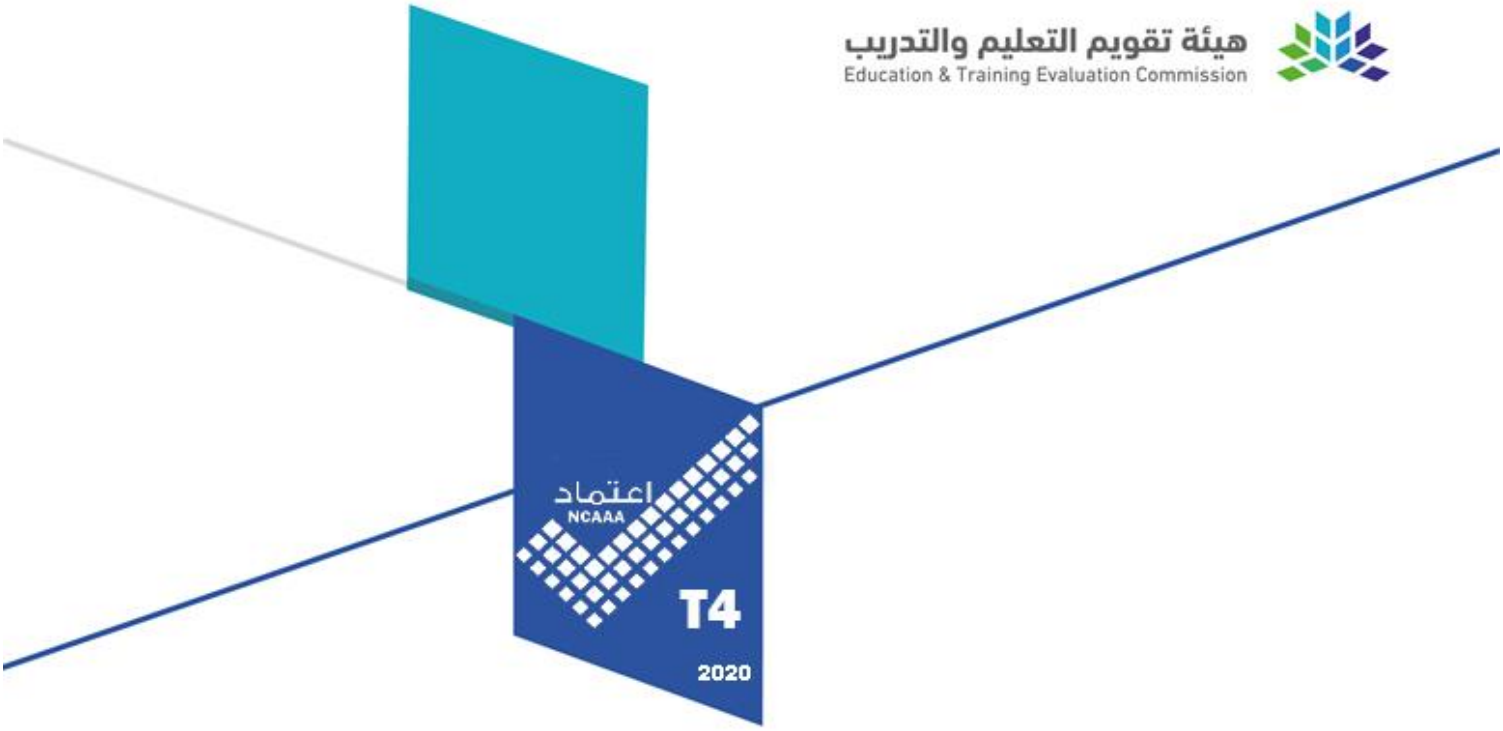
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Vector Analysis**
Course Code:	**MATH 3350**
Program:	**Bachelor of Science in Mathematics**
Department:	**Mathematics**
College:	**College of Science and Humanities Alkharj**
Institution:	**PRINCE SATTAM BIN ABDUALZIZ UNIVERSITY**

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A. Course Identification

1. Credit hours:	4(4,0,0)
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	Level 8
4. Pre-requisites for this course (if any)**:**	Math 3320
5. Co-requisites for this course (if any)**:**	None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	04	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	48
2	**Laboratory/Studio**	0
3	**Tutorial**	0
4	**Others** (specify) – (5 Office Hours in a week)	60
	Total	108

