



# Universe of Physical & Natural Sciences






**FLAME SCHOOL OF LIBERAL EDUCATION  
TRIMESTER 5 & 2  
SUBJECT: CONCEPTUAL PHYSICS 101  
COURSE INSTRUCTOR: PROF. HOSHIAR**

**Min.Class Size: 7**

**Max.Class Size: 32**

**LEARNING METHOD AND MATERIAL: Physics through Modeling Approach**

**A Synopsis Source of the Info: [modeling.asu.edu/modeling/synopsis.html](http://modeling.asu.edu/modeling/synopsis.html))**



The Modeling Method has been developed to correct many weaknesses of the traditional lecture-demonstration method, including the fragmentation of knowledge, student passivity, and the persistence of naive beliefs about the physical world.

**Coherent Instructional Objectives**

- To engage students in understanding the physical world by constructing and using scientific models to describe, to explain, to predict and to control physical phenomena.
- To provide students with basic conceptual tools for modeling physical objects and processes, especially mathematical, graphical and diagrammatic representations.
- To familiarize students with a small set of basic models as the content core of physics.
- To develop insight into the structure of scientific knowledge by examining how models fit into theories.
- To show how scientific knowledge is validated by engaging students in evaluating scientific models through comparison with empirical data.
- To develop skill in all aspects of modeling as the procedural core of scientific knowledge.

**Student-Centered Instructional Design**

- Instruction is organized into [modeling cycles](#) which move students through all phases of model development, evaluation and application in concrete situations -- thus promoting an integrated understanding of modeling processes and acquisition of coordinated modeling skills.
- The teacher sets the stage for student activities, typically with a demonstration and class discussion to establish common understanding of a question to be asked of nature. Then, in small groups, students collaborate in planning and conducting experiments to answer or clarify the question.
- Students are required to present and justify their conclusions in oral and/or written form, including a formulation of models for the phenomena in question and evaluation of the models by comparison with data.
- Technical terms and concepts are introduced by the teacher only as they are needed to sharpen models, facilitate modeling activities and improve the quality of discourse.
- The teacher is prepared with a definite agenda for student progress and guides student inquiry and discussion in that direction with "Socratic" questioning and remarks.
- The teacher is equipped with a taxonomy of typical student misconceptions to be addressed as students are induced to articulate, analyze and justify their personal beliefs.

**Text Book:** No one textbook will be adopted.



Today's pedagogy in science is finding it very difficult to restrict teaching from one selected book because it tends to limit thinking and material, while quite impressive, only to author(s) of one book. Therefore, the trend today is to combine information from various sources, prepare handouts and make them available to students.

**Reference Books:** Many reference book will be kept in my office, which students are free to check out for a period of no more than two days at a time.

**Reading material:** As per need, when it arises, reading assignments and material will be identified, either from the Internet or from the library, and will be shared with the students

**Grading Method** : The final grade will be drawn from the cumulative points a student will have accumulated at the send of the trimester. The following areas and activities will contribute to such total:

Unit Tests: 20% Quizzes: 10% Lab Reports: 20% Participation: 10 %

Research and Reports: 20% Mid-Term: 10% Final: 10%

**Field Trip** : To be determined later

**Budget of the Field Trip:**

## ASSESSMENTS

### Session wise Course Outline

SESSION	TOPIC
From 8/4 – 8/13	Observations, Significant Digits, The S.I. Method
From 8/14-8/23	Kinematics
From 8/25 -9/4	Statics and Dynamics
From 9/4	-9/13Simple Harmonic Motion
From 9/5 – 9/13	Sound
9/14- 9/26	Light and Optics
9/27-10/10	Electricity
10/11-10/20	Magnetism

### Disclaimer:

School Foundation policies regarding Submission of Assignments, group work & attendance are also followed & override any other instructions given in the class Please refer to the Students Manual



**FLAME SCHOOL OF LIBERAL EDUCATION**  
**TRIMESTER 5 & 2**  
**SUBJECT: CONCEPTUAL PHYSICS MECHANICS 201**  
**COURSE INSTRUCTOR: PROF.HIMANSHOO**

**Min.Class Size:** 7

**Max.Class Size:** 32

**LEARNING METHOD AND MATERIAL:** Physics though Modeling Approach

**A Synopsis Source of the Info:** [modeling.asu.edu/modeling/synopsis.html](http://modeling.asu.edu/modeling/synopsis.html)

---

The Modeling Method has been developed to correct many weaknesses of the traditional lecture-demonstration method, including the fragmentation of knowledge, student passivity, and the persistence of naive beliefs about the physical world.

