Model No.12
Course Specifications: Mathematics (1-A)

University: Benha University
Faculty: Faculty of Engineering at Shoubra
Department offering the program: All
Department offering the course: Engineering Mathematics and Physics

1- Course Data

Course Code: EMP011 Course Title: Mathematics 1- A
Specialization: All Study Year : Prep. Year 2016 – 2017, First Semester
Teaching Hours : 6 Lecture : 4 Tutorial : 2 Practical : 0

2- Course Aims

2.1 Provide the students the concepts of functions and linear algebra and their applications in engineering.
2.2 Teach the students the rules of limits, derivative, indefinite integral and tracing curves of trigonometric, exponential, logarithmic functions and polynomials.
2.3 Teach the students the algebra of matrices, solving linear systems, binomial theorem, theory of equations and algebra of complex numbers.
2.4 Apply mathematical techniques for modeling, solving and analyzing real problems.

3- Intended Learning Outcomes of Course (ILO's)

On completing this course, students will be able to:

a- Knowledge and understanding

a.1 Define the polynomials, trigonometric, exponential, logarithmic functions.
a.2 State the concepts of limits, derivative and integral of functions.
a.3 Explain the mathematical operations of matrices.
a.4 Recognize the solutions of linear systems and algebraic equations.

b- Intellectual Skills

b.1 Deduce the derivative of trigonometric exponential, logarithmic functions and polynomials.
b.2 Determine the maximum and minimum values and inflection points.
b.3 Satisfy the mean value theorem, Roll's theorem and Talyor's theorem.
b.4 Verify the Hamilton's equation of a square matrix.

c- Professional and Practical Skills

c.1 Apply the concepts of functions for modeling and solving some real problems in the light of available data and information.
c.2 Solve optimization problems by the concepts of derivative.
c.3 Sketch the curve of function.
c.4 Find the solution of linear systems and algebraic equations.
c.5 Utilize the binomial theorem to expand algebraic expressions.
c.6 Perform the algebraic operations on complex numbers.

d- General and Transferable Skills

d.1 Communicate effectively.
d.2 Use information technology for obtaining information.
d.3 Work in a group and lead a team.
d.4 Manage time effectively and conduct self learning.

4- Contents

Week	Topic	No. of Hours	
		Lecture	Tutorials
1	**Introduction** Elementary functions: exponential, logarithmic, trigonometric functions and polynomial. Matrices and their types.	2 + 2	2
2	Limits. Algebra of matrices.	2 + 2	2
3	Continuity. Eigenvalues and eigenvectors of matrices.	2 + 2	2
4	Derivative of elementary functions. Properties of Eigenvalues and eigenvectors of matrices.	2 + 2	2
5	Higher derivatives. Linear systems and types of solutions.	2 + 2	2
6	Maximum and minimum values, Methods for solving Linear systems.	2 + 2	2
7	Taylor's expansion and L'Hpoital rule. Theory of equations.	2 + 2	2
8	Mid-Term Exam		
9	Mean value theorem and Rolle's theorem. Solving equations of third and fourth degree.	2 + 2	2
10	Optimization problems.	2 + 2	2

	Partial fractions.		
11	Sketching the curve of function. Binomial expansion.	2 + 2	2
12	Integrals of polynomial and exponential functions. Algebra of complex numbers.	2 + 2	2
13	Integrals of trigonometric functions. Complex numbers in polar form.	2 + 2	2
14	Definite Integral. Mathematical induction.	2 + 2	2
15	Final Exam		

5- Teaching and Learning Methods

5.1 Lectures

5.2 Tutorials

6- Teaching and Learning Methods of Disables

Nothing

7- Student Assessment

a- Student Assessment Methods

- Assignments to assess knowledge and general skills.
- Quiz to assess knowledge, intellectual and professional skills.
- Midterm exam to assess knowledge, intellectual and professional skills.
- Final exam to assess knowledge, intellectual and professional skills.

b- Assessment Schedule

Methods of Assessment	Grading / Marks	Weighting %	Outline Details
Quiz	10	6.5 %	Week: 10
Assignments	10	6.5 %	Week: All
Mid-Term Exams	30	20 %	Week: 8 1 hour
Final Exam	100	67 %	Week 15: 3 hours