B. Course Objectives and Learning Outcomes

1. Course Description

Vectors – Dot Product – Cross Product – Parametric Curves – Velocity – Acceleration – arc length – Curvature – Torsion – Level Curves – Partial Derivatives – Tangent Plane – Scalar Field and the Gradient – Directional Derivative – Lagrange Multipliers – Double and Iterated Integrals – Double Integrals in Polar Coordinates – Applications – Change of Variables – Triple Integrals in Rectangular and Cylindrical Coordinates – Spherical Coordinates – Gradient Fields and Path Independence – Conservative Fields and Potential Functions – Green's Theorem – two dimensional Curl (Vorticity) – Simply connected Regions – Flux Form of Green's Theorem – Vector Fields in 3- D- space – Surface Integrals and Flux – Divergence Theorem – Line Integrals in Space – Exactness – Potential – Stokes' Theorem – Conservation Laws – Heat/Diffusion Equation – Maxwell's Equations.

2. Course Main Objective

- The Course is aimed at helping the students acquire knowledge on Vector Algebra, Vector Calculus (Differentiation and Integration), associated theories and its applications

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recall vector and scalar quantities	K1
1.2	Understand the concept of Paritial Derivatives	K3
2	**Skills :**	
2.1	Able to find partial derivatives of Vector Valued functions and Solve problems involving Heat/Diffusion Equations, Maxwell equations	S1
2.2	Evaluate double and triple integrals of vector valued functions	S2

C. Course Content

No	List of Topics	Contact Hours
1	Review of Elementary concepts of Vector Algebra	4
2	Velocity, Accelearation, Arc length, Curvature	3
3	Partial Derivatives, Tangent Plane, Gradient and Scalar Fields	4
4	Directional Derivatives – Lagranges Multipliers	3
5	Double and Iterated Integrals	4
6	Double Integrals in Polar Coordinates and Applications	4
7	Change of Variables	4
8	Triple Integrals in Rectangular and Cylindrical Coordinates	3
9	Gradient Fields – Path Independence – Conservative fields	4
10	Green's Theorem – Vector Fiedls in 3D Space	3
11	Surface Integrals and Flux	4
12	Divergence Theorem – Line Integrals in Space	3
13	Exactness – Potential – Stokes Theorem	4
14	Conservation Laws – Heat Equations – Maxwell's Equations	3
Total		48

D. Teaching and Assessment

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

Code	Course Learning Outcomes	TeachingStrategies	AssessmentMethods
1.0	**Knowledge and Understanding**		
1.1	Recall vector and scalar quantities	1. Class Room Lectures 2. Interactive sessions 3. Exclusive Office Hours for clearing doubts in small groups	1. Two Internal Exams 2. At least two Quiz 3. End Semester Exam
1.2	Understand the concept of dot and cross product of vectors		
2.0	**Skills**		
2.1	Able to find partial derivatives of Vector Valued functions and Solve problems involving Heat/Diffusion Equations, Maxwell equations	1. Application oriented exercises 2. Homework to improve the analytical skills	1. Homework 2. Assignments 3. Quiz 4. Exams
2.2	Evaluate double and triple integrals of vector valued functions		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid Term Exam I	6	20%
2	Quiz	4 & 10	5%
3	Mid Term Exam II	13	20%
4	Continuous Assessment – Homework, Assignment, Attendance etc.	--	5%
5	End Semester Exam	15	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 :

1. Exclusive Office Hours – 5 Hours per week
2. Academic Advising for Students – 1 Hour per week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	- R. C. Hibbeler, "Engineering Mechanics: Statics And Dynamics", *Upper Saddle River, NJ.: Prentice Hall, 2001, ISBN: 0130200*69. L. Bostock, S. Chandler, "Applied Mathematics", Stanley Thornes (Publisher) Ltd. 2002
Essential References Materials	NIL
Electronic Materials	NIL
Other Learning Materials	Lecture Notes Prepared by the Department of Mathematics

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with Smart boards with seating facilities for at least 30 students
Technology Resources (AV, data show, Smart Board, software, etc.)	Smartboard, Internet Connection for Blackboard Computer Lab with software packages such as Excel etc.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Nil

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course Evaluation	Quality Assurance Committee of the Department	Review all the course documents and course report
Peer Review	Senior Faculty Members / HoD	Attend the lecture and fill in a form
End Semester online survey	students	online survey

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

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	