



# VIVEKANANDA COLLEGE

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

## DEPARTMENT OF BIOCHEMISTRY

### LIST OF ADD-ON COURSES

1	TECHNIQUES IN MOLECULAR BIOLOGY AND BIOSTATISTICS
2	TECHNIQUES IN BIOCHEMISTRY
3	CLINICAL DIAGNOSTICS TECHNIQUES

## IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 04 May 2018, to envisage, formulate, and design Add-On Courses, beyond the prescribed Curriculum.

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2018-19 Academic calendar, as per UGC guidelines.

B. It was decided that the Departments would be free to choose the Courses based on their (subject) relevance, practicality, and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course material in consultation with all teachers of the Department.

D. It was decided that each Department would design its format.

E. It was decided that the Departments would be encouraged to use and utilize their resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

  
24/5/18  
Coordinator  
IQAC  
Vivekananda College  
Kolkata-700 093



# VIVEKANANDA COLLEGE

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

Ref No. \_\_\_\_\_

Date 10/05/18

## Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2018-19.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

*H. K. Das*  
10/05/18

Principal  
Vivekananda College  
Thakurpukur, Kol-63

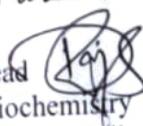
NOTICE

Date: 03/07/18

A departmental meeting will be held on 10/07/18 at 12:00 AM/PM in the departmental staff room. All teachers of the department are requested to attend the same.

**Agenda:**

- i) Introduction of add-on course on "Techniques in Biochemistry" for UG Part-2 and Sem-1 & 2 Honours students.
- 2) Introduction of add-on course on "Techniques in Molecular biology and Biostatistics" for Part-3 Hon. students.

Head   
Dept. of Biochemistry 3/07/18  
Vivekananda College, Kolkata

## DEPARTMENT OF BIOCHEMISTRY

Resolution of the departmental meeting held on 10/07/18 at 12:00 P.M.

### A) Teacher present:

1. Dibyendu Raj 10/07/18
2. Kalkati Sanyal 10/07/18
3. Nireesha San Banerjee 10/7/18
4. Subhasti Banerjee 10/7/18

### B) Minutes of the meeting

1. In the Departmental meeting dated 10/07/2018, the teachers of the UG Department of Biochemistry unanimously decided that:

a. The UG Part- 2/3 and/or Sem- 1 & 2, Honours students would be offered a 30-hour Add-on Course on "Techniques in Biochemistry and Tech. in Mol. bio & Stat" in Collaboration with IQAC, Vivekananda College from the session 20..18..- 20..19.

2. It was also decided in the meeting that Dr. Dibyendu Raj..... of Department of Biochemistry would be the Course Coordinator for the Add-On Course on "Techniques in Biochemistry and Tech. in Mol. bio & Statistics" for the Academic session 20..18..- 20..19

3. The Course structure of the Add-on course on "(Techniques in Biochemistry) and Tech. in Mol. bio & Statistics" submitted by Dr. Dibyendu Raj... and was accepted by all teachers of the department.

5. Certificates would be given to each student at the successful completion of the Course.

To,  
The Principal,  
Vivekananda College,  
Thakurpukur,  
Kolkata-63

SUBJECT: INTIMATION LETTER FOR ADD-ON COURSE

Respected Sir,

This is to inform you that to consider this letter as an intimation letter with reference to your letter dated 10/05/18..... A departmental meeting was held on 10/09/18 with reference to the notice provided by you and the IQAC coordinator dated 04/05/18..... We have introduced one Add-on course on Techniques in Molecular Biology and Biostatistics for the current session 2018-2019..... The Course structure of the Add-on course on Techniques in Molecular Biology and Biostatistics submitted by the Course coordinator Dr. Dibyendu Raj..... was accepted by all teachers of the department.

Sincerely,



Dr. Dibyendu Raj

H.O.D.

Department of Biochemistry

To,  
The Principal,  
Vivekananda College,  
Thakurpukur,  
Kolkata-63

SUBJECT: INTIMATION LETTER FOR ADD-ON COURSE

Respected Sir,

This is to inform you that to consider this letter as an intimation letter with reference to your letter dated 10/05/18..... A departmental meeting was held on 10/07/18 with reference to the notice provided by you and the IQAC coordinator dated 04/05/18..... We have introduced one Add-on course on "Techniques in Biochemistry" for the current session 2018-2019. The Course structure of the Add-on course on "Techniques in Biochemistry" submitted by the Course coordinator Dr. Dibyendu Raj was accepted by all teachers of the department.

Sincerely,

  
Dr. Dibyendu Raj

H.O.D  
Department of Biochemistry

[ADD ON COURSE]

**CERTIFICATE COURSE ON TECHNIQUES IN BIOCHEMISTRY**

3 Hrs./Week

Max. Time: 3Hrs.

Max. Marks: 50

Internal Assessment: 10

Total Marks: 60

**SECTION – A**

▪ **Introduction to Biological Research**

- Definition and significance of research in biology, Historical context and landmark studies, Overview of contemporary research areas in biology, Ethical considerations in biological research.

▪ **Formulating Research Questions and Hypotheses**

- Developing clear and testable research questions, constructing hypotheses in biological research, Significance of hypotheses in experimental design.

▪ **Experimental Design in Biology**

- Basics of experimental design, Control groups, variables, and replication, Randomized controlled trials in biology, Field studies and observational research.

▪ **Sampling Techniques in Biological Research**

- Overview of Random sampling, stratified sampling, and systematic sampling, Importance of representative samples, Sample size determination in biological studies

▪ **Data Collection Methods in Biology: A basic conceptual Approach**

- Measurement and Analysis in Biology, Quantitative and qualitative data in biology, Statistical analysis in biological research, Data interpretation and visualization techniques.
- Research Proposal and Project Presentation, Developing a research proposal in biology, Effective presentation skills for scientific research, Peer review and constructive feedback
- Protein Isolation- Methods of solubilization of proteins from their cellular and extra cellular locations- cytosolic, integral and peripheral membrane protein. Brief outline of the use of simple grinding methods, homogenization, ultrasonication, French press and centrifugation, sedimentation coefficient, stabilization of proteins during purification.
- Solubility of Proteins based on Protein Purification- Salting in and salting out (Ammonium sulphate fractionation), solvent fractionation, Isoelectric precipitation), lyophilization, Dialysis, Ultrafiltration (Principle and application), Ultracentrifugation

- Chromatographic Separation: partition coefficient, phase systems, liquid and gas chromatography, performance parameters: retention, resolution, basis of peak broadening, peak symmetry, Principle, Application, Advantages and Disadvantages, limitation for different modes of chromatography- Partition Chromatography (Paper Chromatography, hydrophobic interaction/ reverse phase chromatography), Adsorption Chromatography; Thin Layer Chromatography, Gel filtration chromatography, affinity chromatography, Ion-exchange chromatography, Demonstration of High Performance Liquid Chromatography (HPLC), brief concept of FPLC.
- Electrophoresis Techniques: Principle and application of different types of Gel Electrophoresis (PAGE- horizontal and vertical, SDS-PAGE and molecular weight determination, Isoelectric Focusing (IEF) and 2-D gel electrophoresis.
- Determination of purity, specific activity, extinction coefficient of enzymes / proteins. Mass Spectrometry (Principle and application only).

