SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

UG Department of Biotechnology

Add on Course: Metabolomics

Session 2023-24

Course Coordinator Report

A free Add-On Course for UG students in the Department Microbiology, Shri Shivaji Education Society Amravati's Science College, Congress Nagar, Nagpur was held from 09th August 2023 to 09th October 2023. The course title was "Metabolomics". It is the complete beginner to Expert Course was perfect for anyone who wants to learn Metabolomics.

The Metabolomics course is designed to provide rapidly evolving field in biochemistry and molecular biology, focusing on the comprehensive analysis of small molecules (metabolites) within cells, tissues, and biofluids. This course provides an overview of metabolomics techniques, including metabolite extraction methods, mass spectrometry analysis, and data interpretation. It also explores the applications of metabolomics in understanding biological systems, health, and disease.

The course duration was 10 weeks (30 hours). Two theory classes were engaged on Friday & Saturday and one Practical was engaged in every week. The structure of marking system was 50 marks on theory paper and 40 marks on practical examination including 10 marks for internal. The question paper of theory examination was in MCQ type of 25 questions with four multiple choices. Practical examination was also taken on this course for 40 marks. Internal marks assessment was on the basis of regularity, attendance, assignment submission etc. All the 48 students were present in both theory and practical examination. The result was prepared and certificates were also distributed to the students.

Action Taken - In the Metabolomics Add-On course conducted by the Department of Biotechnology, students acquired advanced skills in metabolite extraction and analysis using state-of-the-art techniques. They learned to interpret complex metabolomics data and apply it to explore biological systems, health conditions, and disease mechanisms. The course also provided hands-on experience with practical applications and research methodologies, enhancing their expertise in the field.

Science College, Congress Nagar, Nagpur. SEAL

Ms. Payal Talekar
Course- Coordinator
Add on Course

SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

UG Department of Biotechnology

Add on Course: Metabolomics

Session 2023-24

To,
The Principal
SSES Amt's Science College,
Congress Nagar, Nagpur-12

Subject: For permission to conduct the add on courses in Microbiology and Biotechnology department during the session 2023-2024

Respected Sir,

This is to request you that, the teachers of Microbiology and Biotechnology department have prepared the syllabus and modules of the 30 hours certificate courses for the session 2023-2024.

The details of the course module, syllabus and time table is submitted here with.

Hence please permit to run the add on courses and oblige me.

Thanking you

Yours sincerely

HEAD
Department of Microbiology
Science College, Congress Nagar,
NAGPUR.

Science College, Congress Nagar, Nagpur SEAL

Permitted

SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

UG Department of Biotechnology

NOTICE

Date: 03/08/2023

All the students are informed that **U.G. Department of Biotechnology** runs **Add on Course: Metabolomics** for the session 2023-24. Interested students of B.Sc. are requested to provide their names to the course Coordinator Ms. Payal Talekar on or before 07/08/2023.

Science College, Congress Nagar, Nagpur SEAL

Talekar

Ms. PayalTalekar
Course- Coordinator
Add-on Course

U.G. DEPARTMENT OF BIOTECHNOLOGY, SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

AccreditedwithCGPAof3.51at'A+'GradebyNAAC,Bangalore
ACollegewithPotentialforExcellence
AnInstitutionalMemberofAPQN
RecognizedCenterforHigherLearning & Research
AMentorCollegeunderParamarshSchemeofUGC,NewDelhi
A Mentor College under Paris Sparsh Scheme of Maharashtra State

Add on Course for the Session 2023-24

on

Metabolomics

Add-on Certificate Course: Metabolomics

Course Co-ordinator: Ms. PayalTalekar

Course Introduction

Metabolomics is a rapidly evolving field in biochemistry and molecular biology, focusing on the comprehensive analysis of small molecules (metabolites) within cells, tissues, and biofluids. This course provides an overview of metabolomics techniques, including metabolite extraction methods, mass spectrometry analysis, and data interpretation. It also explores the applications of metabolomics in understanding biological systems, health, and disease.

Course Objectives

- Introduction to metabolomics techniques and instrumentation.
- Hands-on practice in metabolite extraction
- Data acquisition and processing
- Applications of metabolomics in health, disease

Registration Date: 07/08/2023

Prof. AtulBobdey
Coordinator
Dept. of Biotechnology

Prof. MahendraDhore
Principal
Science College, Nagpur

Ms. PayalTalekar
Course- Coordinator
Add on Course

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Course Co-ordinator: Ms. PayalTalekar

Course Introduction

Metabolomics is a rapidly evolving field in biochemistry and molecular biology, focusing on the comprehensive analysis of small molecules (metabolites) within cells, tissues, and biofluids. This course provides an overview of metabolomics techniques, including metabolite extraction methods, mass spectrometry analysis, and data interpretation. It also explores the applications of metabolomics in understanding biological systems, health, and disease.

Course Objectives

1. Introduction to metabolomics techniques and instrumentation.
2. Hands-on practice in metabolite extraction
3. Data acquisition and processing
4. Applications of metabolomics in health, disease

- **Instructional Strategies:** Theory class, Practical, Video clips, Models etc.
- **Evaluation Strategies**: Oral discussions and Final MCQ examination

Course Outcomes: By the end of this course, participants will be able to:

1. Understand the principles and importance of metabolomics in biological research.
2. Demonstrate proficiency in metabolite extraction techniques.
3. Perform mass spectrometry analysis for metabolite identification.
4. Interpret metabolomics data and draw meaningful conclusions.
5. Apply metabolomics concepts in addressing biological questions related to health and disease.

