# PANCHAKOT MAHAVIDYALAYA

**SARBARI, NETURIA, PURULIA**

Affiliated to Sidho Kanho Birsha University, Purulia

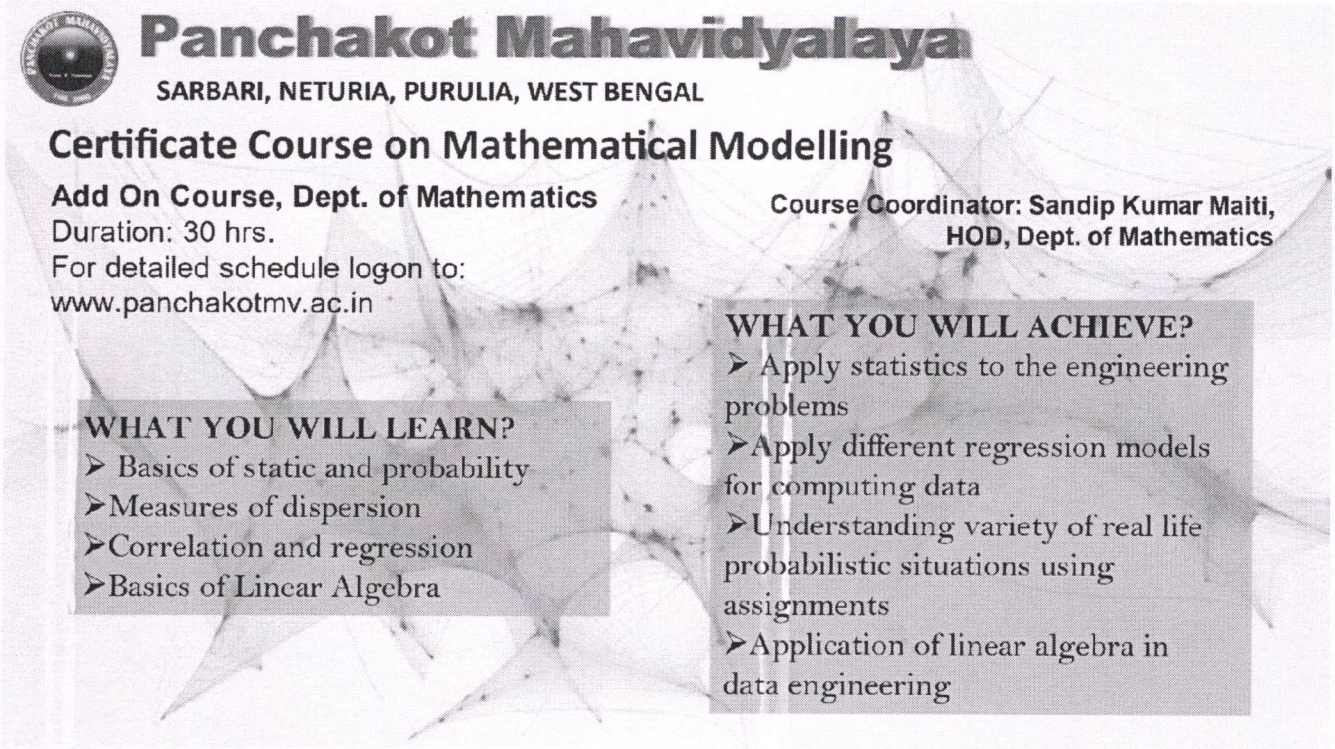
## Department of Mathematics

## Add-on/ Certificate Course

# Certificate Course on Mathematical Modeling

**Session: 2022-2023**

# Brochure


Panchakot Mahavidyalaya
SARBARI, NETURIA, PURULIA, WEST BENGAL
Certificate Course on Mathematical Modelling
Add On Course, Dept. of Mathematics
Duration: 30 hrs.
For detailed schedule logon to:
www.panchakotmv.ac.in
Course Coordinator: Sandip Kumar Maiti,
HOD, Dept. of Mathematics
WHAT YOU WILL LEARN?
➢ Basics of static and probability
➢Measures of dispersion
➢Correlation and regression
➢Basics of Linear Algebra
WHAT YOU WILL ACHIEVE?
➢ Apply statistics to the engineering problems
➢Apply different regression models for computing data
➢Understanding variety of real life probabilistic situations using assignments
➢Application of linear algebra in data engineering

