

Report
On
Add-on Course on
SAGE MATH AND ITS APPLICATIONS

Conducted by
Department of Mathematics
Raja Peary Mohan College, Uttarpara,
Hooghly

2022-2023



RAJA PEARY MOHAN COLLEGE

1, Acharya Dhruba Pal Road,
Uttarpara, Hooghly, West Bengal, Pin- 712 258.

Tel No.: (033)2663-0191, Mob: 7074292263

Website: <https://www.website.rpmcollege.edu.in/>, e-mail: rajapearymohancollege@gmail.com

ISO Certified

Ref.: _____

Date: _____

DECLARATION FROM THE PRINCIPAL

This is to certify that all the data provided in this document is true to the best of my knowledge.

A RAJA PEARY MOHAN COLLEGE INITIATIVE

SAGEMATH AND ITS APPLICATIONS

ADD ON COURSE BY

DEPARTMENT OF MATHEMATICS

SESSION: 2022 - 2023

Course Director : Dr. Sudip Kumar Chakrabarty

Course Coordinator : Dr. Tanusree Choudhury

Course Duration : 36 Hours

Mode of Teaching : OFFLINE

**Beneficiary : Mathematics Honours Students
(Final Semester)**

Course Objective: This course aims to use SageMath, a free and open source computer system to explore concepts in Calculus, Applied Linear Algebra and Numerical Methods. The course will begin with the introduction of basic SageMath, plotting 2D and 3D objects. The main focus will be on using SageMath to explore topics in Calculus, Applied Linear Algebra, Numerical Methods and several applications.

Mode Of delivery: Lectures & Hands on (in the Lab)

Syllabus (Outline):

1. Introduction to SageMath
2. Numerical and symbolic computations using mathematical functions
3. Graphical representations of few functions
4. Plots of functions with asymptotes
5. Superimposing multiple graphs in one plot like plotting a curve along with a tangent on that curve (if it exists)
6. SageMath commands for differentiation, higher order derivatives
7. Introduction to Programming in SageMath
8. Use of inbuilt functions that deal with matrices, determinant, inverse of a given real square matrix (if it exists), solving a system of linear equations, finding roots of a given polynomial
9. Solving differential equations

Course fee: Rs. 250/-

Number of seats: 25

Contact for information and registration:

courses.maths.rpmc@gmail.com



RAJA PEARY MOHAN COLLEGE

রাজা প্যারীমোহন কলেজ

1, ACHARYA DHRUBA PAL ROAD, UTTARPARA, HOOGHLY, WEST BENGAL, PIN- 712 258

Tel No. : 033-2663-0191 & 7074292263

E-mail : rajapearymohancollege@gmail.com Website : www.rpmcollege.edu.in

১, আচার্য্য ধ্রুব পাল রোড উত্তরপাড়া, হুগলী, পশ্চিমবঙ্গ, পিন - ৭১২২৫৮,

দূরভাষ : ০৩৩-২৬৬৩-০১৯১ & ৭০৭৪২৯২২৬৩

NAAC Accredited with B grade (2.7); ISO 9001 : 2015

Ref. No./সূচক সংখ্যা _____

Date/তারিখ 04.03.23

Extract of the Proceedings of the meeting of the IQAC of Raja Peary Mohan College,
Uttarpara, Hooghly, held on 27.02.2023 in the IQAC Room.

Agendum No 4:

Resolved that the following Addon/Certificate courses will start from 2022-2023 even semester.

New courses to be introduced

1. Political Science: Climate Change & Public Policy Indian Perspectives.
2. Physics: basic computational tools for scientific applications.
3. Research: Basic Practical Bio technology.
4. Mitali Women Cell: Handicrafts & Jewellery Making.
5. Philosophy: Philosophy & Practice: Some ethical issues in Contemporary era.
6. Central Library: Digital Library
7. Economics: Add on Course on Advances in Applied Econometrics with Stata Software
8. Bengali: Certificate Course on Folklore
9. Photography Club: Add on Course on Photography & Photo Editing for Beginners
10. Heritage Cell: Add on course on Painting & its Applications
11. Bengali: Add on Course on Eco-Fiction
12. Computer Science: Add on Course on Advance course on MS Office & Networking
- 13 Add on course on Book Making & Editing
- 14, Mathematics: Add on Course on Sage Maths and its Applications
15. Add on Course in Digital Marketing.

