

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Calculus(2)
Course number	MATH1402
Faculty	
Department	
Course type	College Needs
Course level	1
Credit hours (theoretical)	3
Credit hours (practical)	1
Course Prerequisites	

Course Objectives

- 1 - study and recognize other important classes of functions as logarithmic functions, exponential functions and hyperbolic functions
- 2 - learn basic techniques of integration for functions with one variable
- 3 - be prepared to take more advanced courses in mathematics
- 4 - understand infinite series and their convergence and divergence criteria and know how they can be used in approximation techniques
- 5 - enable student to apply his knowledge to solve practical problems they encounter in physical sciences and engineering

## Intended Learning Outcomes

<b>Knowledge and Understanding</b>	<ul style="list-style-type: none"><li>* study and recognize other important classes of functions as logarithmic functions, exponential functions and hyperbolic functions</li><li>* use integration by parts, trigonometric substitution, partial fraction to evaluate definite and indefinite integrals</li><li>* define an improper integral and evaluate some classes of improper integrals by the concepts of limits, convergence and divergence</li><li>* determine convergence or divergence of sequences and series</li><li>* use Taylor and Maclaurin series to represent functions</li><li>* use Taylor and Maclaurin series to integrate functions</li></ul>
<b>Intellectual Skills</b>	<ul style="list-style-type: none"><li>* develop and strengthen problem solving</li><li>* understand concepts rather than mimic techniques</li><li>* learn to think about problems mathematically and to solve problems independently</li></ul>
<b>Professional Skills</b>	<ul style="list-style-type: none"><li>* be able to state and explain basic calculus definitions and theorems</li><li>* understand the relationship between the process and its corresponding inverse</li><li>* understand the meaning and important applications of the concepts</li><li>* have a clear understanding of the ideas of calculus as a foundation for subsequent courses in mathematics</li></ul>
<b>General Skill</b>	<ul style="list-style-type: none"><li>* hone the ability to do reality checks on calculations</li><li>* become effective communicator and team player</li><li>* learn to work together productively and learn to be cooperative</li><li>* be able to communicate mathematics</li></ul>

## Course Contents

1 - Logarithmic and Exponential Functions : invers functions- the natural logarithmic function - the natural exponential function - integration - general logarithmic and exponential functions
2 - Inverse Trigonometric and Hyperbolic Functions: inverse trigonometric functions- derivatives and integrals- hyperbolic functions - inverse hyperbolic functions
3 - Techniques of integration: integration by parts - trigonometric integrals - trigonometric substitutions - integrals of rational functions- integrals involving quadratic expressions - miscellaneous substitution
4 - Indeterminant forms and Improper Integrals: indeterminant forms and l Hopitals rule - integrals with infinite limits of integration - integrals with discontinuous integrands
5 - Infinite Series: sequences - convergent or divergent series - positive term series tests- the ratio and root test- alternating series and absolute convergence- power series- power series representation of functions- Maclaurin and Taylor series- the binomial series

## Teaching and Learning Methods

1 - lectures
2 - discussion

## Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
first midterm exam	after 6 weeks of study	25%
second midterm exam	after 10 weeks of study	25%
final exam	at the end of the semester	50%

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## Books and References

Essential books	Calculus, fifth edition; Earl W. Swokowski; Pws-Kent Puplisher Company, 1991
Recommended books	Calculus with analytic geometry- Robert Ellis & Denny Guhick, 1996 1996, Calculus- Thomas Finny; Addison-Wiesely Puplishing Company, Inc
Other References (Periodical, web sites, .... etc.)	all calculus books

## Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
inverse functions- the natural logarithmic function- the natural exponential function- integration- general exponential and logarithmic function	1-2	<ul style="list-style-type: none"> <li>* study the inverse of the functions and recognize other important functions</li> <li>* integrate functions with certain kinds</li> <li>* apply the procedures of logarithmic differentiation accurately</li> </ul>	introduce mind to the scientific method of analysis	<ul style="list-style-type: none"> <li>*be able communicate mathematics</li> <li>* help to do reality checks on calculations</li> </ul>	<ul style="list-style-type: none"> <li>* work in cooperative learning groups</li> <li>* use mathematics to understand the world around him</li> </ul>
-Inverse trigonometric and hyperbolic functions inverse trigonometric functions- derivatives and integrals- hyperbolic functions- inverse hyperbolic functions	3-5	recognize, differentiate and integrate trigonometric and hyperbolic functions	<ul style="list-style-type: none"> <li>* hone the ability of the student to do reality checks on calculations</li> <li>* provide students with an understanding of mathematical thought and knowledge</li> </ul>	<ul style="list-style-type: none"> <li>*be able to state and explain basic calculus definitions and theorems</li> </ul>	<ul style="list-style-type: none"> <li>* be able to communicate mathematics</li> <li>* work in cooperative learning groups</li> </ul>
integration by parts- trigonometric integrals- trigonometric substitutions- integral of rational functions- integral involving quadratic expressions- miscellaneous substitutions	6-8	study the detailed methods of integration to evaluate definite and indefinite integrals	<ul style="list-style-type: none"> <li>* provide student with an understanding of mathematical thought and knowledge</li> <li>* introduce mind to scientific methods of analysis</li> </ul>	understand the major problems of integral calculus	work in cooperative learning groups help to communicate mathematics
the indeterminate forms and improper integrals- integrals with infinite limits of integration- integrals with discontinuous integrands.	9-11	<ul style="list-style-type: none"> <li>* investigate limits with indeterminate forms</li> <li>* study improper integrals, their convergence and divergence</li> </ul>	<ul style="list-style-type: none"> <li>* be a problem solver</li> <li>* introduce mind to the scientific methods of analysis</li> </ul>	<ul style="list-style-type: none"> <li>* utilize these topics in many mathematical and physical applications</li> </ul>	<ul style="list-style-type: none"> <li>* work together productively and learn cooperatively</li> <li>* demonstrate and understand the important applications of the concepts</li> </ul>

Sequences- convergent or divergent series- positive term series and integral test- alternating series and absolute convergence- -power series- power series representation- Taylor series	12-15	<ul style="list-style-type: none"> <li>* determine whether the sequence converges or diverges</li> <li>* use convergence tests to determine convergence of infinite series</li> <li>*to use Taylor and Maclaurin series to approximate functions</li> </ul>	introduce mind to to the scientific methods of analysis	<ul style="list-style-type: none"> <li>* allow students to consider problems that cannot be solved using finite or conventional methods</li> <li>* prepare student to understand other courses of mathematics</li> </ul>	<ul style="list-style-type: none"> <li>* be a problem solver</li> <li>* learn cooperatively and to work together productively</li> </ul>
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