Duration of course: Ten weeks (30 Hours)

Science College, Congress Nagar, Nagpur SEAL

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Ms. Payal Talekar
Course- Coordinator
Add on Course

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Module: The Structure of Syllabus and system of evaluation

Course	Theory Papers and Practical	Total Marks		
		Theory	Internal	Practical
Certificate Course in Metabolomics	Theory paper- Metabolomics * Theory examination will be of MCQ pattern having 25 questions each with equal marks.	50	10	40
	* Practical examination will be based on performance evaluation in the laboratory and hands-on-training	100		

Ms. Payal Talekar
Add on Course Coordinator

Dr. Amitabh Halder
IQAC Coordinator
Internal Quality Assurance Cell
(IQAC)
S. S. E. S. A. Science College
Congress Nagar, Nagpur.

Prof. Mahendra Dhore
Principal
Principal
S. S. E. S. Amravati's
Science College, Nagpur.

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Syllabus of Add on Course: Metabolomics

Course Units

Unit 1: Introduction to Metabolomics

- Overview of metabolomics and its significance in biomedical research.
- Types of metabolites and their roles in cellular processes.
- Introduction to metabolomics techniques and instrumentation.

Unit 2: Metabolite Extraction Methods

- Principles of metabolite extraction from biological samples.
- Techniques for sample preparation and extraction optimization.
- Hands-on practice in metabolite extraction from different sample types.

Unit 3: Mass Spectrometry in Metabolomics

- Fundamentals of mass spectrometry for metabolite analysis.
- Ionization techniques and mass analyzers used in metabolomics.
- Data acquisition and processing in mass spectrometry-based metabolomics.

Unit 4: Data Interpretation and Applications

- Data analysis strategies in metabolomics.
- Statistical approaches for metabolomics data interpretation.
- Applications of metabolomics in health, disease, and biomarker discovery.

Practical Sessions:

Practical 1: Metabolite Extraction Techniques

- Hands-on practice in metabolite extraction from plant tissues.
- Optimization of extraction protocols for different metabolite classes.

Practical 2: Mass Spectrometry Analysis

- Introduction to mass spectrometry instruments and operation.
- Analysis of standard metabolite samples using mass spectrometry.

Practical 3: Data Processing and Analysis

- Data processing using metabolomics software tools.
- Statistical analysis and visualization of metabolomics data.

Practical 4: Application of Metabolomics

- Case studies on using metabolomics in disease diagnosis.
- Identification of potential biomarkers through metabolomics analysis.

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Ms. PayalTalekar
Course- Coordinator
Add on Course

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Week-wise teaching plan:

Week	Hrs.	Syllabus
Week 1	1	Overview of metabolomics
	1	significance of metabolomics in biomedical research.
	1	Types of metabolites and their roles in cellular processes.
Week 2	1	Introduction to metabolomics techniques
	1	Instrumentation in metabolomics
	1	Principles of metabolite extraction from biological samples.
Week 3	1	Techniques for sample preparation
	1	extraction optimization
	1	metabolite extraction from different sample types.
Week 4	1	Fundamentals of mass spectrometry for metabolite analysis
	1	Ionization techniques
	1	mass analyzers used in metabolomics.

Week 5	1	Data acquisition
	2	mass spectrometry-based metabolomics
Week 6	2	Data analysis.
	1	strategies in metabolomics
Week 7	2	metabolomics data interpretation.
	2	Statistical approaches
Week 8	2	Applications of metabolomics in health, disease
	2	biomarker discovery
Week 9	1	Metabolite Extraction Techniques
	1	Mass Spectrometry Analysis
Week 10	1	Data Processing and Analysis
	1	Application of Metabolomics

Talekar

Ms. Payal Talekar
Course- Coordinator
Add on Course

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Add on Course: Metabolomics

Time Table

w.e.f. 09/08/2023

Day	Theory
Friday	Payal Talekar (R. no C6) Theory 4.00 PM – 5.00 PM
Saturday	Payal Talekar (R. no C6) practical, 4.00 PM – 5.00 PM
	Payal Talekar (R. no C6) Theory, 4.00 PM – 5.00 PM

Science College, Congress Nagar, Nagpur. SEAL

Ms. Payal Talekar
Course- Coordinator
Add on Course

ATTENDENCE SHEET (2023-24)

S.S.E.S.A`s Science College, Congress Nagar, Nagpur

Add on Course Metabolomics (Session -I)

Class: Metabolomics

Theory/ Practical:

Month: Aug + Sep.

Name of Lecturer: Ms. Payal Talekar

Sr. No	Name of Student	12/08/23	19/08/23	26/08/23	02/09/23	09/09/23
1.	Ambulkar Isha Pradnyanand	A	P	P	P	P
2.	Anmadwar Khushi Rajendra	P	P	A	P	P
3.	Bahadure Vanshita Dharmapal	P	P	P	A	P
4.	Bhagwat Ketki Aviraj	P	P	P	P	A
5.	Bhalkar Gauri Abhijit	P	P	P	P	P
6.	Binekar Mansi Sevak	P	A	P	P	P
7.	Bisen Riya Deliram	P	A	P	P	P
8.	Borkar Mansvi Ravi	A	P	P	P	P
9.	Borkar Nandini Ramkrushna	P	P	P	P	P
10.	Borkar Shreyasha Dinesh	P	P	P	A	P
11.	Buddhalwar Siddhi Vyankatesh	P	P	A	P	P
12.	Budhe Vinay Rajendra	P	P	P	A	P
13.	Chauhan Shantanusingh Shailendrasingh	P	P	P	A	P
14.	Choudhari Shravani Ramesh	A	P	P	P	P

