Course Outline

Course Title: Basic Science (Math & Physics)

Course Code: BSC 201

Session: Fall 2025

Department of Mathematics and Physics

Instructor: Dr. Alamgir Kabir(AK)

Office: SAC 1171

Email:Alamgir.kabir02@northsouth.edu (Phone 01711978225)

Class Times: 8:00am-9:30 am, Thursday& Saturday, each week

Class Room: SAC 315

Office Hours: Thursday 11:40 am - 1:20 pm and Saturday 11:40 am - 01:20 pm

Required Textbook: **1. Pre-calculus, 9th Edition, by Michael Sullivan**

2. Fundamental of Physics, 10th extended edition, by Resnick Halliday and Walker

Mark Distribution:

Class Attendance	Class Assessment / Assignments	Quiz	Mid Term	Final
05%	10%	20%	30%	35%

Course Description:

This course comprised of precalculus and fundamental physics. It is designed to introduce the rule of different types of functions and their graphs in mathematics. In the physics part the students will get the idea about wave mechanics, thermodynamics and optics. The key concepts to be developed throughout the semester are:

- Cartesian coordinate systems, graph of two variables, lines, and circle.

- Introduction to functions and graph of different types of function

- Linear functions, quadratic functions, exponential functions and logarithmic functions.

- Oscillations and Waves. Architectural acoustics, acoustic inside a building

- Thermal systems and variables, Energy conservation in a thermal system, Laws of Thermodynamics, kinetic theory of gas, heat insulation of a building

- Optics: interference and diffraction, optics of a building

Course Objective:

- Understand and solve the mathematical problems related to cartesian coordinate system.
- Identify the equation of a line and a circle and analyze the equations to find their intercepts.
- Apply the equations of lines and circles to solve the real-world problems in architecture.
- Understand and apply the equation and graph of a functions
- Understand and apply the graph of quadratic functions without finding the point values.
- Understand and apply the exponential and logarithmic functions
- Understand the physics problems related to wave mechanics and use the wave mechanics in designing of architectural acoustics.
- Understand the importance of thermodynamics and apply the law of thermodynamics to the real-world problems
- Understand and apply the physics of optics in architectural design.

Student Learning Outcomes:

After successful completion of the course, a student will achieve certain skills, and these skills are classified as the Course Learning Outcome (CLO)s according to Bloom's Taxonomy. For this course, the CLOs along with their assessment methods and tools are the following:

Mapping of the Course Outcomes

CLO-#	Outcome types	Bloom's Taxonomy level	Delivery method	Assessment tools
CLO-1	Remembering and apply the distance and midpoint formula, Graph the equation of two variables, lines, and circles	C1, C2, C3, P1	Lecture, Demonstration and Discussion	Quiz, Exam
CLO-2	Identify and apply the knowledge of functions.	C3, C4, P2, P3	Lecture, Demonstration and Discussion	Quiz, Exam
CLO-3	Apply the rules of linear and quadratic function to solve a mathematical problems.	C4, C5, P3, P4	Lecture, Demonstration and Discussion	Quiz, Exam
CLO-4	Understanding and the use of exponential and logarithmic function..	C5, C6, P3, P5	Lecture, Demonstration and Discussion	Quiz, Exam
CLO-5	Understand and apply the physical problems involving wave mechanics, thermodynamics and optics.	C2, C3, P1, P4	Lecture, Demonstration and Discussion	Quiz, Exam
CLO-6	Use the understanding of CLO-5 and connect to the advanced level (or next level)	C6, P1	Lecture, Discussion	Quiz, Assignment

Cognitive domain (knowledge-based): C 1: Knowledge, 2: Comprehension, 3 Application, 4 Analysis, 5: Synthesis, 6: Evaluation

The affective domain (emotion-based): A 1: Receiving, .2: Responding, 3: Valuing, 4: Organizing, 5: Characterizing

The psychomotor domain (action-based): P 1: Perception, 2: Set, 3: Guided response, 4: Mechanism, 5: Complex overt response, 6: Adaptation, 7: Origination.

Lecture Details: The following is a tentative outline of the lecture details. It may change if we need.