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Determination of Molecular weight of protein from SDS-PAGE (kit based)
2. Column chromatography (size exclusion) by teaching kit (Determination of Void volume)
3. Genomic DNA isolation from bacterial cells.
4. Agarose gel electrophoresis.
5. Determination of unknown protein concentration by Folin-Lowry method.
6. PCR and ELISA techniques (demonstration only)

### **BOOKS RECOMMENDED**

1. Biological instrumentation and methodology by Dr. P.K. Bajpai
2. Techniques and methods in Biology by K.L. Ghatak
3. Experimental procedures in Life Sciences by S. Rajan and R. Selvi Christy

4. Methodology of Biological Science by R. Bakkappa
5. Principles and techniques of Biochemistry and Molecular Biology by Wilson and Walker
6. Tools and techniques in Biological Science by Dev, Vats and Chaturvedi
7. A Book on Biological techniques by Pawar and Desai

[ADD ON COURSE]

On

**IN TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

1. The duration of the course of instruction for Certificate in **Techniques in Molecular biology and Biostatistics** shall be of one academic year. The medium of instruction and examination shall be English.
2. The candidates who have qualified +2 in sciences (physics, chemistry, biology or mathematics) with at least 45% marks in aggregate shall be admitted to certificate course.
3. The admission to Certificate shall be open to all those candidates who have sought admission as regular candidates to B.Sc. course of Vivekananda College, Thakurpukur under Calcutta University, Kolkata.
4. The candidate who has attended minimum 75% of delivered lectures and secured at least 25% marks in house examination(s) shall be allowed to appear in annual examination of Certificate Course.
5. The examination shall be held in accordance with the syllabus prescribed by the college.
6. The examination for Certificate shall be held along with the annual and supplementary examinations of B.Sc.
  - 6.1 The annual/supplementary examination for theory paper shall be of 50 marks and that for practical shall be of 30 marks.
  - 6.2 The candidates shall be required to obtain at least 35% of the total marks in theory and practical separately in order to be declared pass in Certificate Courses.
  - 6.3 The candidate who has secured 35% but less than 50% marks in aggregate of theory and practical shall be placed in third division. The candidate who has secured 50% or more and less than 60% marks in aggregate shall be placed in second division. The candidate who has secured 60% or more marks in aggregate shall be placed in first division.
7. A candidate who does not appear or fails in theory of practical or both in annual examination held in May of relevant year and three consecutive examinations held thereafter shall be debarred continuing his/her studies for Certificate Courses.
  - 7.1 Grace marks and re-evaluation shall be allowed as per university rules for B.Sc. course.

**Name of the course: Techniques in Molecular biology and Biostatistics**

**SYLLABUS OF TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

3 Hrs./Week Max. Time: 3Hrs. Max. Marks: 50 Internal Assessment: 10 Total Marks: 60

- **Chapter 1: Biochemistry Techniques**
  - Biomolecules Estimation Methods
- **Chapter 2: Microbiology Techniques**
  - Bacterial growth Curve, Conjugation, Antibiotic Sensitivity, Phage Titration
  - Transduction, Transformation,
  - Bacterial Gene Expression
- **Chapter 3: Chromatography Techniques**
  - Chromatography Techniques - Part 1
  - Chromatography Techniques - Part 2
- **Chapter 4: Protein Assay Techniques**
  - Protein Assay Techniques - Part 1
  - Protein Assay Techniques - Part 2
  - Proteins purification
  - Protein estimation
- **Chapter 5: Molecular Biology Techniques**
  - Electrophoresis
  - PCR Techniques
  - Markers
  - ELISA, FACS
- **Chapter 6: Recombinant DNA Technology**
  - Recombinant Technology - Part 1
  - Recombinant Technology - Part 2
  - Nucleic Acid Sequencing
  - Protein Sequencing
  - Hybridization Techniques
- **Chapter 7: Immunology Techniques**
  - Blood group testing, Immunoelectrophoresis
  - Elispot, Immunofluorescence
  - Latex agglutination, Western blotting
  - Immunodiffusion, Double Diffusion, Radial Immunodiffusion
- **Chapter 8: Statistical analysis of data**
  - Sampling Techniques
  - Statistical evaluation of results-mean, mode, median calculation
  - Standard deviation calculation
  - Distribution of student t-test
  - Correlation coefficient
  - Deviation
  - Numerical Problems solve

**Reference Books:**

- i) GENE VIII- Lewin
- ii) Biochemistry-Voet & Voet
- iii) Molecular Biology of the gene-Watson
- iv) Biochemistry-Lubert Stryer
- v) Molecular Biology by Weaver
- vi) Principles of Gene Manipulations by Old and Primrose
- vii) An Introduction to Practical Biochemistry – David T Plummer
- (vii) Introductory Practical Biochemistry – Sawhney & Singh
- (viii) Biochemical Methods- For Agricultural Sciences.S. Sadasivam and A. Manikam. (Wiley Eastern Limited)
- (ix) Practical Biochemistry in Clinical Biochemistry. R. L. Nath Academic Press, Calcutta.
- (x) Practical Clinical Biochemistry, 5th Edition. Varley & Gowenlock William Heinemann Medical Books Ltd.
- (xi) Experimental Biochemistry: A Student Companion Textbook. Rao and Deshpande (IK International Pvt.Ltd)
- (xii) Molecular cloning: A Laboratory Manual Sambrook (Vol 1)

# VIVEKANANDA COLLEGE

## DEPARTMENT OF BIOCHEMISTRY

THAKURPUKUR, KOLKATA-63

### ROUTINE FOR B.Sc. (H) and B.Sc. (GE) COURSE (SESSION: July, 2018-December, 2018)

Day	Year	10:30-11:15	11:15-12:00	12:00-12:45	12:45-01:30	01:30-02:15	02:30-03:15	03:15-04:00	04:00-04:45
MON	1 <sup>st</sup>	DR (S-216)	DR (S-216)				PRACTICAL (DR)		
	1 <sup>st</sup> GEN ELC.			DR (S-219)					
	2 <sup>nd</sup>						SH (S-216)	SH (S-216)	NS (S-216)
	3 <sup>rd</sup>		PRACTICAL (KR+NS)			DR (S-219)	NS (S-219)	KR (S-219)	KR (S-219)
TUE	1 <sup>st</sup>	PM (S-219)	PM (S-219)				PRACTICAL (PM)		
	1 <sup>st</sup> GEN ELC.			NS (S-219)					
	2 <sup>nd</sup>	KR (S-216)	KR (S-216)				DR (S-219)	DR (S-219)	NS (S-219)
	3 <sup>rd</sup>		PRACTICAL (DR)			DR (S-216)	KR (S-216)	KR (S-216)	DR (S-216)
WED	1 <sup>st</sup>	SB (S-216)	SH (S-216)			KR (S-216)	NS (S-216)	PM (S-216)	PM (S-216)
	1 <sup>st</sup> GEN ELC.								
	2 <sup>nd</sup>	NS (S-219)	KR (S-219)				PRACTICAL (KR)		
	3 <sup>rd</sup>			PRACTICAL (PM)			PM (S-219)	NS (S-219)	NS (S-219)
THU	1 <sup>st</sup>	KR (S-216)	KR (S-216)						
	1 <sup>st</sup> GEN ELC.			PM (S-216)			KR (S-213)	NS (S-213)	
	2 <sup>nd</sup>	SB (S-219)	SH (S-219)				PRACTICAL (PM+DR)		
	3 <sup>rd</sup>			DR (S-219)	DR (S-219)	PM (S-219)	NS (S-219)	KR (S-219)	KR (S-219)
FRI	1 <sup>st</sup>	SH (S-216)	SB (S-216)						
	1 <sup>st</sup> GEN ELC.			PM (S-219)			PRACTICAL (NS)		
	2 <sup>nd</sup>	NS (S-219)	PM (S-219)				SB (S-216)	SH (S-216)	
	3 <sup>rd</sup>		PRACTICAL (DR+NS)			DR (S-219)	PM (S-219)	PM (S-219)	
SAT	1 <sup>st</sup>								# Remedial classes will be taken (if reqd.) in place of practical classes after completion of the practical classes.
	1 <sup>st</sup> GEN ELC.			PRACTICAL (KR)					
	2 <sup>nd</sup>	DR (S-219)	SB (S-216)	SH (S-216)	PM (S-216)				
	3 <sup>rd</sup>		SH (S-219)	DR (S-219)	DR (S-219)	KR (S-219)			
	Add-on course						Time (02:30-03:30)	Time (03:30-04:30)	
	Tech. in Biochem.						DR/KR/ NS/SB (S-219)	DR/KR/NS/SB (S-216)	
Tech. in Mol. Bio.						DR/KR/ NS/SB (S-219)	DR/KR/NS/SB (S-216)		

## IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 03 May 2019, to envisage, formulate, and design Add-On Courses, beyond the prescribed Curriculum.

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2019-20 Academic calendar, as per UGC guidelines.

B. It was decided that the Departments would be free to choose the Courses based on their (subject) relevance, practicality, and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course material in consultation with all teachers of the Department.

D. It was decided that each Department would design its format.

E. It was decided that the Departments would be encouraged to use and utilize their resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

  
03/5/19  
Coordinator  
IQAC  
Vivekananda College  
Ph. No. 700 063



# VIVEKANANDA COLLEGE

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

Ref. No. ....