	Dahat Surbhi Yograj	P	P	P	P	P																												
16.	Daheriya Jaysika Ramkishan	P	P	P	A	P																												
17.	Dahikar Sarwani Atul	P	P	A	P	P																												
18.	Das Chetana Shaktiprasad	P	P	P	P	A																												
19.	Datarkar Nayan Prakashrao	P	A	P	P	P																												
20.	Dhote Shrishti Ravindra	P	P	A	P	P																												
21.	Doye Pranali Shrikrushna	P	P	P	P	A																												
22.	Fiske Vedanti Jagdish	P	P	A	P	P																												
23.	Fulzele Tannu Shailesh	P	A	P	P	P																												
24.	Garode Gargi Shailesh	P	P	P	P	P																												
25.	Ghangare Priyanka Liladhar	P	P	P	A	P																												
26.	Gholse Leena Bhojraj	P	P	P	A	P																												
27.	Giri Yash Dilip	A	P	P	P	P																												
28.	Godse Siddhi Madhav	P	A	P	P	P																												
29.	Gotmare Parikshit Deepak	P	A	P	P	P																												
30.	Gurnule Madhavi Dhanraj	P	A	A	P	P																												
31.	Gurve Aditi Ramkrushna	P	P	P	A	A																												
32.	Hadke Tejasvi Nitin	P	P	A	P	A																												
33.	Jain Shruti Ravikumar	P	P	P	P	P																												
34.	Jenekar Shreya Narendra	P	A	P	P	P																												
35.	Kadu Kartik Vivek	P	P	P	A	P																												
36.	Kale Vaidehi Girish	P	P	P	P	A																												

	Kamane Saurabh Jagdish	P	P	P	P	P																														
38.	Kamble Shatakshi Vijay	P	A	P	P	P																														
39.	Khadse Isha Eshwar	P	A	P	P	P																														
40.	Khaparde Sourabhi Rajendra	P	P	P	P	A																														
41.	Khedule Tashu Vipul	P	A	P	P	P																														
42.	Khobragade Bhavesh Subhash	P	P	A	P	P																														
43.	Khorgade Shiwani Vasantrao	P	P	P	P	A																														
44.	Kohad Purva Sanjay	P	P	A	P	P																														
45.	Kolhe Yashaswi Pravin	P	A	P	A	A																														
46.	Kudkelwar Janhvi Ravi	P	A	P	A	P																														
47.	Lande Sonali Rajendra	P	A	P	P	P																														
48.	Lohakare Shravni Kawadu	P	P	P	P	A																														

ATTENDENCE SHEET (2023-24)

S.S.E.S.A`s Science College, Congress Nagar, Nagpur

Add on Course Metabolomics

(Session - 1)

Class: Metabolomics

Theory/ Practical:

Month: Aug. + Sep.

Name of Lecturer: Ms. Payal Talekar

Sr. No	Name of Student	11/08/23	12/08/23	18/08/23	19/08/23	25/08/23	26/08/23	01/09/23	02/09/23	08/09/23	09/09/23
1.	Ambulkar Isha Pradnyanand	P	P	P	A	P	P	P	P	A	P
2.	Anmadwar Khushi Rajendra	P	P	P	P	P	P	A	P	A	P
3.	Bahadure Vanshita Dharmapal	P	P	P	P	P	A	P	A	P	P
4.	Bhagwat Ketki Aviraj	P	P	P	A	P	P	A	P	P	P
5.	Bhalkar Gauri Abhijit	P	P	P	P	P	P	P	P	P	P
6.	Binekar Mansi Sevak	P	A	P	A	P	A	P	P	A	P
7.	Bisen Riya Deliram	P	P	P	A	P	P	A	P	A	P
8.	Borkar Mansvi Ravi	P	P	P	A	P	A	P	A	P	P
9.	Borkar Nandini Ramkrushna	A	P	P	P	A	P	A	P	A	P
10.	Borkar Shreyasha Dinesh	P	A	P	A	P	A	P	P	A	P
11.	Buddhalwar Siddhi Vyankatesh	P	P	A	P	A	P	P	A	P	A
12.	Budhe Vinay Rajendra	P	A	P	A	P	A	P	A	P	A
13.	Chauhan Shantanusingh Shailendrasingh	P	A	P	A	P	A	P	P	A	A
14.	Choudhari Shravani Ramesh	A	P	A	P	A	P	A	P	A	P

	Dahat Surbhi Yograj	P	P	P	P	A	P	P	A	P	P
16.	Daheriya Jaysika Ramkishan	P	P	P	P	P	P	P	P	A	P
17.	Dahikar Sarwani Atul	P	P	A	P	A	P	A	P	P	P
18.	Das Chetana Shaktiprasad	P	A	P	A	P	A	P	A	P	P
19.	Datarkar Nayan Prakashrao	P	P	P	P	A	P	A	P	A	P
20.	Dhote Shrishti Ravindra	P	P	A	P	A	P	P	P	P	P
21.	Doye Pranali Shrikrushna	P	A	P	A	P	A	P	A	P	P
22.	Fiske Vedanti Jagdish	P	A	P	A	P	A	P	A	P	P
23.	Fulzele Tannu Shailesh	P	P	P	P	P	P	A	P	A	P
24.	Garode Gargi Shailesh	P	A	P	A	P	P	P	P	P	P
25.	Ghangare Priyanka Liladhar	P	P	P	A	P	P	A	P	P	A
26.	Gholse Leena Bhojraj	P	A	P	P	A	P	P	A	P	P
27.	Giri Yash Dilip	P	P	P	A	P	A	P	A	P	P
28.	Godse Siddhi Madhav	P	A	P	A	P	A	P	A	P	A
29.	Gotmare Parikshit Deepak	P	A	P	P	A	P	P	A	P	P
30.	Gurnule Madhavi Dhanraj	P	A	P	A	P	A	P	P	A	P
31.	Gurve Aditi Ramkrushna	P	P	A	P	A	P	A	P	A	P
32.	Hadke Tejasvi Nitin	P	P	A	P	A	P	P	P	A	P
33.	Jain Shruti Ravikumar	P	A	P	A	P	P	P	P	A	P
34.	Jenekar Shreya Narendra	P	P	P	A	P	P	P	A	P	A
35.	Kadu Kartik Vivek	P	P	A	P	P	P	A	P	P	P
36.	Kale Vaidehi Girish	P	P	A	P	A	P	P	A	P	A

	Kamane Saurabh Jagdish	P	P	P	P	A	P	A	P	P	P																								
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48.	Lohakare Shravni Kawadu	P	A	P	P	P	A	P	P	P	P																								

College • Congress Nagar, Nagpur • Science
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P Talekar
Ms. Payal Talekar.

SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

UG Department of Biotechnology

EXAMINATION NOTICE

Date: 11/10/2023

All the students enrolled for**Add on Course: Metabolomics** for the session 2023-24 are informed that Theory and Practical Exam of the course is scheduled on 16/10/2023. All the appearing students are informed to remain present in Biotechnology Laboratory at 10:30 – 11:30AM AM for Theory Exam and at 12:30PM – 5:30PM for Practical Exam.

Science College, Congress Nagar, Nagpur SEAL

Ms. Payal Talekar
Course- Coordinator
Add on Course

List of the Students: Add on Course- Metabolomics

(Session 2023-2024)

Sr. No.	Name of Student	Signature
1)	Ambulkar Isha Pradnyanand	Isha
2)	Anmadwar Khushi Rajendra	Khushi
3)	Bahadure Vanshita Dharmapal	Vanshita
4)	Bhagwat Ketki Aviraj	Ketki
5)	Bhalkar Gauri Abhijit	Gauri
6)	Binekar Mansi Sevak	Mansi
7)	Bisen Riya Deliram	Riya
8)	Borkar Mansvi Ravi	Mansvi
9)	Borkar Nandini Ramkrushna	Nandini
10)	Borkar Shreyasha Dinesh	Shreyasha
11)	Buddhalwar Siddhi Vyankatesh	Siddhi
12)	Budhe Vinay Rajendra	Vinay
13)	Chauhan Shantanusingh Shailendrasingh	Chauhan
14)	Choudhari Shravani Ramesh	Shravani
15)	Dahat Surbhi Yograj	Surbhi
16)	Daheriya Jaysika Ramkishan	Jaysika
17)	Dahikar Sarwani Atul	Sarwani
18)	Das Chetana Shaktiprasad	Chetana
19)	Datarkar Nayan Prakashrao	Nayan
20)	Dhote Shrishti Ravindra	Shrishti
21)	Doye Pranali Shrikrushna	Pranali
22)	Fiske Vedanti Jagdish	Vedanti
23)	Fulzele Tannu Shailesh	Tannu
24)	Garode Gargi Shailesh	Gargi

25)	Ghangare Priyanka Liladhar	Priyanka.
26)	Gholse Leena Bhojraj	Leena
27)	Giri Yash Dilip	Yash
28)	Godse Siddhi Madhav	Siddhi.
29)	Gotmare Parikshit Deepak	Parikshit
30)	Gurnule Madhavi Dhanraj	Madhavi
31)	Gurve Aditi Ramkrushna	Aditi
32)	Hadke Tejasvi Nitin	Tejasvi.
33)	Jain Shruti Ravikumar	Shruti
34)	Jenekar Shreya Narendra	Shreya.
35)	Kadu Kartik Vivek	Kadu.
36)	Kale Vaidehi Girish	Vaidehi.
37)	Kamane Saurabh Jagdish	Saurabh
38)	Kamble Shatakshi Vijay	Shatakshi
39)	Khadse Isha Eshwar	Isha.
40)	Khaparde Sourabhi Rajendra	Sourabhi
41)	Khedule Tashu Vipul	Tashu
42)	Khobragade Bhavesh Subhash	Bhavesh
43)	Khorgade Shiwani Vasantrao	Shivani.
44)	Kohad Purva Sanjay	Purva
45)	Kolhe Yashaswi Pravin	Yashaswi
46)	Kudkelwar Janhvi Ravi	Janhvi.
47)	Lande Sonali Rajendra	Sonali
48)	Lohakare Shravni Kawadu	Shravni.

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Theory Exam Multiple Choice Questions (MCQs) Pattern

1. What is metabolomics?
- A) Study of large biomolecules
- B) Study of small molecules in biological systems
- C) Study of cell structure
- D) Study of protein interactions
- **Answer: B**

2. Which technique is commonly used for metabolite extraction?
- A) Polymerase chain reaction (PCR)
- B) Spectrophotometry
- C) Liquid-liquid extraction
- D) Western blotting
- **Answer: C**

3. What is the purpose of mass spectrometry in metabolomics?
- A) To analyze DNA sequences
- B) To identify proteins
- C) To detect and quantify metabolites
- D) To study cell morphology
- **Answer: C**

4. Which of the following is NOT a mass spectrometry ionization technique?
- A) Electrospray ionization (ESI)
- B) Matrix-assisted laser desorption/ionization (MALDI)
- C) Polymerase chain reaction (PCR)
- D) Chemical ionization (CI)
- **Answer: C**

5. What is a common statistical method used in metabolomics data analysis?
- A) Polymerase chain reaction (PCR)
- B) Principal component analysis (PCA)
- C) Western blotting
- D) Spectrophotometry
- **Answer: B**

6. Which of the following is an application of metabolomics?
- A) Disease diagnosis
- B) Structural biology
- C) Cell culture techniques
- D) Immunohistochemistry
- **Answer: A**

7. What is a biomarker?
- A) A type of enzyme
- B) A molecule used in PCR
- C) An indicator of biological processes or conditions
- D) A protein structure

- **Answer: C**

8. What does LC-MS stand for in metabolomics?
- A) Liquid Chromatography-Mass Spectrometry
- B) Lysine-Cell Mass Spectrometry
- C) Long-chain Metabolite Spectroscopy
- D) Lactic Acid-Methionine Synthesis
- **Answer: A**

9. Which software tool is commonly used for metabolomics data analysis?
- A) Microsoft Excel
- B) Adobe Photoshop
- C) SIMCA
- D) Polymerase chain reaction (PCR)
- **Answer: C**

10. What is the primary goal of metabolomics data interpretation?
- A) To create 3D models of metabolites
- B) To identify potential biomarkers
- C) To study cell division
- D) To analyze gene expression
- **Answer: B**