Sanjukta Bhattacharjee

Coordinator, IQAC
Raja Peary Mohan College
Uttarpara, Hooghly

Coordinator,
Internal Quality Assurance Cell
Raja Peary Mohan College
Uttarpara, Hooghly

প্রিন্সিপাল

Principal
Raja Peary Mohan College
Uttarpara, Hooghly

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly



RAJA PEARY MOHAN COLLEGE

রাজা প্যারীমোহন কলেজ

1, ACHARYA DHRUBA PAL ROAD, UTTARPARA, HOOGHLY, WEST BENGAL, PIN - 712 258

Tel No. : 033-2663-0881/2663-0191, Fax No. : 033-2663-4155

E-mail : rajapearymohancollege@gmail.com Website : www.rpmcollege.org.in

১, আচার্য্য ধ্রুব পাল রোড উত্তরপাড়া, হুগলী, পশ্চিমবঙ্গ, পিন - ৭১২২৫৮,

দূরভাষ : ০৩৩-২৬৬৩-০৮৮১/২৬৬৩-০১৯১, ফ্যাক্স : ০৩৩-২৬৬৩-৪১৫৫

Ref. No./সূচক সংখ্যা _____

Date/তারিখ 23.03.23

NOTICE

NOTICE

It is hereby notified for all concerned that the Add on Course conducted by Department of Mathematics on “Sage Math and its Applications” will commence from 8th April, 2023. Interested students may enroll their name to the course coordinator.

Janusree Choudhury

Course Coordinator

[Signature]

Principal

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly



RAJA PEARY MOHAN COLLEGE

রাজা প্যারীমোহন কলেজ

1, ACHARYA DHRUBA PAL ROAD, UTTARPARA, HOOGHLY, WEST BENGAL, PIN - 712 258

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দূরভাষ : ০৩৩-২৬৬৩-০৮৮১/২৬৬৩-০১৯১, ফ্যাক্স : ০৩৩-২৬৬৩-৪১৫৫

Ref. No. /সূচক সংখ্যা _____

Date /তারিখ 05.04.2023

NOTICE

It is hereby notified for all concerned that the classes of the Add on Course conducted by Department of Mathematics on “**SAGEMATH AND ITS APPLICATIONS**” will commence from 8th April, 2023.

Janusree Choudhury

Course Coordinator

প্রিন্সিপাল

Principal

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

Sage Math and Its Applications
ADD ON COURSE 2023
Department of Mathematics
Registration of the Course

| S.N. | Student Id | Name | Roll No | Signature |
|------|--------------|-----------------------|---------|-----------------------|
| 1. | BSe./20/0017 | Ankan Manna | 017 | Ankan Manna |
| 2. | BSe./20/0244 | Ankita Rajbhar | 244 | Ankita Rajbhar. |
| 3. | BSe./20/0237 | Anvesha Manna | 237 | Anvesha Manna |
| 4. | BSe./20/0087 | Arghya Santra | 087 | Arghya Santra |
| 5. | BSe./20/0205 | Ayantika Karmakar | 205 | Ayantika Karmakar. |
| 6. | BSe./20/0014 | Dibyashri Chowdhury | 014 | Dibyashri Chowdhury. |
| 7. | BSe./20/0189 | Indranil Ganguly | 189 | Indranil Ganguly |
| 8. | BSe./20/0015 | Jeet Kumar Nayek | 015 | Jeet Kumar Nayek |
| 9. | BSe./20/0240 | Kaustav Chattopadhyay | 240 | Kaustav Chattopadhyay |
| 10. | BSe./20/0239 | Rohit Gupta | 239 | Rohit Gupta |
| 11. | BSe./20/0067 | Shubhankar Dalui | 067 | Shubhankar Dalui |
| 12. | BSe./20/0156 | Siya Sana | 156 | Siya Sana |
| 13. | BSe./20/0264 | Srinita Sen | 264 | Srinita Sen |
| 14. | BSe./20/0073 | Tamirul Islam | 073 | Tamirul Islam |
| 15. | BSe./20/0188 | Triyasa Ghosh | 188 | Triyasa Ghosh |
| | | | | |
| | | | | |
| | | | | |

Janusree Choudhury
[COURSE COORDINATOR]

7
[PRINCIPAL]

