# Course Specifications

| | |
|---|---|
| **Course Title:** | Euclidean and Non-Euclidean Geometry |
| **Course Code:** | **232 Math-3** |
| **Program:** | **Mathematics** |
| **Department:** | **Mathematics** |
| **College:** | **Science and Arts** |
| **Institution:** | **Najran University** |

## Table of Contents

## A. Course Identification

| | |
|---|---|
| **1. Credit hours:** 3 | |
| **2. Course type** | |
| **a.** University ☐ College ☐ Department √ Others ☐ | |
| **b.** Required √ Elective ☐ | |
| **3. Level/year at which this course is offered:** 6 / 3 | |
| **4. Pre-requisites for this course** (if any): | |
| **5. Co-requisites for this course** (if any): | |

**6. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 3 | 100% |
| 2 | Blended | --- | --- |
| 3 | E-learning | --- | --- |
| 4 | Correspondence | --- | --- |
| 5 | Other | --- | --- |

**7. Actual Learning Hours** (based on academic semester)

| No | Activity | Learning Hours |
|---|---|---|
| **Contact Hours** | | |
| 1 | Lecture | 45 |
| 2 | Laboratory/Studio | --- |
| 3 | Tutorial | --- |
| 4 | Others (specify) | 3 |
| | Total | 48 |
| | **Other Learning Hours*** | |
| 1 | Study | 30 |
| 2 | Assignments | 10 |
| 3 | Library | 10 |
| 4 | Projects/Research Essays/Theses | --- |
| 5 | Office hours | 15 |
| | Total | 113 |

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

**1. Course Description**

This course covers several geometric systems including Euclidean, non-Euclidean, transformational and projective. Other topics studied are topological properties and the relationship between coordinate and synthetic geometry.

**2. Course Main Objective**

Be familiar with the differences between different forms of geometry, such as Euclidean,

Hyperbolic and Projective.

### 3. Course Learning Outcomes

| | CLOs | AlignedPLOs |
|---|---|---|
| 1 | **Knowledge:** | |
| 1.1 | Recognize the basic notions of Euclidean and Non-Euclidean geometries. | |
| 1.2 | Recognize the concepts of distance andcongruence. | |
| 1.3 | Write geometric problems (particularly,hyperbolic geometry) using techniques of linearalgebra. | |
| | | |
| **2** | **Skills :** | |
| 2.1 | Recognize the properties of the distance in the Euclidean plane. | |
| 2.2 | Calculate the distance between a given point and a straight line. | |
| 2.3 | Recognize the notions of reflections, rotations, translations andglide translations. | |
| 2.4 | Recognize the notions of Projective and Hyperbolic planes, and calculate thehyperbolic distance between a given point and a line in the Hyperbolic plane. | |
| **3** | **Competence:** | |
| 3.1 | Develop specific skills, competencies, and thought processes sufficient to support further study or work in this field or related fields. | |
| 3.2 | Model real world problems using non-Euclidean geometry | |
| 3.3 | --- | |
| 3... | --- | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Euclid's Geometry: Logic and Incidence Geometry , Hilbert's Axioms. | 6 |
| 2 | Axiomatic and Neutral Geometry: Axiomatic Geometry, Neutral Geometry, Euclidean Parallels. | 9 |
| 3 | Hyperbolic Geometry: Hyperbolic Geometry, Boundary Parallels, Defect and Area. | 9 |
| 4 | History of the Parallel Postulate, The Discovery of Non-Euclidean Geometry. | 12 |
| ٥ | Independence of the Parallel Postulate. | 9 |
| ... | --- | |
| **Total** | | 45 |
| | | |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| 1.0 | **Knowledge** | | |
| 1.1 | Define vertices, edges of trees, and graphs. | - Lecture<br>- Discussions | - Quiz<br>- Written Exam |
| 1.2 | Determine whether graphs are directed, undirected, Hamiltonian and/or Eulerian..etc. | - Lecture<br>- Discussions | - Quiz<br>- Written Exam |
| … | --- | --- | --- |
| 2.0 | **Skills** | | |
| 2.1 | Identify induced subgraphs, and proper subgraphs | - Lecture<br>- Discussions | - Exercises<br>- Homework<br>- Quiz/Written<br>- Exam |
| 2.2 | Solve problems involving vertex and edge connectivity, planarity and edge coloring. | - Lecture<br>- Discussions | - Exercises<br>- Assignments<br>- Homework<br>- Quiz<br>- Written Exam |
| … | | | |
| 3.0 | **Competence** | | |
| 3.1 | Interpret adjacency matrix and operations on graphs. | - Lecture<br>- Discussions | - Oral Exam |
| 3.2 | Model real world problems using graph theory | - Lecture<br>- Discussions | - Oral Exam<br>- Rubrics |
| … | --- | --- | --- |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Exercises, Homework& Assignments | Open | 10% |
| 2 | Oral Exam and Rubrics | 14th Week | 5% |
| 3 | Quizzes | Open | 5% |
| 4 | Written Test(1) | 7th Week | 15% |
| 5 | Written Test(2) | 13th Week | 15% |
| 6 | Final Exam | End of Semester | 50% |

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- Introducing the course syllabus, grading scale and the distribution of marks for the course in the first lecture of the course.
- Arrangements for availability of teaching staff for individual student consultations and academic advice (include amount of time teaching staff are expected to be available each week).
- Office hours for a teaching staff for one hour weekly.

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | - Marvin J. Greenberg, Euclidean and Non-Euclidean Geometries: Development and History 4th Edition, Freeman/Worth, 2008.<br>- نصار حسن عبدالعال السلمي، اساسيات الهندسة الاقليدية واللااقليدية،٢٠٠٥، مكتبة الرشد. |
| **Essential References Materials** | - Marvin J. Greenberg, Euclidean and Non-Euclidean Geometries: Development and History 4th Edition, Freeman/Worth, 2008.<br>- نصار حسن عبدالعال السلمي، اساسيات الهندسة الاقليدية واللااقليدية،٢٠٠٥، مكتبة الرشد. |
| **Electronic Materials** | - What Are Euclidean and Non-Euclidean Geometry?<br>- https://www.quickanddirtytips.com/education/math/what-are-euclidean-and-non-euclidean-geometry |
| **Other Learning Materials** | - |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | • Lecture Hall by the number of seats = 25 seat approximately. |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | • Datashow<br>• Smart Board<br>• Wi Fi |
| **Other Resources**<br>(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | • None |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Student course evaluation survey at the end of semester. | Students | Questionnaire (Indirect) |
| Effectiveness of teaching and assessment | Peer Reviewer | Rubrics (Indirect) |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |
| --- | --- | --- |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods**(Direct, Indirect)

## H. Specification Approval Data

| | |
|---|---|
| Council / Committee | |
| Reference No. | |
| Date | |