To
The Principal
Panchakot Mahavidyalaya
Sarbari, Neturia, Purulia

Applicant: Sandip Kumar Maiti, Department of Mathematics

Subject: Proposal for 'Certificate Course on Mathematical Modelling' for the session 2022-2023

Respected Sir,

With respect to the above mentioned subject, I am submitting herewith the proposal to conduct the certificate course in Mathematical Modelling by the department of Mathematics of our college. This course is all about the Basics of statistics and probability, Measures of dispersion, Correlation and regression, and Basics of Linear Algebra which will train the students to develop critical thinking ability and problem solving attitude motivating them for higher studies and research in this field.

Hope you will consider my application and I kindly request you to sanction the same.

Date: 7.02.23

Place: Sarbari

Your sincerely,

HOD, Mathematics

Enclosure: (1) Proposal
(2) Curriculum of the course

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

**Proposal for conducting Short Term Certificate Courses**

Session: (2022-2023)

1. **Details of the applicant department:**

I. Name of the college: Panchakot Mahavidyalaya,
II. Address of the college: Sarbari, PO: Neturia, District: Purulia, Pin: 723121
III. Name of the applicant department: Mathematics

2. **Details of the course proposed:**

I. Name of the course: Certificate Course on Mathematical Modelling
II. Target participants: Undergraduate students from any stream
III. Duration of the course: 30 hrs.
IV. Medium of instruction: English

3. **Details of the faculty:**

I. Whether the college provides degree related to the proposed course: No
II. Whether the course is prepared by experts from related field: yes (by departmental faculty)
III. Information of course coordinator:

| Name | Department | Qualification |
|---|---|---|
| Sandip Kumar Maiti | Mathematics | M. Sc. (Mathematics) |

IV. Details of faculty members to be appointed for this course:

| Sr. No. | Name | Department | Qualification |
|---|---|---|---|
| 1 | Sandip Kumar Maiti | Mathematics | M. Sc. in Mathematics |
| 2 | Chandra Mohan Maji | Mathematics | M.Sc. in Mathematics |

4. **Details of the infrastructure needed/available for this course:**
I. Classroom: Available
II. Books: Available in central library
III. Computer facility: Computer lab and departmental computer facility

Signature of Course coordinator

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

## Department of Mathematics

Certificate Course on Mathematical Modelling

Syllabus (2022-2023)

**Duration: 32 hrs**

**Module 1 (8 hrs):** Basics of static and probability, Probability (uncertain world, perfect knowledge of the uncertainty), Counting, Random variables, distributions, quantiles, mean variance, Conditional probability, Bayes' theorem, base rate fallacy, Joint distributions, covariance, correlation, independence, Central limit theorem, Statistics I: pure applied probability (data in an uncertain world, perfect knowledge of the uncertainty), Bayesian inference with known priors, probability intervals,Conjugate priors,Statistics II: applied probability (data in an uncertain world, imperfect knowledge of the uncertainty), Bayesian inference with unknown priors, Frequentist significance tests and confidence intervals, Resampling methods: bootstrapping, Linear regression, Computation, simulation, and visualization using R and applets will be used throughout the course.

**Module 2 (8 hrs):** Measures of dispersion, Range: This is the simplest measure. It's like saying the difference between the scariest horror movie and the mushiest romantic movie. In data terms, the range is just the difference between the largest and the smallest value.