11. What is the role of metabolomics in personalized medicine?
- A) To study plant metabolism
- B) To analyze DNA sequences
- C) To identify individualized treatment approaches based on metabolite profiles
- D) To perform protein assays
- **Answer: C**

12. Which type of sample is commonly used in metabolomics studies?
- A) Blood
- B) Urine
- C) Plant tissues
- D) All of the above
- **Answer: D**

13. What is the purpose of metabolite extraction from biological samples?
- A) To study gene expression
- B) To isolate proteins
- C) To obtain metabolite profiles for analysis
- D) To perform PCR
- **Answer: C**

14. Which technique is used for metabolomics data visualization?
- A) Electron microscopy
- B) Nuclear magnetic resonance (NMR)
- C) Gel electrophoresis
- D) Western blotting
- **Answer: B**

15. What is the advantage of using mass spectrometry in metabolomics?
- A) It can only detect proteins
- B) It provides high sensitivity and specificity
- C) It requires large sample volumes
- D) It is limited to analyzing DNA sequences
- **Answer: B**

16. Which of the following is a metabolomics database?

- A) Enzyme Commission (EC)
- B) Kyoto Encyclopedia of Genes and Genomes (KEGG)
- C) Polymerase chain reaction (PCR)
- D) Gel electrophoresis
- **Answer: B**

17) Which aspect of sample preparation in metabolomics aims to account for instrumental noise and background contamination?

a) Replicates
b) Samples blanks
c) Extraction methodology optimization
d) Plasticizer detection

Answer: B

18) Which spectroscopic technique is considered non-destructive and is utilized in metabolomics for analyzing small molecules?

a) Raman Spectroscopy (RS)
b) Nuclear magnetic resonance spectroscopy (NMR)
c) Fourier-transform infrared spectroscopy (FTIR)
d) Surface-enhanced Raman scattering (SERS)

Answer:C

19) What is the term used to describe the complete set of all low-molecular-weight metabolites found in a biological sample?

a) Metabolic Profile
b) Metabolic Intermediates
c) Metabolome
d) Lipidome

Answer:C

20) Which component is NOT typically part of a mass spectrometry system operation?

a) High speed switching micro electronics
b) Electric/magnetic field
c) Vacuum system
d) Electromagnetic radiation source

Answer: D

21) What is the main focus of metabolomics in studying small molecules within biological systems?

a) Reflecting the underlying biochemical activity and state of cells/tissues
b) Quantifying protein expression levels

c) Measuring physical characteristics of cells
d) Identifying genetic mutations

Answer: A

22)What is the analysis of all lipids, their interactions, and functions within biological systems known as?

a. Metabolomics
b. Lipidomics
c. Metabolic profiling
d. Proteomics

Answer: B

23) Metabolomics involves the study of...?

a) mRNA
b) Genes
c) Metabolites
d) Proteins

Answer: C

24)Which of the following classes of molecules could be defined as small molecules?

a) tRNA
b) Polymers
c) Lipids
d) Amino acids

Answer: C

25)Metabolomics can help to develop early-detection systems to improve healthcare.

a) True
b) False

Answer: A

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Ms. PayalTalekar
Course- Coordinator
Add on Course

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Practical Exam Question Paper:

Subject :**Metabolomics**

Center :S.S.E.S.A's Science College, Nagpur

Time : 5hrs per day

Dates : 16/10/2023

Max. Marks: 40

Q.1. To perform Metabolite Extraction Technique 10

Q.2. To perform Data Processing and Analysis 10

Q.3. Viva-Voce 10

Q.4. Practical Record 10

Total Marks 40

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P Talekar

Ms. Payal Talekar
Course- Coordinator
Add on Course

Shri Shivaji Education Society, Amravati's

SCIENCE COLLEGE

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Mentor College under 'PARAMARSH Scheme', UGC, New Delhi

U.G. DEPARTMENT OF BIOTECHNOLOGY

Add-on Course

Course Exam Name: Metabolomics

Name of Student: Gauri A. Bhalkar.

Roll No.:

Session: 2023-24

Test Date: 16/10/2023

Max. Marks: 50

Invigilator Signature

Obtained Marks: 50

INSTRUCTIONS FOR FILLING THE SHEET
1. This sheet should not be folded or crushed.
2. Use only blue/ black ball point pen to fill the circles.
3. Use of pencil is strictly prohibited.
4. Circles should be darkened completely and properly.
5. Cutting and erasing on this sheet is not allowed.
6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS CORRECT METHOD

	A	B	C	D
1	○	●	○	○
2	○	○	●	○
3	○	○	●	○
4	○	○	●	○
5	○	●	○	○
6	○	●	○	○
7	○	○	●	○
8	●	○	○	○
9	○	○	●	○
10	○	●	○	○
11	○	○	●	○
12	○	○	○	●
13	○	○	●	○
14	○	●	○	○
15	○	●	○	○
16	○	●	○	○
17	○	●	○	○
18	○	○	●	○
19	○	○	●	○
20	○	○	○	●
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47	○	○	○	○
48	○	○	○	○
49	○	○	○	○
50	○	○	○	○

UG Department of Biotechnology

Mark List: Add on Course- Metabolomics (Session 2023-2024)

Sr. No.	Name of Student	Marks obtained out of 50 (Theory)	Marks obtained out of 40 (Practical)	Marks obtained out of 10 (Internal)	Total Marks 100	Grade
1)	Ambulkar Isha Pradnyanand	46	39	10	95	O
2)	Anmadwar Khushi Rajendra	42	34	10	86	A+
3)	Bahadure Vanshita Dharmapal	48	36	10	94	O
4)	Bhagwat Ketki Aviraj	48	36	10	94	O
5)	Bhalkar Gauri Abhijit	50	38	10	98	O
6)	Binekar Mansi Sevak	48	35	10	93	O
7)	Bisen Riya Deliram	46	35	10	91	O
8)	Borkar Mansvi Ravi	50	37	10	97	O
9)	Borkar Nandini Ramkrushna	48	36	10	94	O
10)	Borkar Shreyasha Dinesh	42	35	10	87	A+
11)	Buddhalwar Siddhi Vyankatesh	48	36	10	94	O
12)	Budhe Vinay Rajendra	50	35	10	95	O
13)	Chauhan Shantanusingh Shailendrasingh	48	35	10	93	O

