COURSE   SPECIFICATION

Requested by College of Sciences, KKU, Abha

2012

Course Specification

Institution: **King Khaled University**

College/ Department: **College Sciences/ Department of Mathematics**

A Course Identification and General Information

1. Course title and code: **Analytical geometry and introduction to linear algebra – 129 Maths -**
2. Credit hours: **3**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **Faculty of Engineering and Mahala campus**
4. Name of faculty member responsible for the course: **Mohammed Nisar, Mohammed hazzazi, Dr. Fuad mahdi**
5. Level/year at which this course is offered: **first level** / first **Academic Year**
6. Pre-requisites for this course (if any): **None**
7. Co-requisites for this course (if any)- N/A
8. Location if not on main campus: **Faculty of Engineering – Mahala campus**

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

The main tool in this program is to familiarize the student with some notion of analytical geometry as finding equations of conical sections like parabolas, circles, ellipses and hyperbolas in both translation and rotation cases. The students are also required to manipulate IR^3 geometry (planes and lines). Also the course gives some methods to solve linear systems using matrix operations, determinants, inverses, Cramer's rule, Gauss-Jordan elimination.

2. The plans for developing and improving the course that are being implemented.

- Increased usage of IT or web based reference material.

- Revising and updating of the course contents.
- To give more important time to mathematics and engineering formation.
- To include suitable engineering applications based on the course.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1. Topics to be Covered

Topics	No of Weeks	Contact hours
• Finding equations from given geometric conditions. • Parabolas	1	3
• Circle, Ellipses and hyperbolas of the form $\qquad Ax^2 + By^2 = C$	2	6
• Translation of axes and recognition of types of conical sections, rotation of axes.	2	6
• Distance between two points, direction numbers of lines and angle between two lines.	1	3
• Straight lines in IR^3, planes and normal to planes.	2	6
• Basic definitions, operations and Echelon forms of a matrix, Gaussian elimination and gauss Jordan elimination methods	2	6
• Inverse of a matrix, inverse properties, matrix inversion method, determinants and Cramer's rule	2	6
Total	12	36

2 Course components (total contact hours per semester):			
Lecture: 36	Tutorial:	Practical/ Fieldwork/ Internship:	Other:

W	Subjects	Class Exercises	Homework's
1			
2	**Finding Equations from Given Geometric Conditions**	**P(4)** **3, 5, 7, 9, 11, 13**	**P(4)** **4, 6, 8, 10, 12, 14**
3	**Parabolas**	**P(10)** **1, 3, 7, 9, 11, 15, 17**	**P(10)** **2, 8, 12, 14, 18, 19**
4	**Circles and Ellipses**	**P(17-18)** **1, 5, 7, 9, 11, 15, 21**	**P(17-18)** **3, 6, 8, 10,14,16, 22**
5	**Hyperbolas, Naming and Sketching Equations of the Form** $Ax^2 + By^2 = C$	**P(24-25)** **1,3,5,7,9,11,17** **P(29)** **1,3,5,7,9,11,13**	**P(24-25)** **2,4,6,8,10,12,18** **P(29)** **2,4,6,8,10,12,14**
6	**Translation of Axes, Recognition of Types of Conic Sections**	**P(43-44)** **1, 7, 9, 15, 17, 9,21,** **25, 29,31,33,35, 37**	**P(43-44)** **2, 8, 10,16,18, 20, 22, 26, 30, 32,34,36**
7	**Rotation of Axes, Recognition of Conic Sections**	**P(51-52)** **1,3,13,19,21,23**	**P(51-52)** **2, 4, 14, 20, 22, 24**
8	**Geometry in R^3 , Direction Cosines, Direction Numbers, Angles between two Lines**	**P(60-61)** **7, 9, 13, 15** **P(64-65)** **1, 3, 5, 7, 13, 15**	**P(60-61)** **8, 10, 14, 16** **P(64-65)** **2, 4, 6, 8, 14, 16**
9			
10	**Straight Lines, Symmetric Equation, Parametric Equation**	**P(68-69)** **1,3,5,7,9,11**	**P(68-69)** **2,4,6,8,10,12**
11	**Planes, Normal to Plane, Standard Form, Distance from a**	**P(73-75)** **1, 3, 5, 7, 9, 11,**	**P(73-75)** **2, 4, 6, 8, 10, 12, 30,**

W	Subjects	Class Exercises	Homework's
	point to a Plane, Intersection of two Planes	29, 31, 33	32, 34
12	Introduction to Linear Systems, Matrices, Back Substitution, Gauss-Jordan Elimination	P(21-22) 1, 3, 5 P(29-30) 1, 3, 7, 9	P(21-22) 2, 4, 6 P(29-30) 2, 4, 10
13	Matrix Operations, Inverse Matrices, Inverse Matrix Rule	P(56-57) 1, 3, 5, 11, 13	P(56-57) 2, 4, 7, 12, 14
14	Determinants Operations, Cramer Rule	P(106) 1, 3, 5, 7, 9	P(106) 2, 4, 6, 8, 10
15	Second midterm exams (14th and 15th week)		
16	General Revision		
17	Exam of general courses		
18	Final exams		

Note: Example problems can be discussed with the students as per the requirement of the given topic.