Interquartile Range (IQR): Now, imagine you listed all the movies based on how much action they had, from least to most. The IQR would tell you the range of movies that fall in the middle 50%. It gives you an idea of where the bulk of your movies lie, excluding the extremes.

Variance: Imagine if you were to measure on a scale of 1-10 how close each movie is to everyone's ideal movie preference. Then, you tried to find out how much each rating differs from the average. Summing up these differences (squared, to avoid negatives) and getting an average gives you the variance. It's like a numerical way of seeing how much individual movie ratings differ from the group's average taste.

Standard Deviation: This is like the trusty sidekick of variance. Think of it as the average difference from the mean, but in the original units. So, if variance is like

measuring in "squared movie differences", standard deviation brings it back to just "movie differences". It's super useful because it's easier to relate to the original data.

Coefficient of Variation: This is a relative measure. It's like saying, "Compared to how much everyone generally liked the movies, how varied were their preferences?" It's the standard deviation as a percentage of the mean, showing variability in relation to the average.

**Module 3 (8 hrs):** Correlation and regression, Positive correlation, Negative correlation, Zero correlation, Linear correlation, Nonlinear correlation, Simple correlation, Partial correlation, Multiple correlations; Linear regression, Ridge regression, Polynomial regression, Lasso regression, Logistic regression

**Module 4 (8 hrs):** Basics of Linear Algebra, Systems of linear equations, Row reduction and echelon forms, Matrix operations, including inverses, Block matrices, Linear dependence and independence, Subspaces and bases and dimensions, Orthogonal bases and orthogonal projections, Gram-Schmidt process, Linear models and least-squares problems, Determinants and their properties, Cramer's Rule, Eigenvalues and eigenvectors, Diagonalization of a matrix, Symmetric matrices, Positive definite matrices, Similar matrices, Linear transformations, Singular Value Decomposition

**Assessment**: Written Test and/or Viva-Voce

Signature
Course Coordinator

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

## Department of Mathematics

Certificate Course on Mathematical Modelling
Session: (2022-2023)

**Course coordinator:**Sandip Kumar Maiti, HOD, Mathematics

## Details of the Course

**Course Objective:**This course aims to develop the concept of mathematics in the field of the Basics of static and probability, Measures of dispersion, Correlation and regression, and Basics of Linear Algebra.

## Schedule

| Day | Hours | Timing/Duration | Resource Person | Venue | Topic |
|---|---|---|---|---|---|
| 1 | 02 | 4:00-6:00 PM | Sandip Kumar Maiti (SKM) | Dept of Mathematics | Module 1 |
| 2 | 02 | 4:00-6:00 PM | Chandra Mohan Maji (CMM) | Dept of Mathematics | Module 1 |
| 3 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 1 |
| 4 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 1 |
| 5 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 2 |
| 6 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 2 |
| 7 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 2 |
| 8 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 2 |
| 9 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 3 |
| 10 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 3 |
| 11 | 02 | 4:00-6:00 PM | SKM | Dept of | Module 3 |

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|---|---|---|---|---|---|
| | | | | Mathematics | |
| 12 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 3 |
| 13 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 4 |
| 14 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 4 |
| 15 | 02 | 4:00-6:00 PM | SKM | Dept of Mathematics | Module 4 |
| 16 | 02 | 4:00-6:00 PM | CMM | Dept of Mathematics | Module 4 |

**Expected Outcome:**

What students learned from this course?

- Apply statistics to engineering problems
- Apply different regression models for computing data
- Understanding a variety of real-life probabilistic situations using assignments
- Application of linear algebra in data engineering

Signature
Course Coordinator

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

## Department of Mathematics

Certificate Course on Mathematical Modelling

Session: (2022-2023)

Ref No: Date: 13.02.2023

## Notice

This is to notify that the Department of Mathematics, Panchakot Mahavidyalaya is going to conduct an Add On/Certificate courses under the title as stated above. The course will be conducted from 20/2/2023 to 11/03/2023 in offline mode.