Date 08-5-19

## Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2019-20.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

*Hkpoddar*  
*08-5-19*

Principal  
Vivekananda College  
Thakurpukur Kol-63

NOTICE

Date: 02/07/19

A departmental meeting will be held on 11 / 07 / 19 at 12:45 AM/PM in the departmental staff room. All teachers of the department are requested to attend the same.

**Agenda:**

- i) Introduction of add-on course on "...Clinical Diagnostic Techniques..." for UG Sem-3 & 4... and part 3 Honours students.
- ii) Introduction of add-on course on "Techniques in Biochemistry" for UG Sem-1 & 2.

 02/07/19  
Head

Dept. of Biochemistry  
Vivekananda College, Kolkata

## DEPARTMENT OF BIOCHEMISTRY

Resolution of the departmental meeting held on 11/07/19 at 12:45 P.m.

### A) Teacher present:

1. Dibyendu Raj 11/07/19
2. Kakali Roy 11/07/19
3. Niresha Sen Banerjee 11/07/19
4. Subhantini Banerjee 11/07/19

### B) Minutes of the meeting

1. In the Departmental meeting dated 11/07/19 the teachers of the UG Department of Biochemistry unanimously decided that:
  - a. The UG Part- 3 and/or Sem- 384, Honours students would be offered a 30-hour Add-on Course on "...Clinical Diagnostic Techniques..." in Collaboration with IQAC, Vivekananda College from the session 20.19.- 20.20
2. It was also decided in the meeting that Dr. ...Kakali Sinha Roy... of Department of Biochemistry would be the Course Coordinator for the Add-On Course on "...Clinical Diagnostic Techniques" for the Academic session 20.19.- 20.20
3. The Course structure of the Add-on course on "...Clinical Diagnostic Techniques" submitted by Dr. ...Kakali Sinha Roy... and was accepted by all teachers of the department.
5. Certificates would be given to each student at the successful completion of the Course.

The Principal,  
Tackanda College,  
Thakurpukur,  
Kolkata-03

SUBJECT: INTIMATION LETTER FOR ADD-ON COURSE

Respected Sir,

It is to inform you that to consider this letter as an intimation letter with reference to your letter dated 08/05/19 a departmental meeting was held on 11/07/19 with reference to the notice provided by you and the IQAC coordinator dated 03/05/19. We have introduced one Add-on course on "Clinical Diagnostic Techniques" for the current session 2019-2020. The Course structure of the Add-on course on "Clinical Diagnostic Techniques" submitted by the Course coordinator Dr. Kakali Suha Roy was accepted by all teachers of the department.

Sincerely,

 11/07/19  
Dr. D. K. Roy  
H.O.D.

Department of Biochemistry

**[ADD ON COURSE]**

**CERTIFICATE COURSE IN CLINICAL DIAGNOSTIC TECHNIQUES**

1. The duration of the course of instruction for Certificate in Clinical Diagnostic Techniques shall be of one academic year. The medium of instruction and examination shall be English.
2. The candidates who have qualified +2 in sciences (physics, chemistry, biology or mathematics) with at least 45% marks in aggregate shall be admitted to certificate course.
3. The admission to Certificate shall be open to all those candidates who have sought admission as regular candidates to B.Sc. course of Vivekananda College, Thakurpukur under Calcutta University, Kolkata.
4. The candidate who has attended minimum 75% of delivered lectures and secured at least 25% marks in house examination(s) shall be allowed to appear in annual examination of Certificate Course.
5. The examination shall be held in accordance with the syllabus prescribed by the college.
6. The examination for Certificate shall be held along with the annual and supplementary examinations of B.Sc.
  - 6.1 The annual/supplementary examination for theory paper shall be of 50 marks and that for practical shall be of 30 marks.
  - 6.2 The candidates shall be required to obtain at least 35% of the total marks in theory and practical separately in order to be declared pass in Certificate Courses.
  - 6.3 The candidate who has secured 35% but less than 50% marks in aggregate of theory and practical shall be placed in third division. The candidate who has secured 50% or more and less than 60% marks in aggregate shall be placed in second division. The candidate who has secured 60% or more marks in aggregate shall be placed in first division.
7. A candidate who does not appear or fails in theory of practical or both in annual examination held in May of relevant year and three consecutive examinations held thereafter shall be debarred continuing his/her studies for Certificate Courses.
  - 7.1 Grace marks and re-evaluation shall be allowed as per university rules for B.Sc. course.

# SYLLABUS OF CERTIFICATE COURSE IN CLINICAL DIAGNOSTIC TECHNIQUES

3 Hrs./Week  
Max. Time: 3Hrs.  
Max. Marks: 50  
Internal Assessment: 10  
Total Marks: 60

## SECTION – A

1. Structure of Animal Cell.
2. Cleaning and sterilization of glass ware.
3. Introduction to Haematology:  
  
Composition and function of blood – parts, functions, principles and working of simple and compound microscope, centrifuge, water bath and cell counter.
4. Blood cell and haemoglobin:  
  
Erythropoiesis, leukopoiesis and thrombopoiesis. Types of haemoglobin and its functions. Formation of haemoglobin and its breakdown.
5. Blood coagulation and Anticoagulants:  
  
Mechanism of blood coagulation. Separation of serum and plasma. Various types of anticoagulants, their modes of action and clinical advantages.

## SECTION – B

6. Haematological Estimations  
  
Collection of blood samples, method of estimation of haemoglobin, bleeding time clotting time, erythrocyte sedimentation rate and staining.  
  
6.1 Haemocytometry: Preparation and staining of blood films, Romanowsky stains, method of counting R.B.C., W.B.C. and platelets. Clinical significance of variation in haemoglobin, RBC, TLC, DLC, ESR and platelet count.
7. Definition and scope of clinical biochemistry.
8. Methods of estimation and clinical significance of the following:
  - 2.1 Blood sugar and glucose tolerance
  - 2.2 Blood Urea
  - 2.3 Blood Cholesterol

- 2.4 Plasma Protein
- 2.5 Electrolytes and trace elements in blood
- 2.6 Serum bilirubin, calcium amylase, alkaline and acid phosphatase, SGOT and SGPT
- 2.7 Serum creatinine and Uric acid, Renal function test.
- 9. Formation and composition of urine. Macroscopic, microscopic and biochemical examination of uric and their clinical importance.

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Use and care of glassware, microscope, centrifuge, analytical balance and calorimeter.
2. Collection of blood samples. Preparation of anticoagulants, stains and reagents. Separation of serum and plasma.
3. Estimation of haemoglobin,.
4. TLC and platelet count.
5. Estimation of blood glucose, urea, uric acid, creatinine and bilirubin.
6. Microscopy and microscopic examination of Urine. Estimation of glucose and protein.

### **BOOKS RECOMMENDED**

1. Medient Lab. Technology Vol. I, II and III. By Kanai L Mukherjee, Tata MC Grawhill New Delhi.
2. Manual of Medical Lab Technology By A.V. Naingokar, Pillani Book Depot, Bombay.
3. A concise Note on Medical Lab. Technology By C.R. Maitt. Centre Book Agency, Calcutta/
4. Handbook of Medical Lab Technology, By V.H. Talib, CBS Publishers, Delhi.
5. Medical Lab Technology, 5th edition By Ramnik Sood, Jaypee Brothers, New Delhi.
6. Practical Manual of Biochemistry, 4th edition, By S.P. Singh, CBS Publishers, New Delhi.

[ADD ON COURSE]

**CERTIFICATE COURSE ON TECHNIQUES IN BIOCHEMISTRY**

3 Hrs./Week

Max. Time: 3Hrs.

Max. Marks: 50

Internal Assessment: 10

Total Marks: 60

**SECTION – A**

▪ **Introduction to Biological Research**

- Definition and significance of research in biology, Historical context and landmark studies, Overview of contemporary research areas in biology, Ethical considerations in biological research.

▪ **Formulating Research Questions and Hypotheses**

- Developing clear and testable research questions, constructing hypotheses in biological research, Significance of hypotheses in experimental design.

▪ **Experimental Design in Biology**

- Basics of experimental design, Control groups, variables, and replication, Randomized controlled trials in biology, Field studies and observational research.