PRINCIPAL
Raja Peary Mohan College

**SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour**

| Student Id | Name | Date 08.04 T.C. | Date 10.04 T.C. | Date 11.04 T.C. | Date 18.04 T.C. | Date 19.04 T.C. | Date 24.04 T.C. |
|------------|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| BSc/20/017 | ANKAN MANNA | P | P | P | P | . | P |
| BSc/20/244 | ANKITA RAJBHAR | P | . | P | P | P | P |
| BSc/20/237 | ANWESHA MANNA | P | P | P | P | P | P |
| BSc/20/087 | ARGHYA SANTRA | P | P | P | P | P | P |
| BSc/20/205 | AYANTIKA KARMAKAR | . | P | P | P | P | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | P | P | . | . | P | P |
| BSc/20/189 | INDRANIL GANGULY | P | P | P | P | P | . |
| BSc/20/015 | JEET KUMAR NAYEK | P | P | P | . | P | P |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | P | . | P | P | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | P | P | P | . |
| BSc/20/067 | SUBHANKAR DALUI | P | . | P | . | P | P |
| BSc/20/156 | SIYA SANA | P | P | . | P | P | P |
| BSc/20/264 | SRINITA SEN | P | P | P | P | P | . |
| BSc/20/073 | TAMIRUL ISLAM | P | P | . | P | . | P |
| BSc/20/188 | TRİYASA GHOSH | P | P | P | . | P | P |

Janusree Choudhury
[Course Coordinator]

J.
[Principal]

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour

| Student Id | Name | Date 24.04 T.C. | Date 26.04 T.C. | Date 26.04 T.C. | Date 02.05 T.C. | Date 03.05 T.C. | Date 03.05 T.C. |
|------------|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| BSc/20/017 | ANKAN MANNA | P | P | . | P | P | P |
| BSc/20/244 | ANKITA RAJBHAR | P | . | P | P | P | P |
| BSc/20/237 | ANWESHA MANNA | P | P | P | . | P | P |
| BSc/20/087 | ARGHYA SANTRA | P | P | P | P | P | . |
| BSc/20/205 | AYANTIKA KARMAKAR | P | P | P | P | . | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | P | P | . | P | P | P |
| BSc/20/189 | INDRANIL GANGULY | . | P | P | P | P | P |
| BSc/20/015 | JEET KUMAR NAYEK | P | . | P | P | P | P |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | P | P | P | . | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | P | P | . | P |
| BSc/20/067 | SUBHANKAR DALUI | P | P | P | P | P | . |
| BSc/20/156 | SIYA SANA | . | P | P | P | P | P |
| BSc/20/264 | SRINITA SEN | P | . | P | P | P | P |
| BSc/20/073 | TAMIRUL ISLAM | P | P | P | P | . | P |
| BSc/20/188 | TRIYASA GHOSH | P | P | P | P | P | . |

Janusree Choudhury
[Course Coordinator]

J
[Principal]

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour

| Student Id | Name | Date 08.05 T.C. | Date 08.05 T.C. | Date 11.05 S.B. | Date 11.05 S.B. | Date 15.05 D.P. | Date 18.05 D.P. |
|------------|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| BSc/20/017 | ANKAN MANNA | P | . | P | P | P | P |
| BSc/20/244 | ANKITA RAJBIAR | . | P | P | P | P | . |
| BSc/20/237 | ANWESHA MANNA | P | P | . | P | P | P |
| BSc/20/087 | ARGHYA SANTRA | P | P | P | . | P | P |
| BSc/20/205 | AYANTIKA KARMAKAR | P | P | P | P | . | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | . | P | P | . | P | P |
| BSc/20/189 | INDRANIL GANGULY | P | . | P | P | P | P |
| BSc/20/015 | JEET KUMAR NAYEK | P | P | P | P | P | . |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | P | P | . | P | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | P | P | . | P |
| BSc/20/067 | SUBHANKAR DALUI | P | P | P | P | P | . |
| BSc/20/156 | SIYA SANA | P | . | P | . | P | P |
| BSc/20/264 | SRINITA SEN | . | P | P | P | P | P |
| BSc/20/073 | TAMIRUL ISLAM | P | P | P | P | . | P |
| BSc/20/188 | TRİYASA GHOSH | P | P | P | . | P | . |

Janasree Choudhury
[Course Coordinator]

[Signature]
[Principal]

