

Ph.D. Course Work, 2019 (24 credits)

**Paper I (100 marks, 12 credits)**

- ⊙ Research methodology + Research Ethics
- ⊙ Quantitative Analysis
- ⊙ Computer techniques
- ⊙ Review of literature-to be evaluated by Mentor

**Paper II - 60(written)+40(assignment)= 100 marks, 12 credits**

Module I ( 6 credits)

Module II ( 6 credits)

**Paper I**

**[ ALL Ph.D ENROLLED SCHOLARS IN 2019]**

**Venue: 29A for Theory Classes/ Computer Lab -5**

<b>Date/Day</b>	<b>Time/Subject/Professor</b>	<b>Time/Subject/Professor 1 P.M. – 3 P.M.</b>
14.11.2019 Thursday <b>9AM- 10AM</b>	<b>QUANTITATIVE ANALYSIS DR. A.CHANDRA ROOM -29A</b>	
15.11.2019 Friday <b>10 AM - 12 PM</b>	<b>QUANTITATIVE ANALYSIS DR. A.CHANDRA ROOM -29A</b>	<b>COMPUTER APPLICATIONS IN RESEARCH  DR. SAMRAT ROY</b>
16.11.2019 Saturday <b>10 AM- 12 PM</b>	<b>COMPUTER APPLICATIONS IN RESEARCH  DR. SAMRAT ROY</b>	
21.11.2019 Thursday <b>10 AM- 12 PM</b>	<b>COMPUTER APPLICATIONS IN RESEARCH DR. SAMRAT ROY</b>	<b>RESEARCH METHODOLOGY DR. SHIVAJI BANERJEE</b>
30.11.2019 Saturday <b>10 AM – 12 PM</b>	<b>COMPUTER APPLICATIONS IN RESEARCH  DR. SAMRAT ROY</b>	
02.12.2019 Monday		<b>INTEGRITY &amp; ETHICS IN RESEARCH DR. SHIVAJI BANERJEE</b>
06.12.2019 Friday <b>(12 P.M. – 2 PM)</b>	<b>COMPUTER APPLICATIONS IN RESEARCH  DR. SAMRAT ROY</b>	
07.12.2019 Saturday		<b>QUANTITATIVE ANALYSIS DR. A.CHANDRA</b>

## Course Work 2019 - Paper II

### COMMERCE

**Venue : Ph.D Conference Room**

Date	Lecture 1 (1.15- 2.15)	Lecture 2 (2.30-3.30)
18.11.19 (Monday)	DR. SANJIB KUMAR BASU	DR. SANJIB KUMAR BASU
19.11.19 (Tuesday)	INDIRECT TAX DR. PARTHA PRATIM GHOSH	TAX PLANNING DR. PARTHA PRATIM GHOSH
20.11.19 (Wednesday)	ACCOUNTING STANDARDS DR. SAMIR KUMAR LOBWO	FORENSIC ACCOUNTING DR. SAMIR KUMAR LOBWO
22.11.19 (Friday)	BALANCE SCORE CARD DR. AMITAVA ROY	SHAREHOLDER'S VALUE CREATION DR. AMITAVA ROY
23.11.19 (Saturday) <i>(11am onwards)</i>	FINANCIAL MARKETS & INVESTMENTS DR. SOHELI GHOSE <b>(11AM-12 PM)</b>	CAPITAL MOVEMENTS DR. SOHELI GHOSE <b>(12.15 PM-1.15 PM)</b>
25.11.19 (Monday)	CORPORATE SOCIAL RESPONSIBILITY DR. SUMONA GHOSH	CORPORATE SOCIAL RESPONSIBILITY DR. SUMONA GHOSH
26.11.19 (Tuesday)	MICROFINANCE DR. SREEMOYEE GUHA ROY	MICROFINANCE DR. SREEMOYEE GUHA ROY
27.11.19 (Wednesday)	INTERNATIONAL BUSINESS DR. SASWATI CHAUDHURI	SDGs and GENDER DR. SASWATI CHAUDHURI
28.11.19 (Thursday)	DR. SANJIB KUMAR BASU	DR. SANJIB KUMAR BASU
29.11.19 (Friday)	DR. SUMANA GUHA	DR. SUMANA GUHA
04.12.19 (Wednesday)	MARKET RESEARCH DR. SHIVAJI BANERJEE	QUALITATIVE TECHNIQUES IN RESEARCH DR. SHIVAJI BANERJEE
10.12.19 (Tuesday)	DR. SAMRAT ROY	DR. SAMRAT ROY