▪ **Sampling Techniques in Biological Research**

- Overview of Random sampling, stratified sampling, and systematic sampling, Importance of representative samples, Sample size determination in biological studies

▪ **Data Collection Methods in Biology: A basic conceptual Approach**

- Measurement and Analysis in Biology, Quantitative and qualitative data in biology, Statistical analysis in biological research, Data interpretation and visualization techniques.
- Research Proposal and Project Presentation, Developing a research proposal in biology, Effective presentation skills for scientific research, Peer review and constructive feedback
- Protein Isolation- Methods of solubilization of proteins from their cellular and extra cellular locations- cytosolic, integral and peripheral membrane protein. Brief outline of the use of simple grinding methods, homogenization, ultrasonication, French press and centrifugation, sedimentation coefficient, stabilization of proteins during purification.
- Solubility of Proteins based on Protein Purification- Salting in and salting out (Ammonium sulphate fractionation), solvent fractionation, Isoelectric precipitation), lyophilization, Dialysis, Ultrafiltration (Principle and application), Ultracentrifugation

- Chromatographic Separation: partition coefficient, phase systems, liquid and gas chromatography, performance parameters: retention, resolution, basis of peak broadening, peak symmetry, Principle, Application, Advantages and Disadvantages, limitation for different modes of chromatography- Partition Chromatography (Paper Chromatography, hydrophobic interaction/ reverse phase chromatography), Adsorption Chromatography; Thin Layer Chromatography, Gel filtration chromatography, affinity chromatography, Ion-exchange chromatography, Demonstration of High Performance Liquid Chromatography (HPLC), brief concept of FPLC.
- Electrophoresis Techniques: Principle and application of different types of Gel Electrophoresis (PAGE- horizontal and vertical, SDS-PAGE and molecular weight determination, Isoelectric Focusing (IEF) and 2-D gel electrophoresis.
- Determination of purity, specific activity, extinction coefficient of enzymes / proteins. Mass Spectrometry (Principle and application only).

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Determination of Molecular weight of protein from SDS-PAGE (kit based)
2. Column chromatography (size exclusion) by teaching kit (Determination of Void volume)
3. Genomic DNA isolation from bacterial cells.
4. Agarose gel electrophoresis.
5. Determination of unknown protein concentration by Folin-Lowry method.
6. PCR and ELISA techniques (demonstration only)

### **BOOKS RECOMMENDED**

1. Biological instrumentation and methodology by Dr. P.K. Bajpai
2. Techniques and methods in Biology by K.L. Ghatak
3. Experimental procedures in Life Sciences by S. Rajan and R. Selvi Christy

4. Methodology of Biological Science by R. Bakkappa
5. Principles and techniques of Biochemistry and Molecular Biology by Wilson and Walker
6. Tools and techniques in Biological Science by Dev, Vats and Chaturvedi
7. A Book on Biological techniques by Pawar and Desai

# VIVEKANANDA COLLEGE

## Department of Biochemistry

Thakurpukur, Kolkata-700063

**Class Schedule for the Session January, 2019-June 2019**

**W. e. f. 19/01/19**

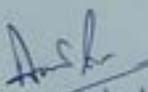
Days	SEM	10:30-11:15 A.M.	11:15-12:00 P.M	12:00-12:45 P.M.	12:45-01:30 P.M.	01:30-02:15 P.M.	02:15-02:30 P.M.	02:30-03:15 P.M.	03:15-04:00 P.M.	04:00-05:00 P.M.
<b>MON</b>	<b>2<sup>nd</sup></b>	KR (S-216)	SB (S-216)		DR (S-219)	NS (S-216)	R	KR (LAB-1)		
	<b>2<sup>nd</sup> GE</b>									
	<b>2<sup>nd</sup> yr</b>	SB (S-219)	NS (S-219)	DR (S-219)				NS (LAB-1)		
	<b>3<sup>rd</sup> yr</b>			NS (S-216)	KR (S-216)			NS (S-216)	DR (S-219)	DR (S-219)
<b>TUE</b>	<b>2<sup>nd</sup></b>	PM (S-216)	DR (S-216)				E	SB (LAB-1)		
	<b>2<sup>nd</sup> GE</b>		NS (S-219)			DR (S-219)		DR (LAB-2)		
	<b>2<sup>nd</sup> yr</b>			NS (S-219)	KR (S-219)			NS (S-216)		
	<b>3<sup>rd</sup> yr</b>	DR (S-219)	KR (LAB-1)		NS (S-216)				PM (S-219)	
<b>WED</b>	<b>2<sup>nd</sup></b>	SB (S-219)	PM (S-219)	KR (S-219)			C	NS (S-216)		
	<b>2<sup>nd</sup> GE</b>			NS (S-216)						
	<b>2<sup>nd</sup> yr</b>	PM (S-216)			KR (S-216)	NS (S-216)			PM (S-219)	
	<b>3<sup>rd</sup> yr</b>		KR (S-216)		SB (S-219)					
<b>THU</b>	<b>2<sup>nd</sup></b>	DR (S-216)	NS (S-216)				E			
	<b>2<sup>nd</sup> GE</b>	NS (S-219)	KR (LAB-1)		NS (S-219)	DR (S-219)				
	<b>2<sup>nd</sup> yr</b>		SB (S-219)	NS (S-216)	DR (S-216)			DR+PM (LAB-1)		
	<b>3<sup>rd</sup> yr</b>		DR (S-208)	DR (S-219)		NS (S-216)				
<b>FRI</b>	<b>2<sup>nd</sup></b>	SB (S-216)	DR (S-208)			NS (S-216)	S		SB (S-219)	
	<b>2<sup>nd</sup> GE</b>		SB (S-216)							
	<b>2<sup>nd</sup> yr</b>	NS (S-216)		DR (S-219)	SB (S-216)					
	<b>3<sup>rd</sup> yr</b>		NS (S-216)	NS (S-216)	DR (S-219)	DR (S-219)		DR (LAB-2)		
<b>SAT</b>	<b>2<sup>nd</sup></b>						S			
	<b>2<sup>nd</sup> GE</b>	KR (S-219)	PM (S-219)	PM(S-219)	KR (S-216)					
	<b>2<sup>nd</sup> yr</b>	PM	DR (S-208)	KR (S-216)	DR (S-219)					
	<b>3<sup>rd</sup> yr</b>		KR (S-216)	DR (S-208)						
	<b>Add-on course</b>							<b>Time 03:00-04:00</b>	<b>Time 04:00-05:00</b>	# Remedial classes will be taken (if reqd.) in place of practical classes after completion of the practical classes.
	<b>Tech. in Biochem.</b>							DR/KR/NS/SB (S-219)	DR/KR/NS/SB (S-216)	
	<b>Clin. Diag. Tech.</b>							DR/KR/NS/SB (S-219)	DR/KR/NS/SB (S-216)	

H. O. D

#### IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 14/Sept/2021, to envisage, formulate and design Add-On Courses, beyond prescribed Curriculum

- A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for the session 2021-22, Academic calendar, as per UGC guidelines.
- B. It was decided that the Departments would be free to choose the Courses on the basis of their (subject) relevance, practicality and feasibility.
- C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course materials, in consultation with all teachers of the Department.
- D. It was decided that each Department would design its own format; and could follow a blended mode of instruction.
- E. It was decided that the Departments would be encouraged to use and utilize their own resources while formulating the Add-On Courses, rather than relying on Outsourcing.
- F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

  
14/09/21  
Co-ordinator  
IQAC  
Vivekananda College  
Kolkata-700 063



# VIVEKANANDA COLLEGE

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

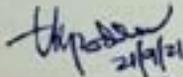
Ref. No. \_\_\_\_\_

Date 21/9/21

## Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2021- 22.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

  
21/9/21

Principal  
Vivekananda College  
Thakurpukur, K22-62

DEPARTMENT OF BIOCHEMISTRY

Date: 07/02/22

A departmental meeting will be held on 17.02.2022 at 12:00 noon to discuss the following agenda. All teachers are requested to kindly attend the meeting.