14)	Choudhari Shravani Ramesh	46	35	10	91	O
15)	Dahat Surbhi Yograj	50	35	10	95	O
16)	Daheriya Jaysika Ramkishan	48	36	10	94	O
17)	Dahikar Sarwani Atul	50	38	10	98	O
18)	Das Chetana Shaktiprasad	46	39	10	95	O
19)	Datarkar Nayan Prakashrao	42	34	10	86	A+
20)	Dhote Shrishti Ravindra	48	36	10	94	O
21)	Doye Pranali Shrikrushna	48	36	10	94	O
22)	Fiske Vedanti Jagdish	50	38	10	98	O
23)	Fulzele Tannu Shailesh	50	35	10	95	O
24)	Garode Gargi Shailesh	50	37	10	97	O
25)	Ghangare Priyanka Liladhar	48	36	10	94	O
26)	Gholse Leena Bhojraj	42	35	10	87	A+
27)	Giri Yash Dilip	48	36	10	94	O
28)	Godse Siddhi Madhav	46	39	10	95	O
29)	Gotmare Parikshit Deepak	42	34	10	86	A+
30)	Gurnule Madhavi Dhanraj	48	36	10	94	O
31)	Gurve Aditi Ramkrushna	48	36	10	94	O

32)	Hadke Tejasvi Nitin	50	38	10	98	O
33)	Jain Shruti Ravikumar	50	35	10	95	O
34)	Jenekar Shreya Narendra	50	37	10	97	O
35)	Kadu Kartik Vivek	48	36	10	94	O
36)	Kale Vaidehi Girish	42	35	10	87	A+
37)	Kamane Saurabh Jagdish	48	36	10	94	O
38)	Kamble Shatakshi Vijay	50	38	10	98	O
39)	Khadse Isha Eshwar	46	39	10	95	O
40)	Khaparde Sourabhi Rajendra	42	34	10	86	A+
41)	Khedule Tashu Vipul	48	36	10	94	O
42)	Khobragade Bhavesh Subhash	48	36	10	94	O
43)	Khorgade Shiwani Vasantrao	50	38	10	98	O
44)	Kohad Purva Sanjay	50	37	10	97	O
45)	Kolhe Yashaswi Pravin	48	36	10	94	O
46)	Kudkelwar Janhvi Ravi	42	35	10	87	A+
47)	Lande Sonali Rajendra	48	36	10	94	O
48)	Lohakare Shravni Kawadu	50	37	10	97	O

Science College, Congress Nagar, Nagpur SEAL

Ms Payal Talekar -
Course Co-ordinator

Shri Shivaji Education Society Amravati's

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CERTIFICATE

Mr./Ku. GAURI A BHALKAR is awarded with certificate on successful completion of the course entitled, Certificate course in "Metabolomics"

Session 2023-24 under Add-on course conducted for 30 hours from 09/08/2023 to 09/10/2023 by Department of Biotechnology, SSESA's, Science College, congress Nagar, Nagpur 440012.

He/She has passed the Examination with '_O_' Grade.

Ms. Payal Talekar
Coordinator, Department of Biotechnology

SEAL

Prof. M. P. Dhore
Principal, Science College, Nagpur

SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

UG Department of Biotechnology

Add on Course: Metabolomics (Session 2023-24)

Feedback form

Thank you for participating in our Add on course Metabolomics. Your feedback is crucial in helping us improve the course and enhance your learning experience. Please take a few moments to complete this feedback form.

Que. 1 **How would you rate the overall quality of the Add on Course –Metabolomics**

a) Excellent
b) Good
c) Average

Que. 2 **How well did the Add on Course – Metabolomics meet your expectations?**

a) Exceeded expectations
b) Met expectations
c) Below expectations

Que. 3 **How effective were the course instructors in delivering the Add on Course – Metabolomics**

a) Very effective
b) Effective
c) Ineffective

Que. 4 **How likely are you to recommend the Add on Course –Metabolomics to others?**

a) Very Likely
b) Likely
c) Unlikely

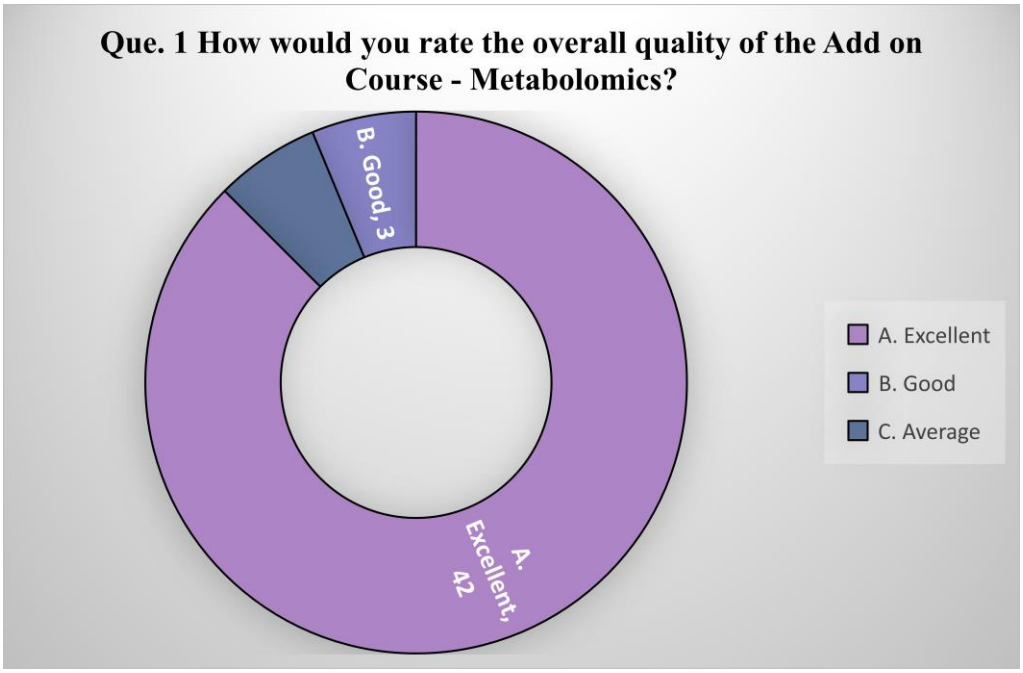
Que. 5 **How satisfied are you with the practical sessions of the Add on Course – Metabolomics?**