8- List of References

a- Course Notes	• Lectures In Mathematic, Differential Calculus, Mohamed H. Eid, Benha Univeristy, 2013. • Lectures In Mathematic, Algebra, Mohamed H. Eid, Benha Univeristy, 2014.

b- Required Books (text books)	• Calculus, 6th Edition, James Stewart, Thomson Brooks / Cole, U.S.A, 2008. • The Theory of Matrices, 2nd Edition, P.Lancaster and M.Tismenetsky, Academic Press, London, New York, 1985.
c- Recommended Books	• Advanced Calculus With Applications In Statistics, 2nd Edition, A.I. Khuri, John Wiley & Sons, Inc., New Jersey, 2003.
d- Periodicals, web sites,…	www.intmath.com www.thomsonrights.com

Course Coordinator : Dr. Mohamed Husien Eid and Dr. Fathy Abdelsalam

Head of Department: Prof. Dr. Said Adballah

Model No.11A

Course Specifications : Mathematics (1-A)

University: Benha University
Faculty: Faculty of Engineering – Shoubra
Department: All

Matrix of Knowledge and Skills of the Course

No.	Topics	Week no.	Knowledge and Understanding	Intellectual Skills	Practical and Professional Skills	General and Transferable Skills
1	Elementary functions: exponential, logarithmic, trigonometric functions and polynomial. Matrices and Algebra of matrices.	1, 2	a.1, a.2, a.3, a.4	b.1, b.2 , b.3, b.4	c.1, c.2, c.3, c.4, c.5, c.6	
2	Derivative of elementary functions. Eigenvalues and eigenvectors of matrices.	3, 4	a.1, a.2, a.3	b.1, b.2	c.1, c.2, c.3, c.4, c.5, c.6	
3	Maximum and minimum values, Curve of function. Linear systems.	5, 6	a.3, a.4	b.3, b.4	c.1, c.2, c.3, c.4, c.5, c.6	d.1, d.2, d.3, d.4
4	Applications of derivative : Mean value theorem, Taylor's expansion, L'Hpoital rule, Optimization problems. Theory of equations.	7, 8, 9	a.1, a.2	b.1	c.1, c.2, c.3, c.4, c.5, c.6	d.1, d.2, d.3, d.4
5	Indefinite and definite Integrals. Partial fractions, Binomial expansion, Complex numbers, Mathematical induction.	10, 11, 12, 13	a.1, a.2, a.3, a.4			d.1, d.2, d.3, d.4

Course Coordinator : Dr. Mohamed Husien Eid and Dr. Fathy Abdelsalam

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Matrix of Course Aims and ILO's

Course Title: Mathematics (1- A)

Course Code: EMP011

Teaching Hours: Lecture: 4 Tutorial: 2 Practical: 0 Total: 6

Major or minor element of program: Major

Program on which the course is given: All

Department offering the course: Engineering Mathematics and Physics Department

Academic year / level: 2016-2017 Preparatory Year / First Semester

Date of specifications approval: 16/3/2010

No.	Topics	Knowledge	Intellectual Skills	Professional Skills	General Skills
2.1	Provide the students the concepts of functions and linear algebra and their applications in engineering.	a.1, a.2, a.3 , a.4	b.1, b.2, b.3, b.4	c.1, c.2, c.3, c.4, c.5, c.6	
2.2	Teach the students the rules of limits, derivative, indefinite integral and tracing curves of trigonometric, exponential, logarithmic functions and polynomials.	a.1, a.2, a.3	b.1, b.2	c.1, c.2, c.3, c.4, c.5, c.6	
2.3	Teach the students the algebra of matrices, solving linear systems, binomial theorem, theory of equations and algebra of complex numbers.	a.3, a.4	b.3, b.4	c.1, c.2, c.3, c.4, c.5, c.6	
2.4	Apply mathematical techniques for modeling, solving and analyzing real problems.	a.1, a.2	b.1	c.1, c.2, c.3, c.4, c.5, c.6	d.1, d.2, d.3, d.4

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