Agenda of the meeting:

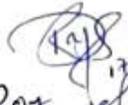
- i) Introduction of Add-on course on "Clinical Diagnostic Technique" for UG Sem-I & II and III & IV Honours students.
- ii) Introduction of Add-on course on "Techniques in Molecular Biology and Biostatistics" for UG Sem-V & VI Honours Students from the session 2021-2022.

  
HOD 07/02/22

## DEPARTMENT OF BIOCHEMISTRY

Resolution of the departmental meeting held on 17.02.22

### A) Teacher present:

1. Dr. Dibyendu Raj  17/02/22
2. Dr. Kakali Sinha Roy  17/02/22
3. Nireesha Sen Banerjee 17.2.22
4. Dr. Subhanti Banerjee  17/02/22

### B) Minutes of the meeting

1. In the Departmental meeting dated 17.02.2022 the teachers of the UG Department of Biochemistry unanimously decided that:

a. The UG Sem-II Honours students would be offered a 30-hour Add-on Course on "Clinical Diagnostic Technique" in Collaboration with IQAC, Vivekananda College.

b. Another 30-hour Add-on course on "Techniques in Biochemistry" will be offered to UG Sem-I students from the Session 2022-2023.

2. It was also decided in the meeting that Dr. Kakali Sinha Roy, Department of Biochemistry would be the Course Coordinator for the Add-On Course on "Clinical Diagnostic Technique" for the Academic session 2021-2022 and Dr. Dibyendu Raj, H.O.D would be the Course Coordinator for the Add-On Course on "Techniques in Biochemistry"

3. The Course structure of the course on "Clinical Diagnostic Technique" would be submitted by Dr. Kakali Sinha Roy and was accepted by all teachers of the department.

4. The Course structure of the course on "Techniques in Biochemistry" would be submitted by Dr. Dibyendu Raj and was accepted by all teachers of the department.

5. Certificates would be given to each student at the successful completion of the Course.

To,  
The Principal,  
Vivekananda College,  
Thakurpukur,  
Kolkata-63

SUBJECT: INTIMATION LETTER FOR ADD-ON COURSE

Respected Sir,

This is to inform you that to consider this letter as an intimation letter with reference to your letter dated 21/09/21..... A departmental meeting was held on 17/02/22..... with reference to the notice provided by you and the IQAC coordinator dated 14/09/21.....In the meeting we have decided to continue the Add-on course on "Clinical Diagnostic Techniques" and "Techniques in Biochemistry".....for the current session 2021-2022... as discussed in our previous departmental meeting dated 11/07/19 and 10/07/18 respectively.

Sincerely,

  
Dr. Dipankar Das  
H.O.D  
Department of Biochemistry

[ADD ON COURSE]

**CERTIFICATE COURSE ON TECHNIQUES IN BIOCHEMISTRY**

3 Hrs./Week

Max. Time: 3Hrs.

Max. Marks: 50

Internal Assessment: 10

Total Marks: 60

**SECTION – A**

- **Introduction to Biological Research**
- Definition and significance of research in biology, Historical context and landmark studies, Overview of contemporary research areas in biology, Ethical considerations in biological research.
- **Formulating Research Questions and Hypotheses**
- Developing clear and testable research questions, constructing hypotheses in biological research, Significance of hypotheses in experimental design.
- **Experimental Design in Biology**
- Basics of experimental design, Control groups, variables, and replication, Randomized controlled trials in biology, Field studies and observational research.
- **Sampling Techniques in Biological Research**
- Overview of Random sampling, stratified sampling, and systematic sampling, Importance of representative samples, Sample size determination in biological studies
- **Data Collection Methods in Biology: A basic conceptual Approach**
- Measurement and Analysis in Biology, Quantitative and qualitative data in biology, Statistical analysis in biological research, Data interpretation and visualization techniques.
- Research Proposal and Project Presentation, Developing a research proposal in biology, Effective presentation skills for scientific research, Peer review and constructive feedback
- Protein Isolation- Methods of solubilization of proteins from their cellular and extra cellular locations- cytosolic, integral and peripheral membrane protein. Brief outline of the use of simple grinding methods, homogenization, ultrasonication, French press and centrifugation, sedimentation coefficient, stabilization of proteins during purification.
- Solubility of Proteins based on Protein Purification- Salting in and salting out (Ammonium sulphate fractionation), solvent fractionation, Isoelectric precipitation), lyophilization, Dialysis, Ultrafiltration (Principle and application), Ultracentrifugation

- Chromatographic Separation: partition coefficient, phase systems, liquid and gas chromatography, performance parameters: retention, resolution, basis of peak broadening, peak symmetry, Principle, Application, Advantages and Disadvantages, limitation for different modes of chromatography- Partition Chromatography (Paper Chromatography, hydrophobic interaction/ reverse phase chromatography), Adsorption Chromatography; Thin Layer Chromatography, Gel filtration chromatography, affinity chromatography, Ion-exchange chromatography, Demonstration of High Performance Liquid Chromatography (HPLC), brief concept of FPLC.
- Electrophoresis Techniques: Principle and application of different types of Gel Electrophoresis (PAGE- horizontal and vertical, SDS-PAGE and molecular weight determination, Isoelectric Focusing (IEF) and 2-D gel electrophoresis.
- Determination of purity, specific activity, extinction coefficient of enzymes / proteins. Mass Spectrometry (Principle and application only).

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Determination of Molecular weight of protein from SDS-PAGE (kit based)
2. Column chromatography (size exclusion) by teaching kit (Determination of Void volume)
3. Genomic DNA isolation from bacterial cells.
4. Agarose gel electrophoresis.
5. Determination of unknown protein concentration by Folin-Lowry method.
6. PCR and ELISA techniques (demonstration only)

### **BOOKS RECOMMENDED**

1. Biological instrumentation and methodology by Dr. P.K. Bajpai
2. Techniques and methods in Biology by K.L. Ghatak
3. Experimental procedures in Life Sciences by S. Rajan and R. Selvi Christy

**[ADD ON COURSE]**

**CERTIFICATE COURSE IN CLINICAL DIAGNOSTIC TECHNIQUES**

1. The duration of the course of instruction for Certificate in Clinical Diagnostic Techniques shall be of one academic year. The medium of instruction and examination shall be English.
2. The candidates who have qualified +2 in sciences (physics, chemistry, biology or mathematics) with at least 45% marks in aggregate shall be admitted to certificate course.
3. The admission to Certificate shall be open to all those candidates who have sought admission as regular candidates to B.Sc. course of Vivekananda College, Thakurpukur under Calcutta University, Kolkata.
4. The candidate who has attended minimum 75% of delivered lectures and secured at least 25% marks in house examination(s) shall be allowed to appear in annual examination of Certificate Course.
5. The examination shall be held in accordance with the syllabus prescribed by the college.
6. The examination for Certificate shall be held along with the annual and supplementary examinations of B.Sc.
  - 6.1 The annual/supplementary examination for theory paper shall be of 50 marks and that for practical shall be of 30 marks.
  - 6.2 The candidates shall be required to obtain at least 35% of the total marks in theory and practical separately in order to be declared pass in Certificate Courses.
  - 6.3 The candidate who has secured 35% but less than 50% marks in aggregate of theory and practical shall be placed in third division. The candidate who has secured 50% or more and less than 60% marks in aggregate shall be placed in second division. The candidate who has secured 60% or more marks in aggregate shall be placed in first division.
7. A candidate who does not appear or fails in theory of practical or both in annual examination held in May of relevant year and three consecutive examinations held thereafter shall be debarred continuing his/her studies for Certificate Courses.
  - 7.1 Grace marks and re-evaluation shall be allowed as per university rules for B.Sc. course.

# SYLLABUS OF CERTIFICATE COURSE IN CLINICAL DIAGNOSTIC TECHNIQUES

3 Hrs./Week  
Max. Time: 3Hrs.  
Max. Marks: 50  
Internal Assessment: 10  
Total Marks: 60

## SECTION – A

1. Structure of Animal Cell.
2. Cleaning and sterilization of glass ware.
3. Introduction to Haematology:  
  
Composition and function of blood – parts, functions, principles and working of simple and compound microscope, centrifuge, water bath and cell counter.
4. Blood cell and haemoglobin:  
  
Erythropoiesis, leukopoiesis and thrombopoiesis. Types of haemoglobin and its functions. Formation of haemoglobin and its breakdown.
5. Blood coagulation and Anticoagulants:  
  
Mechanism of blood coagulation. Separation of serum and plasma. Various types of anticoagulants, their modes of action and clinical advantages.