Lecture #	Topics to be covered
Lec-1	Cartesian Coordinate System, The distance and midpoint formula, Graphs of Equation of Two Variables, Intercepts and Symmetries
Lec-2	Slope, Equation of a line, parallel line and perpendicular line
Lec-3	Equation of a circle, tangent of a circle, graph of a circle
Lec-4	Idea of a function, Graph of a function, Properties of a function, Library of Functions.
Lec-5	Piecewise-defined function,
Lec-6	Graphing techniques of a function by transformation, Properties of a linear and quadratic function, Quadratic Models; Building Quadratic functions from data
Lec-7	Inequalities involving quadratic functions
Lec-8	Composite functions, One-to-one functions; Inverse functions
Lec-9	Exponential functions and Logarithmic functions
Lec-10	Properties of logarithms
Lec-11	Logarithmic and exponential equations

Lec-12	Mid Term Exam
Lec-13	Simple harmonic motion, Free and forced vibration, Resonance.
Lec-14	Waves motion, Types of waves, some definitions connected with wave motions, Expression for a plane progressive wave, The intensity of waves, Standing waves
Lec-15	Acoustics measurement, Architectural acoustics, Determination of absorption coefficient, Requisites of a good acoustics, reverberation
Lec-16	What is light, Interference of light, conservation of light energy, Young double slit experiments.
Lec-17	Diffraction of light, diffraction by single slit, double slit, and diffraction grating.
Lec-18	Polarization of light. Application of polarized light.
Lec-19	Concept of heat and temperature, Measurement of heat
Lec-20	Work and heat, First law of thermodynamics, Isothermal, and adiabatic process, Diathermal and adiabatic wall.
Lec-21	Thermal conductivity, thermal resistance, Transmission of heat, conduction, convection and radiation, Black body radiation. Ventilation.
Lec-22	Black body radiation. Ventilation.
Lec-23	Kinetic theory of gases, The molecular specific heat of ideal gases.
Lec-24	Maxwell's law of equipartition of energy, Degrees of freedom.

Teaching Policies:

Attendance: Class attendance is very important since by missing a class you may miss a quiz or a mid-term exam that may be equivalent to a failed quiz or exam and it carry 5% weight of your grade, unless the absence is appropriately justified and excused. Arriving 15 minutes late will automatically marked as absent. Two late arrivals is equivalent to one absence.

Missed Work Policy: Missed work will only be permitted for University-sanctioned activities and authentic medical or family reasons. Authentic justifying documentation must be provided in every case (and in advance for University-sanctioned activities). Note that for this class, the dropped exam is the

default policy for a missed exam for any reason. This is also the policy for homework. There will be no make-up for any mid-term exams.

Quiz:There will be three quizzes, best two of them will be averaged and counted as 15% of the total marks. If you miss any quiz, it will count at the lowest score, and will be dropped. So no make-up for any quizzes.

Conduct: Please turn off your cell phones before entering class, and please don't have any sidebar

conversations during class. There will be ample opportunity for you to talk during class at certain times. However, it is imperative that the class is quiet at all other times so that your fellow students are not distracted. I encourage you to raise your hand and ask relevant questions in class.

Collaboration Policy: Collaboration during exams is strictly prohibited. Exams will be of the usual closed-book, closed-notes type. On the other hand, in order to learn the materials, collaboration and group discussions outside of classroom is highly encouraged.

Email: It is very likely that I will need to send email to you regarding class logistics or material. My email address is ***alamgir.kabir02@northsouth.edu***.If you write an email to me, please identify yourself in it, and please include PHY107 in the subject line. No grade information will be provided via email. Please do not send excuses for absences via email.

Calculators and Laptops: A non-graphic, non-programmable calculator may be used for exams. While in the class any calculators can be used. You may take notes on a laptop. However, you may not use your laptop for Facebook, web surfing, or other activities not directly related to the class.

Questions:I favor an interactive classroom environment. Be prepared to ask and answer questions. If you are confused about a topic or would like to follow-up, please come to office hours.

ID: Picture ID is required in all tests and final exam.