Course Description Form

1. Course Name:
Subjects in Geometry
2. Course Code:
MATH-3011
3. Semester / Year:
Second Semester/Third Year
4. Description Preparation Date:
27 March 2024
5. Available Attendance Forms:
Classroom or electronic by Web
6. Number of Credit Hours (Total) / Number of Units (Total)
60 Hours/3 credits
7. Course administrator's name (mention all, if more than one name)
Name: Azher Abbas Mohammad Email:drazh64@tu.edu.iq
8. Course Objectives
1. Students must realize basic concepts in Euclidean geometry. 2. Learning a student's haw the Axiomatic system work with its contents, postulates, theorems, exercises. 3. Students must know a philosophy of Euclidean and non- Euclidean geometry. 4. Developing the ability of students in treat with a non-Euclidean geometry such as points, lines, surfaces, spaces which takes its meaning from the axiomatic system. 5. Providing students with experience and skills in treatment with the concepts in hyperbolic and Elliptic geometry 6. Providing students with experience and skills in treatment with the concepts in hyperbolic and Elliptic triangles and the triangular relations for them.
9. Teaching and Learning Strategies
This course characterized that it represent one of the three mathematical structures which is geometrical structure. So the learning strategy based on

training the student to expand his imaginative understanding to comprehended concepts of non-Euclidean geometries that contradict each other .This comes by helping the students to imagine a non-planer spaces such as Poincare and Riemann spaces that deals with a different concepts of parallelism and Orthogonality and deals with a non-Euclidean triangles. Then the focus will be on following up with students by assigning them some home works and discussing solutions and proofs in each lecture in order to adopting proof methods based on axiomatic system and the mathematical thinking approach and adopting several methods to evaluate the extent of students understanding of the scientific material based on oral scientific discussion and some quizzes, in addition to two quarterly tests during the semester.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Learn about the history of geometry and its origins	Brief history of geometry and Euclidean Axiomatic system	Theoretical Lecture and discussion	Oral tests and quizzes
2	4	Concepts of axiom, postulate and axiomatic systems	Hilbert Axiomatic system	Theoretical Lecture and discussion	Oral tests and quizzes
3	4	Dealing with the most important concepts of circles	The power of a point with respect to a circle , pencil of hyperbolic and elliptic circles	Theoretical Lecture and discussion	Oral tests and quizzes
4	4	Inversion concept with respect to a circle	Inversion , inversion relations and some theorems and exercises	Theoretical Lecture and discussion	Oral tests and quizzes
5	4	Cross ratio concept	Cross ratio of collinear four points on a line definitions and properties	Theoretical Lecture and discussion	Oral tests and quizzes
6	4	Developing of non-Euclidean concepts in geometry	Fifth Euclidean postulate reward and axiomatic system of hyperbolic geometry in Poincare space	Theoretical Lecture and discussion	Oral tests and quizzes
7	4	Haw to measure a hyperbolic distance in Poincare space	Hyperbolic distance between two points in Poincare space	Theoretical Lecture and discussion	Oral tests and quizzes
8	4	Learning a parallelism concept in Poincare space	Hyperbolic lines , parallel and meeting lines	Theoretical Lecture and discussion	1st Midterm exam in previous weeks(1-7)
9	4	Haw to measure a vertical hyperbolic distance	Hyperbolic vertical distance and angle of parallelism	Theoretical Lecture and discussion	Oral tests and quizzes

10	4	Recognition the relation between the elements of hyperbolic right triangle	Hyperbolic right triangle ,relation between its elements with examples	Theoretical Lecture and discussion	Oral tests and quizzes
11	4	Recognition the relation between the elements of hyperbolic oblique triangle	Hyperbolic oblique triangle ,relation between its elements with examples	Theoretical Lecture and discussion	Oral tests and quizzes
12	4	Identifying the axiomatic system of elliptic geometry	Introduction in elliptic geometry and Riemann unite sphere and stereographic projection	Theoretical Lecture and discussion	Oral tests and quizzes
13	4	Haw to calculate a elliptic distance on Riemann Sphere	The elliptic distance between two points on Riemann sphere and its projection in a plane	Theoretical Lecture and discussion	Oral tests and quizzes
14	4	Recognition the relation between the elements of elliptic right triangle	Elliptic right triangle ,relation between its elements with examples	Theoretical Lecture and discussion	Oral tests and quizzes
15	4	Recognition the relation between the elements of elliptic oblique triangle	Elliptic oblique triangle ,relation between its elements with examples	Theoretical Lecture and discussion	2nd Midterm exam

11. Course Evaluation

Couse evolution of a student including the sum of the following two parts

1. Formative Evalution 40%
   (2 exams through the term 30% and Oral discussion 5% and Quizzes 5%)
2. Summative Evalution
   (Final Exam 60%)

12. Learning and Teaching Recourses

Required textbook(Curricular book, if any):

امال شهاب العطار , " مفاهيم اساسية في الهندسة", دار الحكة للطباعة والنشر – بغداد 1992

Main References (Sources):

عبد الوهاب احمد السراج ,"نظم البديهيات والهندسة " , مطابع جامعة الموصل 1985

ملزمة من اعداد ا.م. يحيى عبد سعيد من كلية التربية جامعة الموصل

Recommended book and references (Scientific journals, reports,…):

خالد احمد السامرائي , " الهندسة الحديثة" , مطابع التعليم العالي – بغداد – 1988

Electronic Reference ,Web sites:

كتاب الهندسة اللااقليدية ومصادرة اقليدس الخامسة

https://www.alfreed-ph.com/2018/03/No-Euclid-Engineering-pdf.html#google_vignette