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour

| Student Id | Name | Date 18.05 Sat | Date 19.05 Sat | Date 20.05 Sat | Date 22.05 Sat | Date 22.05 Sat | Date 25.05 Sat |
|------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| BSc/20/017 | ANKAN MANNA | P | P | . | P | . | P |
| BSc/20/244 | ANKITA RAJBHAR | . | P | P | P | P | P |
| BSc/20/237 | ANWESHA MANNA | P | . | P | P | P | P |
| BSc/20/087 | ARGHYA SANTRA | P | P | P | . | P | . |
| BSc/20/205 | AYANTIKA KARMAKAR | . | P | P | P | P | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | P | . | P | P | P | P |
| BSc/20/189 | INDRANIL GANGULY | P | P | . | P | P | P |
| BSc/20/015 | JEET KUMAR NAYEK | P | P | P | P | P | P |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | P | P | P | . | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | P | P | . | P |
| BSc/20/067 | SUBHANKAR DALUI | P | P | P | P | P | . |
| BSc/20/156 | SIYA SANA | P | P | P | P | P | P |
| BSc/20/264 | SRINITA SEN | P | P | P | P | P | P |
| BSc/20/073 | TAMIRUL ISLAM | P | . | P | P | P | P |
| BSc/20/188 | TRIYASA GHOSH | P | P | P | . | P | . |

Janusree Choudhury
 [Course Coordinator]

J.
 [Principal]

PRINCIPAL
 Raja Peary Mohan College
 Uttarpara, Hooghly

SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour

| Student Id | Name | Date | Date | Date | Date | Date | Date |
|------------|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | 27.05 S.F. | 27.05 S.F. | 29.05 S.F. | 29.05 S.F. | 02.06 D.M. | 02.06 D.M. |
| BSc/20/017 | ANKAN MANNA | P | P | P | P | P | P |
| BSc/20/244 | ANKITA RAJBHAR | P | P | . | P | P | P |
| BSc/20/237 | ANWESHA MANNA | P | . | P | P | P | P |
| BSc/20/087 | ARGHYA SANTRA | . | P | P | P | P | P |
| BSc/20/205 | AYANTIKA KARMAKAR | P | P | P | P | P | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | P | P | P | . | . | P |
| BSc/20/189 | INDRANIL GANGULY | P | P | P | P | P | . |
| BSc/20/015 | JEET KUMAR NAYEK | . | P | P | P | P | P |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | P | . | P | P | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | . | P | P | P |
| BSc/20/067 | SUBHANKAR DALUI | P | P | P | . | P | P |
| BSc/20/156 | SIYA SANA | P | P | P | P | . | P |
| BSc/20/264 | SRINITA SEN | P | P | P | P | P | . |
| BSc/20/073 | TAMIRUL ISLAM | . | P | P | P | P | P |
| BSc/20/188 | TRIYASA GHOSH | P | . | P | . | P | P |

Janusree Choudhury
[Course Coordinator]

J
[Principal]

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

SAGEMATH AND ITS APPLICATIONS
ADD ON COURSE 2023
Department of Mathematics
Attendance Sheet
Class Duration - 1 Hour

| Student Id | Name | Date 05.06 D.M. | Date 05.06 D.M. | Date 07.06 T.C. | Date 07.06 T.C. | Date 08.06 S.D. | Date 10.06 S.D. |
|------------|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| BSc/20/017 | ANKAN MANNA | P | . | P | P | P | P |
| BSc/20/244 | ANKITA RAJBHAR | P | P | P | . | P | P |
| BSc/20/237 | ANWESHA MANNA | P | P | . | P | P | P |
| BSc/20/087 | ARGHYA SANTRA | . | P | P | P | P | P |
| BSc/20/205 | AYANTIKA KARMAKAR | P | P | P | P | . | P |
| BSc/20/014 | DIBYASHRI CHOWDHURY | P | P | P | P | P | P |
| BSc/20/189 | INDRANIL GANGULY | P | . | P | P | . | P |
| BSc/20/015 | JEET KUMAR NAYEK | P | P | P | P | P | P |
| BSc/20/240 | KAUSTAV CHATTOPADHYAY | . | P | P | P | P | P |
| BSc/20/239 | ROHIT GUPTA | P | P | . | P | P | P |
| BSc/20/067 | SUBHANKAR DALUI | P | P | P | . | P | P |
| BSc/20/156 | SIYA SANA | P | P | P | P | P | P |
| BSc/20/264 | SRINITA SEN | . | P | P | P | P | P |
| BSc/20/073 | TAMIRUL ISLAM | P | . | P | P | P | P |
| BSc/20/188 | TRİYASA GHOSH | P | P | P | P | P | P |

Janusree Choudhury
 [Course Coordinator]

[Signature]
 [Principal]