### Ph. D Course Work Lecture Schedule for Biotechnology, Nov-Dec 2019

Date	Lecture 1 (10:10 A.M – 11:10 A.M)	Lecture 2 (11:30 A.M – 12:30 P.M)
19.11.19.	ARC	ARC
21.11.19.	SR	SR
23.11.19.	Dr. Arun Bandyopadhyay (Guest Lecturer)	Dr. Arun Bandyopadhyay (Guest Lecturer)
25.11.19.	US	US
26.11.19.	AB	AB
28.11.19.	CB	CB
29.11.19.	JD	JD
30.11.19.	Dr. Sanghamitra Sengupta (Guest Lecturer)	Dr. Sanghamitra Sengupta (Guest Lecturer)
4.12.19.	RNC	RNC
9.12.19.	PD	PD
10.12.19.	SS	SS

Dr. Arindam Bhattacharyya (Guest Lecturer) has confirmed that he will be giving a lecture in the course work for 1 day; date to be intimated later.

### Class Schedule for Ph. D Course Work in Microbiology 2019

#### Elective 1 [E1] and Elective 2 [E2]

#### Paper-2

Date	No. of Classes	Teacher	Day	Time
18.11.19	2	KS	Monday	10.10 AM-12.10PM
19.11.19	2	SSC	Tuesday	10.10 AM-12.10PM
20.11.19	2	MM	Wednesday	10.10 AM-12.10PM
21.11.19	2	MMG	Thursday	10.10 AM-12.10PM
22.11.19	2	JG	Friday	10.10 AM-12.10PM
23.11.19	2	RM	Saturday	10.10 AM-12.10PM
25.11.19	2	AB	Monday	10.10 AM-12.10PM
26.11.19	2	AKM	Tuesday	10.10 AM-12.10PM
27.11.19	2	AKM	Wednesday	10.10 AM-12.10PM
28.11.19	2	KS	Thursday	10.10 AM-12.10PM
29.11.19	2	SSC	Friday	10.10 AM-12.10PM
30.11.19	2	MM	Saturday	10.10 AM-12.10PM
02.12.19	2	MMG	Monday	10.10 AM-12.10PM
04.12.19	2	RM	Wednesday	10.10 AM-12.10PM
05.12.19	2	AB	Thursday	10.10 AM-12.10PM
06.12.19	2	JG	Friday	10.10 AM-12.10PM
07.12.19	2	AKM	Saturday	10.10 AM-12.10PM

## Schedule for Ph.D. Course work in Physics

November 2019

Date	Names of Professors 10.10-12.10
18.11.19	Dr. Shibaji Banerjee
19.11.19	Dr. Saunak Palit
20.11.19	Dr. Subhankar Ghosh
21.11.19	Dr. Subhankar Ghosh
25.11.19	Dr. Shibaji Banerjee
26.11.19	Dr. Saunak Palit
27.11.19	Dr. Sarbari Guha
28.11.19	Dr. Saunak Palit
10.12.19	

### Syllabus for Course Work Physics –Paper II

Dr. Subhankar Ghosh – 4 lectures

1. Relativistic effects in Graphene

Dr. Saunak Palit – 6 lectures

1. Green functions in electrodynamics
2. Angular spectrum representation of optical fields
3. Propagation and focussing of optical fields.

Dr. Sarbari Guha - 2 lectures

1. Discussion on mega science projects of SKA and LIGO

Dr. Shibaji Banerjee- 4 lectures ( R. K.Hall Computer Lab)

1. Introduction to the symbolic computation

### **Syllabus of Quantitative Analysis**

**Lecture 1:** Types of data – Qualitative and Quantitative, Frequency and Non-Frequency.

**Lecture 2:** Basic Characteristics – Central Tendency, Dispersion, Skewness and Kurtosis.

**Lecture 3:** Characteristics of Bivariate data – Correlation and Regression.

**Lecture 4:** Basic concepts of Probability.

**Lecture 5:** Binomial, Poisson and Normal distributions and their basic properties.

**Lecture 6:** Introduction to the theory of inference.

**Lecture 7:** Tests of significance concerning a single population and comparison of two populations using Normal distribution.

### **Syllabus on Research Methodology and Ethics**

1. **Introduction:** Meaning, process and Types of Research. Research Design: Types of research design, Exploratory Studies, Descriptive Studies, constructing an appropriate Research Design. Hypothesis; types and criteria of a statistics. Testing of hypothesis.
2. **Source of Data:** Stimulus-Response Relationship, Forms of communication and data collection method, Nature of data under various settings. Maintaining the Data Quality under various Settings. Informal setting with written or verbal mode of communication, The Advantage and Disadvantage of the oral verbal method of communication, Content analysis, Observation, Secondary data. Errors in Data: Measurement Error Introduction, Error identification Problem of Outlier, Sources of Non sampling Error, Response and Non-Response error, other checks on data.
3. **Experimental Technique:** Types of Experiments, Setting for Experiments, Errors in Experiment, Experimental Design Notation, and Application of experimental Design.
4. **Methods of Data Collection:** Different methods of data collection. Questionnaire Method, Questionnaire, Types of Questionnaire, Wording of Questions, Observation, Verbal Testing.
5. **Measurement and Scaling Techniques:** Introduction, Measurement scales, Scaling of Techniques, More on Specialized Scales - Ordinal scale and Thurstone Scale.