Interested students are requested to contact the concerned teacher(s) of the department/course coordinator for further course details (such as course duration, schedule, module etc.) as well as enrollment in the course.

HOD, Department of Mathematics

Principal
PANCHAKOT MAHAVIDYALAYA
Sarbari•Neturia•Purulia

Principal,

Panchakot Mahavidyalaya

Sarbari, Neturia, Purulia

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

Department of Mathematics

Certificate Course Name ...Mathematical Modeling.....

Session: (2022-2023)

### List of Enrolled Students

| Sr. No. | Students Name | Roll Number | Semester | Student Signature |
|---|---|---|---|---|
| 1 | GOLDI KUMARI | 22000102 2 | 2 | Goldi Kumari |
| 2 | MUSKAN PASWAN | 220000761 | 2 | Muskan Paswan |
| 3. | AVEN MANDI | 220001087 | 2 | Aven Mandi |
| 4. | TAPAS KAIBARTA | 220000079 | 2 | Tapas Kaibarta |
| 5. | NISHA BAURI | 220000442 | 2 | Nisha Bauri |
| 6. | TRISHNA MANDAL | 220001524 | 2 | Trishna Mandal |
| 7. | SUJATABAURI | 210001044 | 4 | Sujata Bauri |
| 8. | ANKITA CHAR | 210000916 | 4 | Ankita Char |
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Principal
PANCHAKOT MAHAVIDYALAYA
Sarbari•Neturia•Purulia

Signature
Course Coordinator

**PANCHAKOT MAHAVIDYALAYA**
**SARBARI, NETURIA, PURULIA**
Affiliated to Sidho Kanho Birsha University, Purulia
Department of ...Mathematics...
Certificate Course : ....Mathematical...Modeling.....
Session: (20.22..-20.23.....)

## Attendance Sheet

| Sr. No. | Name of Student | Day and Month | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1 | GOLDI KUMARI | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 2 | MUSKAN PASWAN | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 3 | AVEN MANDI | P | P | P | P | P | P | P | P | P | P | P | · | P | P | P | P |
| 4 | TAPAS KAIBARTA | P | P | · | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 5 | NISHA BAURI | P | P | P | P | P | P | P | P | P | P | P | · | P | P | P | P |
| 6 | TRISHNA MANDAL | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 7 | SUJATA BAURI | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 8 | ANKITA CHAR | P | P | P | P | P | P | P | P | P | · | P | P | P | P | P | P |
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Principal
PANCHAKOT MAHAVIDYALAYA
Sarbari • Neturia • Purulia

Course Coordinator

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

Department of .Mathematics.....

Certificate Course:

.....Mathematical Modeling.....

Session: (20.22..-20.23..)

## Result

Full Marks:

| Sr. No. | Name of Student | Marks Obtained |
|---|---|---|
| 1 | GOLDI KUMARI | A |
| 2 | MUSKAN PASWAN | B |
| 3 | AVEN MANDI | B |
| 4 | TAPAS KAIBARTA | A |
| 5 | NISHA BAURI | A |
| 6 | TRISHNA MANDAL | B |
| 7 | SUJATA BAURI | A |
| 8 | ANKITA CHAR | A |
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Principal
PANCHAKOT MAHAVIDYALAYA
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Signature
Course Coordinator

Affiliated to SidhoKanho Birsha University, Purulia

# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

Add On/ Certificate Course

Organized by: Department of ...Mathematics...

## CERTIFICATE OF COMPLETION

Session: (20.22-20.23.)

This is to certify that Mr./Ms ...GOLDI KUMARI.....

of ...Hindi (Hons)..... Department has successfully completed Add On/Certificate course entitled:

...Mathematical Modeling.....

for session ...2022 - 2023.....

Course Coordinator

HOD (Organizing Dept)

Principal

Principal
PANCHAKOT MAHAVIDYALAYA
Sarbari•Neturia•Purulia