

Basic Math for Ph.D students in Conservation and Sustainability Studies at ATREE – Fall 2015

Instructor: Veena Srinivasan

Goal: To provide a review of the fundamentals of Mathematics needed to understand quantitative methods in environmental, social and ecological sciences.

Credit: 1 (16 hours) **Grading Type:** Pass/not pass

Office hours: Friday 2-3 pm

Who is exempt:

1. If students have successfully passed at least two Mathematics courses at the Bachelor's degree level, they do not need to take the Math pre-requisite course. They may claim exception by submit their official score documents to Madhavi.
2. Students obtaining a minimum GRE quantitative score of 660 (old) or 151 (new) (> 60th percentile rank) do not need to take that portion of the basic math course that includes the following topics covered in the GRE test - algebra, arithmetic, trigonometry, geometry, and mensuration. But students are required to take the pre-calculus and calculus portion of the class and pass it.
3. Any other student who feels that they have the basic level of competency in Mathematics required for ATREE's PhD programme and who would like to be exempt from the course may take an assessment test at the beginning of the semester or take the final assessment at the end of the semester to demonstrate minimum competency in Mathematics. After the first class, students who feel comfortable with the course material may take a Math Skill Assessment test on August 14th 2015, from 3-5 pm. Students who fare well (>75%) are exempt from the class. The test will only test concepts; any formulae/tables required will be provided. No prior preparation should be needed to pass the test.

Approach: Math is best learned through doing problems. So we will learn the basic concepts and skills by doing problems on each session. Please do read the relevant material or watch suggested relevant videos prior to each class. We will then go over the concepts and work on the problems together in class.

Textbooks/Source materials: I have set up a Google Drive folder – relevant course material will be uploaded there. Please do consult websites like Math is Fun and Khan Academy

Course Evaluation: There will be four quizzes, each worth 15% of the grade. 20% of the grade is class participation. 20% will be reserved for making an honest attempt to solve the problem sets. The course is Pass/Fail only. No letter grade is offered.

Integrity: Please **DO NOT** copy. Homework assignments are meant to be attempted individually. I won't fail anyone for getting things wrong, but I will not hesitate to fail people for blindly copying.

Schedule:

Week	Subject	Learning Goal
Session 1: Wed, 12-Aug	Introduction to Numeracy	Course Syllabus, Learning Goals, Unit conversion Precision and significant digits.
Session 2: Fri, 14 Aug		Powers, exponents, logs, radicals Applications.
Session 3: Wed, 19 Aug	Sets	Set Operations: Union, Intersection, Venn diagrams
Session 4: 21 Fri, Aug (20 min Quiz)		QUIZ 1: NUMBERS, UNITS AND SETS Permutation, Combination. Introduction to probability.
Session 5: Wed, 26 Aug	Geometry	Basics (parallel, perpendicular lines), Polygons, Perimeter, Area and Volume Calculations
Session 6: Wed, 2 Sep	Basic Algebra	How to create an equation, Solve 1, 2 variable equations. Graphical and algebraic solutions.
Session 7: Fri, 4 Sep		Quadratic equations, Numerical solutions to higher order equations.
Session 8: Wed 9 Sep	Trigonometry	Right triangle trigonometry, trigonometric identities, inverse trigonometric Functions, simple equations.
Session 9: Fri, 11 Sep (20 min Quiz)	Pre-Calculus	QUIZ 2: ALGEBRA AND TRIGONOMETRY What is a function? Interpret and plot functions.
Session 10: Wed, 16 Sep		Inverse of functions, composite functions, shifting and stretching axes, linear transformations.
Session 11: Fri, 18 Sep		Roots, Asymptotes, Domain and Range, Periodic Functions. Maxima, Minima, Rate of Change (Graphical only)
Session 12: Wed, 23 Sep (20 min quiz)	Calculus	QUIZ 3: PRE-CALCULUS Limits, Derivatives – what do they mean? How to interpret and solve.
Session 13: Fri, 25 Sep		Maxima and minima using calculus
Session 14: Wed, 30 Sep		Applications of derivatives, optimization
Session 15: Wed, 7 Oct		Integration – intuition, summation, graphical understanding. Integration of simple polynomial functions.
Session 16: Fri, 9 Oct		QUIZ 4: CALCULUS More integration.