## SECTION – B

6. Haematological Estimations  
  
Collection of blood samples, method of estimation of haemoglobin, bleeding time clotting time, erythrocyte sedimentation rate and staining.  
  
6.1 Haemocytometry: Preparation and staining of blood films, Romanowsky stains, method of counting R.B.C., W.B.C. and platelets. Clinical significance of variation in haemoglobin, RBC, TLC, DLC, ESR and platelet count.
7. Definition and scope of clinical biochemistry.
8. Methods of estimation and clinical significance of the following:
  - 2.1 Blood sugar and glucose tolerance
  - 2.2 Blood Urea
  - 2.3 Blood Cholesterol

- 2.4 Plasma Protein
- 2.5 Electrolytes and trace elements in blood
- 2.6 Serum bilirubin, calcium amylase, alkaline and acid phosphatase, SGOT and SGPT
- 2.7 Serum creatinine and Uric acid, Renal function test.
- 9. Formation and composition of urine. Macroscopic, microscopic and biochemical examination of uric and their clinical importance.

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Use and care of glassware, microscope, centrifuge, analytical balance and calorimeter.
2. Collection of blood samples. Preparation of anticoagulants, stains and reagents. Separation of serum and plasma.
3. Estimation of haemoglobin,.
4. TLC and platelet count.
5. Estimation of blood glucose, urea, uric acid, creatinine and bilirubin.
6. Microscopy and microscopic examination of Urine. Estimation of glucose and protein.

### **BOOKS RECOMMENDED**

1. Medient Lab. Technology Vol. I, II and III. By Kanai L Mukherjee, Tata MC Grawhill New Delhi.
2. Manual of Medical Lab Technology By A.V. Naingokar, Pillani Book Depot, Bombay.
3. A concise Note on Medical Lab. Technology By C.R. Maitt. Centre Book Agency, Calcutta/
4. Handbook of Medical Lab Technology, By V.H. Talib, CBS Publishers, Delhi.
5. Medical Lab Technology, 5th edition By Ramnik Sood, Jaypee Brothers, New Delhi.
6. Practical Manual of Biochemistry, 4th edition, By S.P. Singh, CBS Publishers, New Delhi.

[ADD ON COURSE]

On

**IN TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

1. The duration of the course of instruction for Certificate in **Techniques in Molecular biology and Biostatistics** shall be of one academic year. The medium of instruction and examination shall be English.
2. The candidates who have qualified +2 in sciences (physics, chemistry, biology or mathematics) with at least 45% marks in aggregate shall be admitted to certificate course.
3. The admission to Certificate shall be open to all those candidates who have sought admission as regular candidates to B.Sc. course of Vivekananda College, Thakurpukur under Calcutta University, Kolkata.
4. The candidate who has attended minimum 75% of delivered lectures and secured at least 25% marks in house examination(s) shall be allowed to appear in annual examination of Certificate Course.
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7. A candidate who does not appear or fails in theory of practical or both in annual examination held in May of relevant year and three consecutive examinations held thereafter shall be debarred continuing his/her studies for Certificate Courses.
  - 7.1 Grace marks and re-evaluation shall be allowed as per university rules for B.Sc. course.

**Name of the course: Techniques in Molecular biology and Biostatistics**

**SYLLABUS OF TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

3 Hrs./Week Max. Time: 3Hrs. Max. Marks: 50 Internal Assessment: 10 Total Marks: 60

- **Chapter 1: Biochemistry Techniques**
  - Biomolecules Estimation Methods
- **Chapter 2: Microbiology Techniques**
  - Bacterial growth Curve, Conjugation, Antibiotic Sensitivity, Phage Titration
  - Transduction, Transformation,
  - Bacterial Gene Expression
- **Chapter 3: Chromatography Techniques**
  - Chromatography Techniques - Part 1
  - Chromatography Techniques - Part 2
- **Chapter 4: Protein Assay Techniques**
  - Protein Assay Techniques - Part 1
  - Protein Assay Techniques - Part 2
  - Proteins purification
  - Protein estimation
- **Chapter 5: Molecular Biology Techniques**
  - Electrophoresis
  - PCR Techniques
  - Markers
  - ELISA, FACS
- **Chapter 6: Recombinant DNA Technology**
  - Recombinant Technology - Part 1
  - Recombinant Technology - Part 2
  - Nucleic Acid Sequencing
  - Protein Sequencing
  - Hybridization Techniques
- **Chapter 7: Immunology Techniques**
  - Blood group testing, Immunoelectrophoresis
  - Elispot, Immunofluorescence
  - Latex agglutination, Western blotting
  - Immunodiffusion, Double Diffusion, Radial Immunodiffusion
- **Chapter 8: Statistical analysis of data**
  - Sampling Techniques
  - Statistical evaluation of results-mean, mode, median calculation
  - Standard deviation calculation
  - Distribution of student t-test
  - Correlation coefficient
  - Deviation
  - Numerical Problems solve

## **Reference Books:**

- i) GENE VIII- Lewin
- ii) Biochemistry-Voet & Voet
- iii) Molecular Biology of the gene-Watson
- iv) Biochemistry-Lubert Stryer
- v) Molecular Biology by Weaver
- vi) Principles of Gene Manipulations by Old and Primrose
- vii) An Introduction to Practical Biochemistry – David T Plummer
- (vii) Introductory Practical Biochemistry – Sawhney & Singh
- (viii) Biochemical Methods- For Agricultural Sciences.S. Sadasivam and A. Manikam. (Wiley Eastern Limited)
- (ix) Practical Biochemistry in Clinical Biochemistry. R. L. Nath Academic Press, Calcutta.
- (x) Practical Clinical Biochemistry, 5th Edition. Varley & Gowenlock William Heinemann Medical Books Ltd.
- (xi) Experimental Biochemistry: A Student Companion Textbook. Rao and Deshpande (IK International Pvt.Ltd)
- (xii) Molecular cloning: A Laboratory Manual Sambrook (Vol 1)

# VIVEKANANDA COLLEGE

## Department of Biochemistry

Thakurpukur, Kolkata-700063

Online Class Schedule for the Session 2021-2022

W. e. f. 02/05/22

<b>DAYS</b>	<b>SEM-2</b>	<b>SEM-4</b>	<b>SEM-6</b>	<b>SEM-2</b> (GE-BCMG)	<b>SEM-4</b> (GE-BCMG)
<b>Monday</b>	<b>SB</b>	<b>SB</b>	<b>KR</b>	<b>NS</b> (3:00 p.m-4:00p.m)	<b>KR</b> (4:00 p.m 5:00p.m)
<b>Tuesday</b>	<b>DR</b>	<b>NS</b>	<b>KR</b>	<b>DR</b> (4:00 p.m-5:00p.m)	
<b>Wednesday</b>	<b>SB</b>	<b>DR</b>	<b>DR</b>		<b>SB</b> (3:00 p.m-4:00p.m)
<b>Thursday</b>	<b>KR</b>	<b>DR</b>	<b>SB</b>	<b>KR</b> (3:00 p.m 4:00p.m)	<b>NS</b> (4:00 p.m-5:00p.m)
<b>Friday</b>	<b>NS</b>	<b>DR</b>	<b>NS</b>	<b>SB</b> (4:00 p.m-5:00p.m)	
<b>Saturday</b>	<b>DR</b>	<b>KR</b>	<b>DR</b>		<b>DR</b> (3:00 p.m-4:00p.m)

\*Class duration will be 2 hrs.