#### **Coherent Instructional Objectives**

- To engage students in understanding the physical world by **constructing and using scientific models** to describe, to explain, to predict and to control physical phenomena.
- To provide students with **basic conceptual tools** for modeling physical objects and processes, especially mathematical, graphical and diagrammatic representations.
- To familiarize students with a small set of basic models as the **content core** of physics.
- To develop insight into the **structure** of scientific knowledge by examining how models fit into theories.
- To show how scientific knowledge is **validated** by engaging students in evaluating scientific models through comparison with empirical data.
- To develop skill in all aspects of modeling as the **procedural core** of scientific knowledge.

#### **Student-Centered Instructional Design**

- Instruction is organized into [modeling cycles](#) which move students through all phases of model development, evaluation and application in concrete situations -- thus promoting an integrated understanding of modeling processes and acquisition of coordinated modeling skills.
- The teacher sets the stage for student activities, typically with a demonstration and class discussion to establish common understanding of a question to be asked of nature. Then, in small groups, students **collaborate** in planning and conducting experiments to answer or clarify the question.
- Students are required to present and justify their conclusions in oral and/or written form, including a **formulation** of models for the phenomena in question and **evaluation** of the models by comparison with data.
- Technical terms and concepts are introduced by the teacher only as they are needed to sharpen models, facilitate modeling activities and improve the quality of discourse.
- The teacher is prepared with a definite **agenda** for student progress and **guides** student inquiry and discussion in that direction with "Socratic" questioning and remarks.
- The teacher is equipped with a **taxonomy** of typical student misconceptions to be addressed as students are induced to articulate, analyze and justify their personal beliefs.





FLAME SCHOOL OF LIBERAL EDUCATION

TRIMESTER 5 & 2

SUBJECT :Introduction to Probability 201

SUBJECT CODE : Intermediate Level course

COURSE INSTRUCTOR : **Prof. Santosh Kumar Kudtarkar**

Min Class : 7

Max Class : 32

### **Aim:**

This course is about chance, odds, randomness, risk, uncertainty. Probability gives us a measure of how certain we are about uncertainty. Uncertainty is a fact of life. It governs our lives in the sense of what we are and what we do. But our minds either by being wired the way they are by nature or by training, appear to be ill-suited for probabilistic thought. This course aims to introduce you to the rudiments of probabilistic reasoning. Aimed at the first or second year college student, it demands no more mathematical maturity than the ability to count, felicity with primary school arithmetic and importantly a willingness to learn and explore. The main focus of the course will be applications of simple probability concepts to the real world and if time permits, we will study some games of chance.

### **Topics:**

Sets: Basics. Venn diagrams. ( 5 sessions)

Rudiments of Counting: Fundamental rule of counting. Inclusion-Exclusion Principle.( 8 sessions)

**Probability: Definitions. Conditional Probability. Bayes Theorem. Probability distributions (Binomial, Poisson and Normal).( 17 sessions)**

### **Grading Components:**

Class participation: 20%

Quizzes: 40%

Assignments/Viva: 20%

End Exam: 20%

### **References:**

1]Ross: A first course in probability, Sixth edition, Pearson(2006)

2]Grinstead & Snell, Introduction to Probability, Lecture Notes

3]Paolella: Fundamental Probability, Wiley (2006)

### **Disclaimer :**

School Foundation policies regarding Submission of Assignments, group work & attendance are also followed & override any other instructions given in the class. Please refer to the Students Manual.