a) Very Satisfied
b) Satisfied
c) Dissatisfied

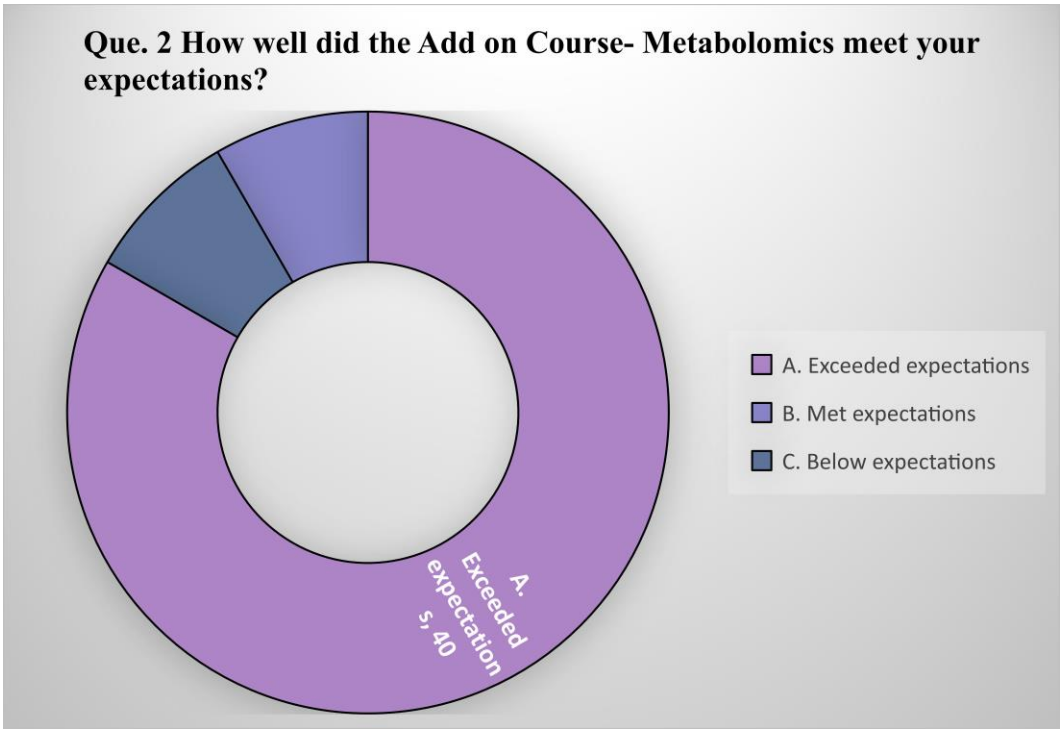
UG Department of Biotechnology
Skill Based Course: Metabolomics (Session 2023-24)