Regards

Mohammed Nisar

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3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week):

4. **Development of Learning Outcomes in Domains of Learning**

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;

- A description of the teaching strategies to be used in the course to develop that knowledge or skill;

- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

The main tool in this program is to familiarize the student with some notion of analytical geometry as finding equations of conical sections like parabolas, circles, ellipses and hyperbolas in both translation and rotation cases. The students are also required to manipulate IR^3 geometry (planes and lines). Also the course gives some methods to solve linear systems using matrix operations, determinants, inverses, Cramer's rule, Gauss-Jordan elimination.

(i) Description of the knowledge to be acquired

At the end of this course, the student will be able to:

1. Recognize types of conical sections from their equations and from a given geometric conditions

2. Understand the geometry of IR^3(lines and planes).

3. Solve linear systems using matrix operations, determinants, inverses, Gauss-Jordan elimination.

4. To use the techniques and theorems in the area of speciality and in the all field where it is possible.

(ii) Teaching strategies to be used to develop that knowledge

The strategies used to acquire theses skills through:

- Theoretical part: lectures, which may include teaching videos and the use of IT

- Discussion groups about the exercises

(iii) Methods of assessment of knowledge acquired

Assessment of the theoretical part by attending the following tests
- Quizzes

- Midterm exam

- Final Exam

b. Cognitive Skills

(i) Cognitive skills to be developed

- To use the techniques and theorems in the area of speciality and in the all field where it is possible

- To develop the spirit of analysis and logic.

(ii) Teaching strategies to be used to develop these cognitive skills

- Discussion groups.

- Collect information paper about selected cases or topics through the internet sources and libraries.

(iii) Methods of assessment of students cognitive skills

- Interview with students.
- Research projects.
- Online / in class group discussions.
- Assessment of written reports.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

i- Work independently and as part of a team.

ii- Manage resources, time and other members of the group.

iii- Communicate results of work to others.

(ii) Teaching strategies to be used to develop these skills and abilities

i- Writing group reports.

ii- Solving problems in groups.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

i- Student's behaviour is considered in the continuous assessment marks.

ii- Grading research projects.

iii- Assessing oral discussion of different cases.

iv- Final evaluation of the works.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

i- Use computational tools

ii- Report writing

iii- How to search and use the internet.

iv- How to use power point to present their projects.

v- How to improve their language and writing skills

(ii) Teaching strategies to be used to develop these skills

i- Writing reports.

ii- Incorporating the use and utilization of computer in the course requirements.

iii- Hands on training on different software like Microsoft office and internet.

(iii) Methods of assessment of students numerical and communication skills **i- Direct evaluation of take home projects.**

ii- Presentations and live discussion.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required
- Student should have skills of drawing conical sections and drawing planes in IR^3.
- Student should manipulate all the mathematical knowledge in real-life problems.
-Capacity to present and discuss mathematical ideas and to acquire mathematical proof skills.
- Comprehension of the concepts of mathematics as an integral system in the human knowledge and its applications.

(ii) Teaching strategies to be used to develop these skills
- Attending seminars and conferences held in the department.

(iii) Methods of assessment of students psychomotor skills
- Continuous evaluation to perform the student's skills.

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Quizzes(5)	4	10%
2	Midterm examination(1,2)	7	40%
4	Final Exam	13	50%

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)
- Office hours (7 hours per week).
- Contacts through university's E-learning system.
- E-mail messages.

E Learning Resources

1. Required Text(s)
2. Essential References E.W.Swokourki, M.Olinich, D.Pena, J.A.Cole, Calculus. Pws pub. Co. ,1994.
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.)   - Lecture room equipped with 30 seats and computer and projecting unit with audio system
2. Computing resources - Computers with monitors connected to the internet and KKU- e-learning center
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

G   Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Feedback questionnaire distributed to the students after midterm.
- Students- faculty meeting
- Department meetings.

2 **Other Strategies for Evaluation of Teaching by the Instructor or by the Department**

- Peer consultation on teaching.

- Departmental council discussions.

- Discussions within the group of faculty teaching the course.

- Discussing contributors' reports.

- Discussing the reports of the guest evaluator(s).

- Discussing the evaluation of the quality assurance/academic affairs committee.

3 Processes for Improvement of Teaching

- Conducting workshops given by experts on the teaching and learning methodologies.

- Using different teaching modalities.

- Periodical departmental revisions of the methods of teaching.

- Monitoring of teaching activities by senior faculty members.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- Providing samples of all kind of assessment in the departmental course portfolio of each course.

- Assigning group of faculty members teaching the same course to grade same questions for various students.

- Faculty from other institutions are invited to review the accuracy of the grading policy.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Assigning periodical student' questionnaires.

- Follow up of the quality assurance/academic affairs committee.

- The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental and higher councils.

- The head of the department and faculty take the responsibility of implementing the proposed changes.