**FLAME SCHOOL OF LIBERAL EDUCATION  
TRIMESTER 5 & 2  
SUBJECT: CALCULUS INTERMEDIATE  
COURSE INSTRUCTOR: PROF. RENU DHADWAL**

**Min.Class Size : 7**

**Max.Class Size : 32**

**LEARNING METHOD AND MATERIAL**

**Aim:**

Calculus is a subject whose knowledge is essential in several fields like finance, business, economics, physical and biological sciences. Mathematical modeling involves a good grasp of the subject. This course is meant for students who have done Mathematics in their high school and have scored at least 60% in the subject. It is meant to give a strong grounding in the basic concepts of Calculus which include limits, continuity, differentiation, integration and applications.

**Text Book:**

CALCULUS 11<sup>th</sup> edition. Authors: Thomas, Finney, Weir, Giardano. Publisher: Addison-Wesley

**Reference Books:**

1. An Introduction to Calculus by Serge Lang  
Calculus by Tom Apostol

**Reading material:**

**Students expected to make notes in the class.**

**Grading Method** : Instructor's Discretion

**Field Trip** : NA

**Budget of the Field Trip** :NA

**ASSESSMENTS**

CP 20%

Assignments 10%



Class tests                      30%

End Term                        40%

**Session wise Course Outline**

<b>SESSION</b>	<b>TOPIC</b>
1-5	Introduction to Calculus, functions, limits, continuity, continuous functions
6-9	Derivative as slope of a function, differentiation, differentiability, rules of differentiation, chain rule , differentiation of logarithm and exponential functions
10-14	Monotonic functions, maxima, minima, points of inflection, curve sketching
15-18	Inverse functions, derivatives of inverse functions, mean value theorem, applications of derivatives
19-20	Introduction to differential equations
21-24	Introduction to integral calculus, definite and indefinite integrals, integration by parts, integration of trigonometric functions
25-30	Application of integration: Finding area between two curves, finding surface areas and volumes

**Disclaimer :**

School Foundation policies regarding Submission of Assignments, groupworks & attendance are also followed & override any other instructions given in the class Please refer to the Students Manual



FLAME SCHOOL OF LIBERAL EDUCATION  
TRIMESTER 5 & 2  
SUBJECT: Biology 101  
COURSE INSTRUCTOR: Prof. SHWETA RANA

Min.Class Size: 7

Max.Class Size: 32

### LEARNING METHOD AND MATERIAL

Books ,Course related Charts &Diagrams and doing Practicals in the Laboratory,Class

Assignments ,Presentations

#### Grading Method :

Assessment will be done on the basis of Class Tests{20% weightage},Assignments{20%},Laboratory Practicals{30%} , Trimester End Exam{30%}.

### ASSESSMENTS

#### Session wise Course Outline

SESSION	TOPIC
1 <sup>st</sup> & 2 <sup>nd</sup> week	Biological diversity: diversity of plants and animals .Important characteristic features of life forms .Basis of classification, hierarchy, scientific naming.
3 <sup>rd</sup> & 4 <sup>th</sup> week	Major groups of plants and animals :their salient features
5 <sup>th</sup> week	Organization of organisms: cell as basic unit of life, prokaryotic cell.
6 <sup>th</sup> week	Eukaryotic cells [plant and animal cell], cell organelles and their basic structure and function.
7 <sup>th</sup> ,8 <sup>th</sup> &9 <sup>th</sup> week	Levels of organization-cells, tissues, organs, organ systems, organism.
10 <sup>th</sup> week	Photosynthesis in plants

#### **Disclaimer :**

School Foundation policies regarding Submission of Assignments, groupworks & attendance are also followed & override any other instructions given in the class Please refer to the Students Manual



FLAME SCHOOL OF LIBERAL EDUCATION  
TRIMESTER 5 & 2  
SUBJECT : BIOLOGY 201  
COURSE INSTRUCTOR: Prof. SHWETA RANA

Min.Class Size : 7

Max.Class Size : 32

### LEARNING METHOD AND MATERIAL

Books ,Diagrams and related lab work , Class Assignments , Presentations

**Text Book:** Text book of Microbiology by Dubey and Maheshwari , Prescott

### Grading Method :

Assessment will be done on the basis of Class Tests {20% weightage}, Assignments{20%}, Laboratory Practicals{30%}, Trimester End Exam{30%}.