Feedback Response

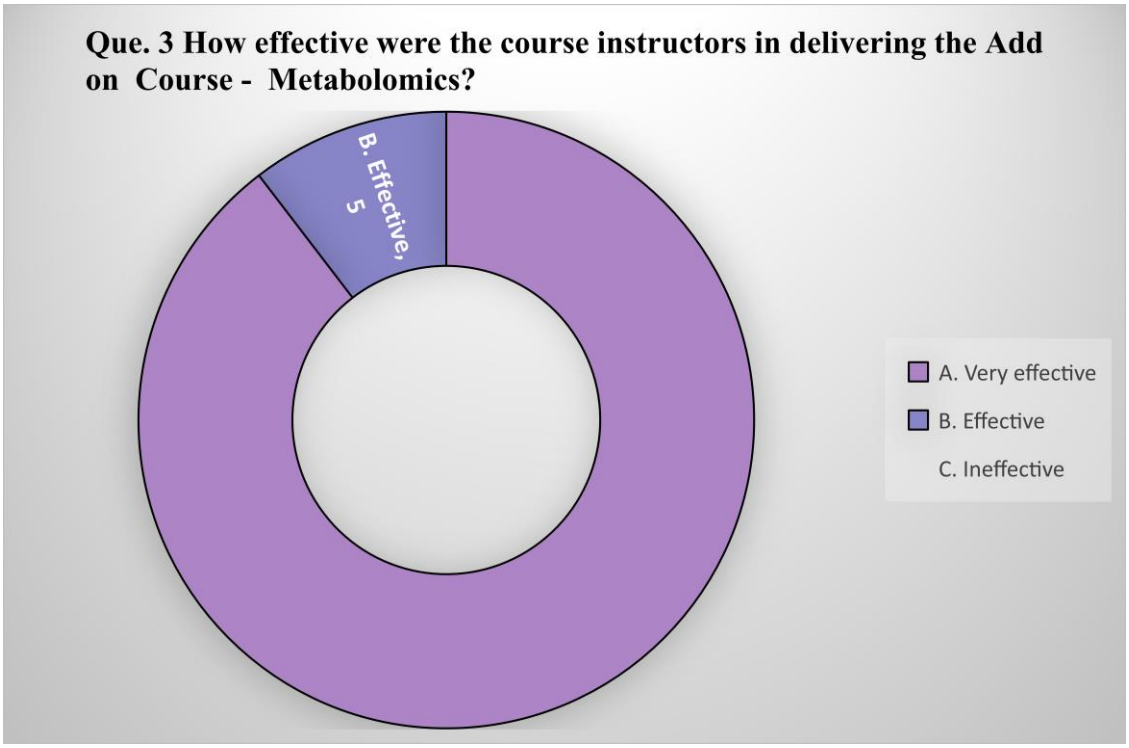
48 responses



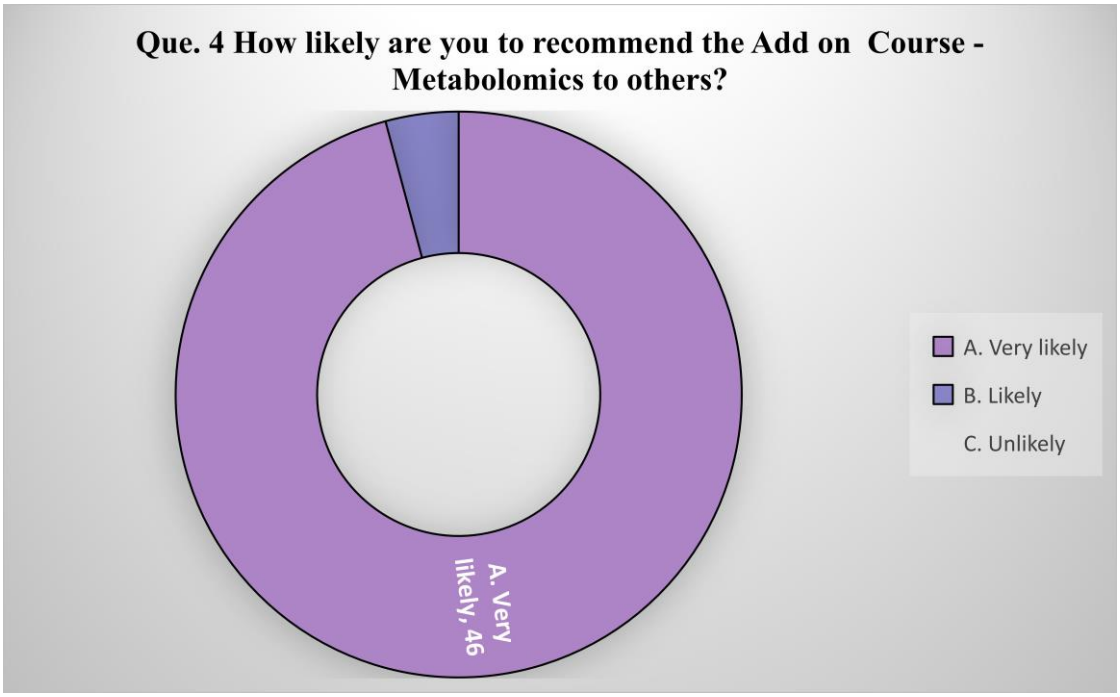
48 responses



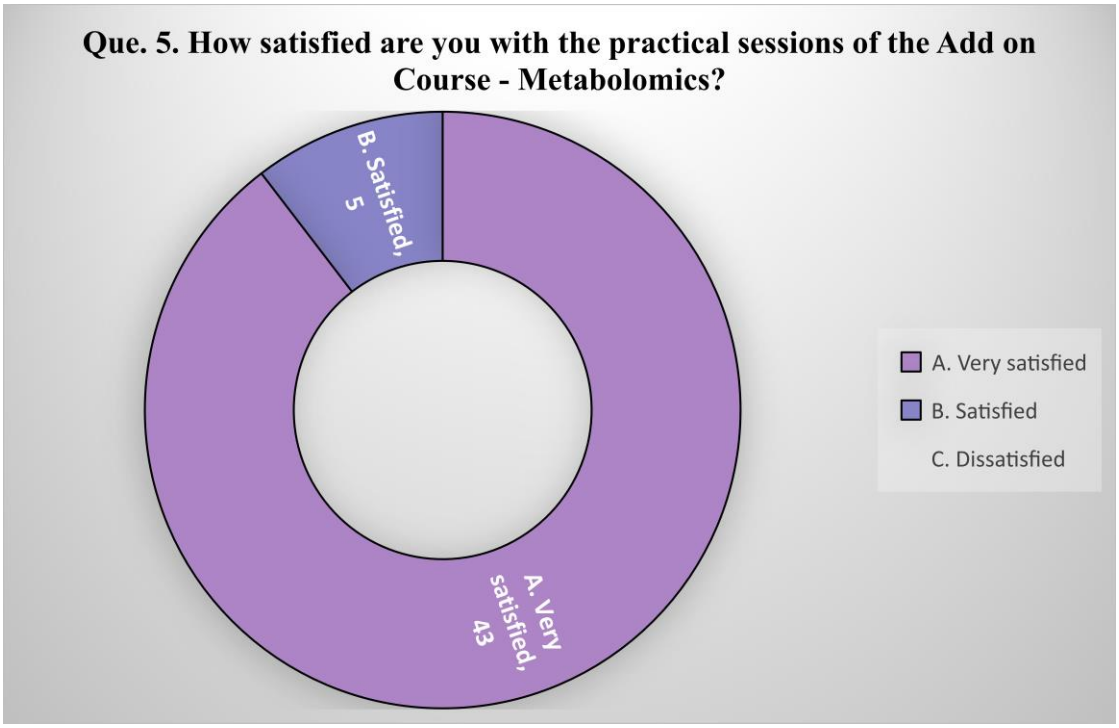
48 responses



48 responses



48 responses



Ms. Payal Talekar
Course- Coordinator
Add on Course

Dr. Amitabh Halder
IQAC Coordinator
Internal Quality Assurance Cell
(IQAC)
S. S. E. S. A. Science College
Congress Nagar, Nagpur.

Prof. Mahendra Dhore
Principal
Principal
S. S. E. S. Amravati's
Science College, Nagpur.

Science College, Congress Nagar, Nagpur.
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