**	**Team work**	**Homework and Mini-projects**

C. Course Content

No	List of Topics	Contact Hours
1.	**Review:** basics and stating basic facts concepts and facts of the triangle geometry.	9
2.	**Ceva's theorem:** Ceva's Theorem and its dual Menelaus's theorem and their applications. Simon's Line, The Butterfly, Theorem Pappus's Theorem.	15
3.	**Stewart's theorem and its applications:** Equiangular point, Property of Equilateral triangles, and a Minimum Distance Point.	12
4.	**Centers of Quadrilaterals:** Cyclic Quadrilaterals, and Ptolemy's Theorem and its applications.	9
5.	**Miquel's Theorem:** Euler distance formula. The nine points circle Theorem and its proof.	6
6.	**Axiomatic Systems and Finite Geometries**: Glimpse on hyperbolic geometry, elliptic geometry.	9
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	HomeWorks, Quizzes, Mini-projects	During the term	10%
2.	First Midterm	Week 5-6	25%
3.	Second Midterm	Week 10-11	25%
4.	Final Exam	Week 15-16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Advanced Euclidean Geometry, **A. Posamentier, Wiley 2008.** • Advanced Euclidean Geometry, **R. Johnson, Dover 2007.**
Supportive References	Geometry for College Students, I. Isaacs, Thomson Learning 2001.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• **Classrooms:** Equipped with whiteboards, projectors, and Smart Boards for interactive lessons and group discussions. • **Laboratories:** Feature computers with internet access, enabling hands-on activities and exploration of algebraic and trigonometric concepts. • **Exhibition Rooms:** Spaces for showcasing projects and presentations to encourage collaborative learning.
Technology equipment (projector, smart board, software)	• **Data Show Projectors:** For clear presentations in classrooms and labs. • **Smart Boards:** To enhance interactivity during lessons. • **Mathematical Software:** Essential for graphing and analysis.
Other equipment (depending on the nature of the specialty)	• **Computers:** For mini-project and homework and practical applications in laboratories. • **Advanced Calculators:** For computations and problem-solving and supporting the study of limits, continuity, and differentiation. • **Whiteboards and Markers:** To facilitate brainstorming and collaboration.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty, Program Manager, Students, Course Coordinator	- **Student Course Evaluation**: Student feedback surveys to assess teaching quality (clarity, engagement, delivery). - **Instructor Course Report**: Instructor reflection on their teaching effectiveness and challenges. - **Classroom Observations**: Conducted by the program manager or course coordinator to directly observe teaching methods. - **Benchmarking Between Male and Female Sections**: Compare student evaluations and performance across gender-based sections to identify any disparities in teaching effectiveness. - **Advisory Board Feedback**: Gathering insights on teaching methods from external academic or industry professionals.
Effectiveness of Students assessment	Faculty, External Reviewers, Program Manager, Course Coordinator	- **Alignment of Assessments with CLOs**: Ensuring exams, assignments, and projects measure the intended CLOs. - **Benchmarking Between Semesters**: Comparing assessment effectiveness across different semesters to maintain consistency and improvement. - **CLOs Assessment Excel Sheet**: Tracking student performance in relation to CLOs to evaluate the strength of assessments. - **Instructor Course Report**: Faculty analysis of assessment outcomes and potential adjustments. - **External Audit/Reviewers**: External examiners review assessments for rigor and fairness.
Quality of learning resources	Program Manager, Librarians, Faculty, Course Coordinator	- **Student Course Evaluation**: Students provide feedback on the usefulness and availability of learning resources (textbooks, software, etc.). - **Instructor Course Report**: Faculty report on the adequacy and relevance of learning materials. - **Resource Usage Statistics**: Data on the usage of learning resources (digital/physical) such as library access, software downloads. - **Benchmarking Between Sections/Semesters**: Compare resource satisfaction across male/female sections and over semesters. - **Advisory Board Input**: External experts suggest updated or alternative resources to align with industry or academic developments.
The extent to which CLOs have	Faculty, Program Manager, External	- **CLOs Assessment Excel Sheet**: Regular tracking of student performance for each CLO based on exams, projects, and assignments.

Assessment Areas/Issues	Assessor	Assessment Methods
been achieved	Reviewers, Course Coordinator	- **Instructor Course Report**: Faculty reflection on CLO achievement and any gaps identified. - **Student Course Evaluation**: Students assess whether they feel they've met the course learning outcomes. - **Benchmarking Between Semesters**: Analyze CLO achievement across different semesters to ensure continuous improvement. - **Advisory Board Feedback**: Assess whether CLOs are aligned with industry or academic standards and if students are adequately prepared.
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**8/1446**
DATE	**05/04/1446 (08/10/2024)**