6. **Report Writing:** Chapterisation, Quantitative write-up, Qualitative Write-up, Mixed Method Write-up. Referencing.

## **Syllabus for Microbiology Course Work- Paper II**

### **Unit 1: Introductory Microbiology, Biochemistry & Bioinformatics**

**No. of Classes: 32**

**Introductory Microbiology**-Introduction to various types of microbes, Growth patterns of bacteria; Control of Microbes; Isolation, identification, classification and characterization of bacteria. Types of cultural methods practiced in the laboratory. The Prokaryotic cell structure and function.

**Biochemistry & biochemical techniques**-Concept pH, buffer, basic concept of different biomolecules, Enzyme kinetics, Thermodynamics related to biology, concept of chromatography (HPLC, gas chromatography-GC-MS), NMR, ESR

**Bioinformatics**-Sequence alignment study with FASTA and BLAST, Protein structural classification by SCOP, CATH, Protein structure database PDB analysis, Phylogentic analysis.

### **Unit 2: Medical Microbiology, Immunology, Molecular Biology**

**No. of Classes: 32**

**Medical Microbiology**-The mechanism of pathogenesis in bacterial and viral diseases. Toxigenesis including mechanism of toxin production, structure and its mode of action. Types of toxins. Different mechanism by which host defence system is evaded by the pathogens.

**Immunology**-Roll of T cell & B cell. Antigen antibody interaction, inflammation, cytokines, Hypersensitivity, Vaccine, toxoid. Techniques like ELISA, Western blot analysis, Immunoprecipitation, Raising of antibody etc.

**Molecular Biology**- Nucleic acids and gene structure: Replication: Mechanism of DNA replication; mutations. Transcription and Post-transcriptional processing of mRNA  
Translation: Recombinant DNA techniques: Enzymes for manipulation of DNA; PCR; plasmid and vectors; cloning and screening strategies.

### **Unit 3: Agricultural, Environmental, Industrial Microbiology**

**No. of Classes: 32**

Rhizosphere and phyllosphere microorganisms and their interaction with plants. Mechanism of plant pathogenicity, Molecular basis of plant disease control. Beneficial association between plant and microorganisms. Biocontrol agents, SAR and ISR.

Biology of Hydrosphere, Biology of Atmosphere, Biology of Lithosphere

Biology of Industrial Microorganisms, Fermentation-types and processes.

## **Syllabus of Paper II -Commerce**

This paper is to be divided into three parts. Part I consists of theoretical foundation, Part II relates to the studies of the emerging areas of research and Part II contents are to be left to the discretion of the Course coordinator and the Ph. D Committee

### **PART I: THEORETICAL FOUNDATIONS**

For this part the following areas are to be covered:

- I Foundation of Accounting theory and its development stages
- II Corporate financial reporting and its regulations
- IV International financial reporting standards
- V Financial systems and Financial Market
- VI. Other Topics may be included (Depending on requirements)

### **PART II: STUDY OF EMERGING AREAS**

For this part following areas are to be covered:

- I Shareholders Value creation
- II Balanced Score Card
- III Contemporary issues in mergers and acquisitions
- IV Derivatives and their accounting
- V Strategic financial management
- VI Indian Financial Institutions
- VII Other Topics may be included (Depending on requirements)

### **PART III: APPLIED AREA**

For this part the study area will be decided by the Guides/ Course Coordinator and the Ph. D Committee and the areas should be specifically related to the topic of research

### **Syllabus for Course Work Physics –Paper II**

#### **Physics of Graphene**

1. The wonder material: structural aspects
2. Electronic transport
3. Test of relativistic Quantum Mechanics: emerging issue

## **1. Introduction**

1.1 Fabrication of Photonic Crystals

1.2 Applications of Photonic Crystals

## **2. Hamiltonian Formulation of Maxwell's equations (frequency considerations)**

2.1 Plane wave solutions for uniform dielectrics

2.2 Methods of quantum mechanics in electromagnetism

2.3 Properties of harmonic modes of Maxwell's equations

2.4 Symmetries of Electromagnetic eigenmodes

## **3. One dimensional photonic crystals – multilayer stacks**

3.1 Transfer matrix technique

3.2 Reflection from a finite multilayer (dielectric mirror)

3.3 Reflection from semi-infinite multilayer (dielectric photonic crystal mirror)