### ASSESSMENTS

#### Session wise Course Outline

SESSION	TOPIC
1 <sup>st</sup> week	Microbial world introduction
2 <sup>nd</sup> & 3 <sup>rd</sup> week	Structure of a bacterial cell, its features and functions
4 <sup>th</sup> week	Nutrition , mode of transport of nutrients
5 <sup>th</sup> week	Microbial growth and the growth curve
6 <sup>th</sup> & 7 <sup>th</sup> week	Association of plants and microorganisms
8 <sup>th</sup> week	Fungi: the yeasts and molds
9 <sup>th</sup> & 10 <sup>th</sup> week	Importance of microorganisms

#### **Disclaimer :**

School Foundation policies regarding Submission of Assignments, groupworks & attendance are also followed & override any other instructions given in the class Please refer to the Students Manual



FLAME SCHOOL OF LIBERAL EDUCATION

TRIMESTER 5 & 2

SUBJECT: **Statistics 101 (Introduction to Statistics – I)**

COURSE INSTRUCTOR: Prof. AKSHAY DHUME

Min Class Size: 7

Max Class Size: 32

## LEARNING METHOD AND MATERIAL

### Overview

Statistics 101 is the first course in Statistics. The course aims at familiarizing participants to basic tools in Statistics. I plan to introduce some basic tools in Excel while discussing some of the topics.

It is advised that you complete Stats 101 (Stats 201) before opting for Research Methodology, and Economics or Psychology majors. It is recommended that students opting for Statistics 101 follow it up with Statistics 201 at the earliest time that it is offered.

### Text Book:

Business Statistics – Sharma, J.K.

### Reference Books:

### Reading material:



Grading Method : Instructor's Discretion

Field Trip : N/A

Budget of the Field Trip: N/A

### ASSESSMENTS:

The student will be assessed in the following manner:

Class Participation: 20%

Test/Assignment: 20%

Midterm: 20%

Final: 40%

### Session wise Course Outline

SESSION	TOPIC
1	Introduction
2	Introduction
3	Data Classification, Tabulation, and Presentation
4	Data Classification, Tabulation, and Presentation
5	Measures of Central Tendency
6	Measures of Central Tendency



7	Measures of Central Tendency
8	Measures of Central Tendency
9	Measures of Dispersion, Skewness, and Kurtosis
10	Measures of Dispersion, Skewness, and Kurtosis
11	Measures of Dispersion, Skewness, and Kurtosis
12	Measures of Dispersion, Skewness, and Kurtosis
13	Measures of Dispersion, Skewness, and Kurtosis
14	Fundamentals of Probability
15	Fundamentals of Probability
16	Fundamentals of Probability
17	Fundamentals of Probability
18	Fundamentals of Probability
19	Test (Tentative) / Probability Distribution (Binomial, Poisson, Normal Distributions)
20	Probability Distribution (Binomial, Poisson, Normal Distributions)
21	Probability Distribution (Binomial, Poisson, Normal Distributions)
22	Probability Distribution (Binomial, Poisson, Normal Distributions)
23	Probability Distribution (Binomial, Poisson, Normal Distributions)
24	Probability Distribution (Binomial, Poisson, Normal Distributions)



25	Sampling and Sampling Distributions
26	Sampling and Sampling Distributions
27	Sampling and Sampling Distributions
28	Sampling and Sampling Distributions
29	Sampling and Sampling Distributions
30	Sampling and Sampling Distributions

### Disclaimer :

School Foundation policies regarding Submission of Assignments, groupworks & attendance are also followed & override any other instructions given in the class Please refer to the Students Manual