PRINCIPAL
 Raja Peary Mohan College
 Uttarpara, Hooghly

Sage Math and Its Applications
ADD ON COURSE 2023
Department of Mathematics
Distribution of Certificates

| S.N. | Student Id | Name | Roll No | Signature |
|------|------------------|-----------------------|---------|-----------------------|
| 1. | BSc. 20 0017 | Ankan Manna | 017 | Ankan Manna |
| 2. | BSc. 20 0244 | Ankita Rajbhar | 244 | Ankita Rajbhar. |
| 3. | BSc. 20 0237 | Anwesha Manna | 237 | Anwesha Manna |
| 4. | BSc. 20 0087 | Arghya Santra | 087 | Arghya Santra |
| 5. | BSc. 20 0205 | Ayantika Karmakar | 205 | Ayantika Karmakar |
| 6. | BSc. 20 0014 | Dibyashri Chowdhury | 014 | Dibyashri Chowdhury |
| 7. | BSc. 20 0189 | Indranil Ganguly | 189 | Indranil Ganguly |
| 8. | BSc. 20 0015 | Jeet Kumar Nayek | 015 | Jeet Kumar Nayek |
| 9. | BSc. 20 0240 | Kaustav Chattopadhyay | 240 | Kaustav Chattopadhyay |
| 10. | BSc. 20 0239 | Rohit Gupta | 239 | Rohit Gupta |
| 11. | BSc. 20 0067 | Shubhankar Dalui | 067 | Shubhankar Dalui |
| 12. | BSc. 20 0156 | Siya Sana | 156 | Siya Sana |
| 13. | BSc. 20 0264 | Srinita Sen | 264 | Srinita Sen |
| 14. | BSc. 20 0073 | Tamirul Islam | 073 | Tamirul Islam |
| 15. | BSc. 20 0188 | Triyasa Ghosh | 188 | Triyasa Ghosh |
| | | | | |
| | | | | |
| | | | | |

Janusree Choudhury
[COURSE COORDINATOR]

7
[PRINCIPAL]

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

RAJA PEARY MOHAN COLLEGE

Uttarpara :: Hooghly

Department of Mathematics



Certificate of Appreciation

This is to Certify that

ANKAN MANNA

of Raja Peary Mohan College

has successfully completed Addon Course on

SAGE MATH AND ITS APPLICATIONS

with a score of

.....90..... (out of 100)

Date : 21.06.23

Tanusree Choudhury
Course Coordinator

[Signature]
Principal
Raja Peary Mohan College

SAGEMATH AND ITS APPLICATIONS

ADD ON COURSE 2023

Department of Mathematics

A Brief Report of The Course

We want to create adequate opportunities for our students to acquire the additional skills within our campus by saving their time, money and energy. Realizing this urgency of enhancing the skill and as SageMath can be used in various fields of Mathematics like basic algebra, graph theory and numerical computations, Department of Mathematics of Raja Peary Mohan College organized an Add On course “ SageMath and Its Applications”. This course was offered to all Mathematics Honours students of final semester. The course was of thirty six hours duration (from 8th April, 2023—10th June, 2023) and delivered in offline mode (theory lectures and hands on training in the departmental lab). After completion of the course certificates were distributed among successful candidates.

SOME PICTURES OF THE COURSE



SAGEMATH AND ITS APPLICATIONS

ADD ON COURSE 2023

Department of Mathematics

LECTURE AND LAB SCHEDULE

| TOPIC | SPEAKER/TRAINER | NO. OF LECTURES/ HANDS ON SESSION (IN HOURS) |
|--|-----------------|--|
| Introduction to SageMath, Installation Procedure | T Choudhury | 01 |
| Lab Session | T Choudhury | 01 |
| Numerical and symbolic computations using mathematical functions | T Choudhury | 02 |
| Lab Session | D Mandal | 02 |
| Graphical representations of few functions | T Choudhury | 02 |
| Lab Session | T Choudhury | 02 |
| Plots of functions with asymptotes | S Roy | 01 |
| Lab Session | S Roy | 01 |
| Superimposing multiple graphs in one plot | T Choudhury | 02 |
| Lab Session | S Banerjee | 02 |
| SageMath commands for differentiation, higher order derivatives | D Mandal | 02 |
| Lab Session | S Roy | 02 |
| Indefinite Integrals and definite integrals | S Banerjee | 01 |
| Lab Session | S Roy | 01 |
| Introduction to Programming in SageMath | S Banerjee | 03 |
| Lab Session | S Roy | 03 |
| Use of inbuilt functions | D Mandal | 02 |
| Lab Session | D Mandal | 02 |
| Solving differential equations | T Choudhury | 02 |
| Lab Session | S Banerjee | 02 |