H. O. D

## VIVEKANANDA COLLEGE

Department of Biochemistry

Thakurpukur, Kolkata-700063

Class Schedule for the Session 2021-2022

W. e. f. 15/02/22

Days	SEM	10:45-11:45 A.M.	11:45-12:45 P.M	12:45-01:45 P.M.	01:45-02:45 P.M.	02:45-03:00 P.M.	03:00-04:00 P.M.	04:00-05:00 P.M.
<b>MON</b>	<b>2</b>	NS (S-216)	SB (S-216)				SB (CC-3) LAB-1	
	<b>GE-2</b>			SB (S-216)				
	<b>4</b>		NS (S-219)				KR (S-219)	
	<b>GE-4</b>			NS (S-219)	KR (S-219)			
	<b>6</b>	KR (S-219)	KR (DSE-B3) LAB-1		SB (S-216)	<b>R</b>		
<b>TUE</b>	<b>2</b>		KR (S-219)				KR (CC-4) LAB-1	
	<b>GE-2</b>			DR (S-219)				
	<b>4</b>	NS (CC-8) LAB-1						
	<b>GE-4</b>			NS (GE-4) LAB-1				
	<b>6</b>			KR (S-216)	DR (S-219)	<b>E</b>	DR (DSE-B3) LAB-2	
<b>WED</b>	<b>2</b>		SB (S-216)					
	<b>GE-2</b>			SB (S-216)				
	<b>4</b>			DR(S-219)			SB (S-216)	
	<b>GE-4</b>				DR (S-219)			
	<b>6</b>	DR (S-216)	DR (S-219)			<b>C</b>	DR (DSE-A3) LAB-1	
<b>THU</b>	<b>2</b>		SB (S-219)				KR (S-216)	
	<b>GE-2</b>			NS (S-219)				
	<b>4</b>	DR (S-216)	DR (CC-10) LAB-1+LAB-2				SB (S-219)	KR (S-219)
	<b>GE-4</b>							
	<b>6</b>			SB (S-216)	DR (S-216)	<b>E</b>	DR+NS (CC-13) LAB-1	
<b>FRI</b>	<b>2</b>		DR (S-216)					
	<b>GE-2</b>			DR (GE-2) LAB-1				
	<b>4</b>		NS (S-219)	SB (S-219)				
	<b>GE-4</b>				NS (S-219)			
	<b>6</b>	DR (S-216)		NS (S-216)	SB (S-216)	<b>S</b>	NS+DR (CC-14) LAB-1	
<b>SAT</b>	<b>2</b>							
	<b>GE-2</b>			DR (S-219)	KR (S-219)			
	<b>4</b>	KR (S-219)	KR (CC-9) LAB-1					
	<b>GE-4</b>				DR (S-219)			
	<b>6</b>					<b>S</b>		

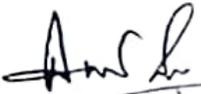
Class allotted: SB-13, NS-15, KR-15, DR-24

H. O. D

### IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 18/June/2022, to envisage, formulate and design Add-On Courses, beyond prescribed Curriculum. The IQAC has also decided to organise a program on staff training:

- A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2022-23, Academic calendar, as per UGC guidelines.
- B. It was decided that the Departments would be free to choose the Courses on the basis of their (subject) relevance, practicality and feasibility.
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- D. It was decided that each Department would design their own format; and could follow a blended mode of instruction.
- E. It was decided that the Departments would be encouraged to use and utilize their own resources while formulating the Add-On Courses, rather than relying on Outsourcing.
- F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.
- G. The IQAC would also organise a Staff Training programme - 'Effective Working Style' Conducted by IPE Of Professional Excellence On 25th June 2022 .

  
18/06/22

Co-ordinator  
IQAC  
Vivekananda College  
Kolkata-700 063



# VIVEKANANDA COLLEGE

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

Ref. No.....

Date.....

## Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2022-23.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

*Handwritten signature*  
24/6/22

Principal

Vivekananda College  
Thakurpukur, Kol-53

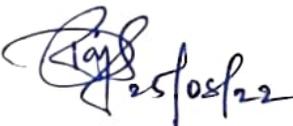
DEPARTMENT OF BIOCHEMISTRY

**Date: 25/08/22**

A departmental meeting will be held on 29.08.2022 at 12:00 noon to discuss the following agenda. All teachers are requested to kindly attend the meeting.

Agenda of the meeting:

- i) Introduction of Add-on course on "Techniques in Molecular Biology and Biostatistics" for UG Honours students.
- ii) Introduction of Add-on course on "Techniques in Biochemistry" for UG Honours Students from the session 2022-2023

  
HOD

## DEPARTMENT OF BIOCHEMISTRY

Resolution of the departmental meeting held on ...29/08/22.....

### A) Teacher present:

1. Dibyendu Raj 29/08/22
2. Nimesha Sen Banerjee 29/8/22
3. Kakali Sultana 29/8/22
4. Prangya 29/08/22

### B) Minutes of the meeting

1. In the Departmental meeting dated...29/08/22...the teachers of the UG Department of Biochemistry unanimously decided that:
  - a. The UG Part- and/or Sem- Honours students would be offered a 30-hour Add-on Course on "...Techniques in Mol. Biol and Biostatistics..." in Collaboration with IQAC, Vivekananda College from the session 20.22.- 20.23
  2. It was also decided in the meeting that Dr. Dibyendu Raj of Department of Biochemistry would be the Course Coordinator for the Add-On Course on "...Techniques in Molecular Biology and Biostatistics" and "Techniques in Biochemistry" for the Academic session 20.22.- 20.23
  3. The Course structure of the Add-on course on "...Techniques in Biochemistry" submitted by Dr. Dibyendu Raj and was accepted by all teachers of the department.
  5. Certificates would be given to each student at the successful completion of the Course.

Principal,  
Sri Venkateswara College,  
Chakrapur,  
Kolkata-63

**SUBJECT: INTIMATION LETTER FOR ADD-ON COURSE**

Respected Sir,

This is to inform you that to consider this letter as an intimation letter with reference to your letter dated 21/06/22..... A departmental meeting was held on 29/05/22..... with reference to the notice provided by you and the IQAC coordinator dated 18/06/22..... In the meeting we have decided to continue the Add-on course on "Techniques in Molecular Biology and Biostatistics" and Techniques in Biochem for the current session 2022-2023 as discussed in our previous departmental meeting dated 10/07/18

Sincerely,

  
29/05/22  
Dr. Dibyendu Raj  
H.O.D  
Department of Biochemistry

[ADD ON COURSE]

On

**IN TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

**Session: 2018-19 Onwards**

1. The duration of the course of instruction for Certificate in **Techniques in Molecular biology and Biostatistics** shall be of one academic year. The medium of instruction and examination shall be English.
2. The candidates who have qualified +2 in sciences (physics, chemistry, biology or mathematics) with at least 45% marks in aggregate shall be admitted to certificate course.
3. The admission to Certificate shall be open to all those candidates who have sought admission as regular candidates to B.Sc. course of Vivekananda College, Thakurpukur under Calcutta University, Kolkata.
4. The candidate who has attended minimum 75% of delivered lectures and secured at least 25% marks in house examination(s) shall be allowed to appear in annual examination of Certificate Course.
5. The examination shall be held in accordance with the syllabus prescribed by the college.
6. The examination for Certificate shall be held along with the annual and supplementary examinations of B.Sc.
  - 6.1 The annual/supplementary examination for theory paper shall be of 50 marks and that for practical shall be of 30 marks.
  - 6.2 The candidates shall be required to obtain at least 35% of the total marks in theory and practical separately in order to be declared pass in Certificate Courses.
  - 6.3 The candidate who has secured 35% but less than 50% marks in aggregate of theory and practical shall be placed in third division. The candidate who has secured 50% or more and less than 60% marks in aggregate shall be placed in second division. The candidate who has secured 60% or more marks in aggregate shall be placed in first division.
7. A candidate who does not appear or fails in theory of practical or both in annual examination held in May of relevant year and three consecutive examinations held thereafter shall be debarred continuing his/her studies for Certificate Courses.
  - 7.1 Grace marks and re-evaluation shall be allowed as per university rules for B.Sc. course.

