Course title: Applied Mathematics

Course code: NRE 113	**No. of credits:** 3	**L-T-P:** 33-12-0	**Learning hours:** 45

Pre-requisite course code and title (if any): For students who have not done courses in mathematics at 10+2/bachelor's level, a boot camp of 2 weeks will be held in the beginning of each academic session. Passing the course will be a mandatory requirement for such candidates, prior to registration for the programme.

Department: Natural and Applied Sciences

Course coordinator: Dr Amit Singh	**Course instructor:**

Contact details:

Course type: Audit	**Course offered in:** Semester 1

Course Description

The course is designed to serve as a foundation course in order to meet the requirement of mathematical knowledge in various subsequent courses offered in the master's degree program.

Course objectives

The course aims to build conceptual understanding and applied skills in said mathematical domains of Trigonometry, Algebra, Limits and Continuity, Calculus, and Differential equations. This is achieved inter-alia by engaging the students.

The student will be able to

- Appreciate quantitative aspects in decision making using deterministic and stochastic tools.
- Comprehend the key concepts and methods of said domains.
- Develop the problem solving approach in the said domains.

Course content

Module	**Topic**	**L**	**T**	**P**
1.	Introduction: Quantitative aspects in decision making, tools available–deterministic (analytical and numerical), stochastic processes	2		
2.	Review of trigonometry, logarithms and quadratic equations	4		
3.	Linear algebra: Linear algebraic equations, solution methods, system conditioning, applications	6	3	
4.	Differential calculus: Relations and functions, limits and continuity, derivatives and differentiation, applications of differential calculus	7	3	
5.	Integral calculus: Indefinite integrals, methods of integration–integration by substitution, by parts, decomposition into sums etc, applications. Definite integrals, theorems of definite integrals and evaluation of definite integrals, applications	7	3	
6.	Differential equations: Ordinary differential equations, partial differential equations, applications	7	3	
	Total	**33**	**12**	

Evaluation criteria

- Tutorials/assignment: 20%
- Minor Test 1: 15%
- Minor Test 2: 15%
- Major Test: 50%

Learning outcomes

Upon completion of the course, the students will be able to

- Analyse problems in the said mathematical domains
- Formulate problems and it's solution in the said mathematical domains
- Establish a prospective and retrospective conceptual and application level connect between the said mathematical domains and their area of study.

Pedagogical approach

Classroom lectures, class exercises and tutorials

Materials

1. Mackenzie A. (2005) *Mathematics and Statistics for Life Scientists*, Taylor & Francis, New York.
2. Parkhurst D.F. (2006) *Introduction to Applied Mathematics for Environmental Science*, Springer, New York.

Suggested Readings

1. Prasad G. (2004) *Differential Calculus*, Pothishala Pvt. Ltd., Allahabad
2. Prasad G. (2004) *Integral Calculus*, Pothishala Pvt. Ltd., Allahabad.

Additional information (if any)

Student responsibilities

Attendance, feedback, discipline, guest faculty etc.