**Name of the course: Techniques in Molecular biology and Biostatistics**

**SYLLABUS OF TECHNIQUES IN MOLECULAR BIOLOGY AND BIostatISTICS**

3 Hrs./Week Max. Time: 3Hrs. Max. Marks: 50 Internal Assessment: 10 Total Marks: 60

- **Chapter 1: Biochemistry Techniques**
  - Biomolecules Estimation Methods
- **Chapter 2: Microbiology Techniques**
  - Bacterial growth Curve, Conjugation, Antibiotic Sensitivity, Phage Titration
  - Transduction, Transformation,
  - Bacterial Gene Expression
- **Chapter 3: Chromatography Techniques**
  - Chromatography Techniques - Part 1
  - Chromatography Techniques - Part 2
- **Chapter 4: Protein Assay Techniques**
  - Protein Assay Techniques - Part 1
  - Protein Assay Techniques - Part 2
  - Proteins purification
  - Protein estimation
- **Chapter 5: Molecular Biology Techniques**
  - Electrophoresis
  - PCR Techniques
  - Markers
  - ELISA, FACS
- **Chapter 6: Recombinant DNA Technology**
  - Recombinant Technology - Part 1
  - Recombinant Technology - Part 2
  - Nucleic Acid Sequencing
  - Protein Sequencing
  - Hybridization Techniques
- **Chapter 7: Immunology Techniques**
  - Blood group testing, Immunoelectrophoresis
  - Elispot, Immunofluorescence
  - Latex agglutination, Western blotting
  - Immunodiffusion, Double Diffusion, Radial Immunodiffusion
- **Chapter 8: Statistical analysis of data**
  - Sampling Techniques
  - Statistical evaluation of results-mean, mode, median calculation
  - Standard deviation calculation
  - Distribution of student t-test
  - Correlation coefficient
  - Deviation
  - Numerical Problems solve

## **Reference Books:**

- i) GENE VIII- Lewin
- ii) Biochemistry-Voet & Voet
- iii) Molecular Biology of the gene-Watson
- iv) Biochemistry-Lubert Stryer
- v) Molecular Biology by Weaver
- vi) Principles of Gene Manipulations by Old and Primrose
- vii) An Introduction to Practical Biochemistry – David T Plummer
- (vii) Introductory Practical Biochemistry – Sawhney & Singh
- (viii) Biochemical Methods- For Agricultural Sciences.S. Sadasivam and A. Manikam. (Wiley Eastern Limited)
- (ix) Practical Biochemistry in Clinical Biochemistry. R. L. Nath Academic Press, Calcutta.
- (x) Practical Clinical Biochemistry, 5th Edition. Varley & Gowenlock William Heinemann Medical Books Ltd.
- (xi) Experimental Biochemistry: A Student Companion Textbook. Rao and Deshpande (IK International Pvt.Ltd)
- (xii) Molecular cloning: A Laboratory Manual Sambrook (Vol 1)

[ADD ON COURSE]

**CERTIFICATE COURSE ON TECHNIQUES IN BIOCHEMISTRY**

**FOR 2022-23**

3 Hrs./Week

Max. Time: 3Hrs.

Max. Marks: 50

Internal Assessment: 10

Total Marks: 60

**SECTION – A**

▪ **Introduction to Biological Research**

- Definition and significance of research in biology, Historical context and landmark studies, Overview of contemporary research areas in biology, Ethical considerations in biological research.

▪ **Formulating Research Questions and Hypotheses**

- Developing clear and testable research questions, constructing hypotheses in biological research, Significance of hypotheses in experimental design.

▪ **Experimental Design in Biology**

- Basics of experimental design, Control groups, variables, and replication, Randomized controlled trials in biology, Field studies and observational research.

▪ **Sampling Techniques in Biological Research**

- Overview of Random sampling, stratified sampling, and systematic sampling, Importance of representative samples, Sample size determination in biological studies

▪ **Data Collection Methods in Biology: A basic conceptual Approach**

- Measurement and Analysis in Biology, Quantitative and qualitative data in biology, Statistical analysis in biological research, Data interpretation and visualization techniques.
- Research Proposal and Project Presentation, Developing a research proposal in biology, Effective presentation skills for scientific research, Peer review and constructive feedback
- Protein Isolation- Methods of solubilization of proteins from their cellular and extra cellular locations- cytosolic, integral and peripheral membrane protein. Brief outline of the use of simple grinding methods, homogenization, ultrasonication, French press and centrifugation, sedimentation coefficient, stabilization of proteins during purification.
- Solubility of Proteins based on Protein Purification- Salting in and salting out (Ammonium sulphate fractionation), solvent fractionation, Isoelectric precipitation), lyophilization, Dialysis, Ultrafiltration (Principle and application), Ultracentrifugation

- Chromatographic Separation: partition coefficient, phase systems, liquid and gas chromatography, performance parameters: retention, resolution, basis of peak broadening, peak symmetry, Principle, Application, Advantages and Disadvantages, limitation for different modes of chromatography- Partition Chromatography (Paper Chromatography, hydrophobic interaction/ reverse phase chromatography), Adsorption Chromatography; Thin Layer Chromatography, Gel filtration chromatography, affinity chromatography, Ion-exchange chromatography, Demonstration of High Performance Liquid Chromatography (HPLC), brief concept of FPLC.
- Electrophoresis Techniques: Principle and application of different types of Gel Electrophoresis (PAGE- horizontal and vertical, SDS-PAGE and molecular weight determination, Isoelectric Focusing (IEF) and 2-D gel electrophoresis.
- Determination of purity, specific activity, extinction coefficient of enzymes / proteins. Mass Spectrometry (Principle and application only).

### **LABORATORY**

3 Hrs./Week

Max. Time: 3 Hrs.

Max. Marks: 40

1. Determination of Molecular weight of protein from SDS-PAGE (kit based)
2. Column chromatography (size exclusion) by teaching kit (Determination of Void volume)
3. Genomic DNA isolation from bacterial cells.
4. Agarose gel electrophoresis.
5. Determination of unknown protein concentration by Folin-Lowry method.
6. PCR and ELISA techniques (demonstration only)

### **BOOKS RECOMMENDED**

1. Biological instrumentation and methodology by Dr. P.K. Bajpai
2. Techniques and methods in Biology by K.L. Ghatak
3. Experimental procedures in Life Sciences by S. Rajan and R. Selvi Christy

4. Methodology of Biological Science by R. Bakkappa
5. Principles and techniques of Biochemistry and Molecular Biology by Wilson and Walker
6. Tools and techniques in Biological Science by Dev, Vats and Chaturvedi
7. A Book on Biological techniques by Pawar and Desai

## VIVEKANANDA COLLEGE

**Department of Biochemistry**

Thakurpukur, Kolkata-700063

**Class Schedule for the Session 2022-2023**

**W. e. f. 10/08/22**

Days	SEM	10:45-11:45 A.M.	11:45-12:45 P.M	12:45-01:45 P.M.	01:45-02:45 P.M.	02:45-03:00 P.M.	03:00-04:00 P.M.	04:00-05:00 P.M.
<b>MON</b>	<b>1</b>	NS (S-219)	SB (S-216)				SB (CC-2) LAB-1	
	<b>3</b>		NS (S-216)					
	<b>5</b>	KR (CC-12) LAB-1		KR (S-219)	SB (S-219)		NS (S-219)	
	<b>CHEM</b>					<b>R</b>		
<b>TUE</b>	<b>1</b>		KR (S-219)					NS (S-216)
	<b>3</b>		DR (CC-7) LAB-2				NS (S-216)	
	<b>5</b>			KR (S-219)	NS (S-216)		KR (DSE-B1) LAB-1	
	<b>CHEM</b>					<b>E</b>		
<b>WED</b>	<b>1</b>		DR (S-219)				DR (CC-1) LAB-1	
	<b>3</b>		SB (S-216)	SB (S-216)				
	<b>5</b>		DR (CC-12) LAB-1				SB (S-216)	
	<b>CHEM</b>					<b>C</b>		
<b>THU</b>	<b>1</b>		DR (S-219)				KR (S-216)	
	<b>3</b>	KR (S-216)	NS (CC-6) LAB-1				SB (S-216)	
	<b>5</b>		SB (S-216)		KR (S-216)		DR+NS (CC-11) LAB-2	
	<b>CHEM</b>		KR/NS	DR/SB				
<b>FRI</b>	<b>1</b>		SB (S-216)				NS (S-219)	
	<b>3</b>		DR (S-219)	SB (CC-5) LAB-1			SB (S-216)	NS (S-219)
	<b>5</b>			NS (S-219)	DR (S-219)		DR (DSE-A1) LAB-2	
	<b>CHEM</b>					<b>S</b>		
<b>SAT</b>	<b>1</b>							
	<b>3</b>	KR (S-219)	DR (S-219)					
	<b>5</b>	DR (S-219)	KR (S-219)					
	<b>CHEM</b>					<b>S</b>		

Class allotted: SB- , NS- , KR- , DR-

H. O. D