# DEPARTMENT OF BOTANY

## LIST OF ADD-ON COURSES

| | |
|---|---|
| **1** | **BIOSTATISTICS WITH R** |
| **2** | **INTRODUCTION TO INDIGENOUS MEDICINAL PLANTS** |
| **3** | **MUSHROOM CULTIVATION TECHNOLOGY** |

# 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.

04/5/18
Co-ordinator
I Q A C
Vivekananda College
Kolkata-700 063

# 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.

10/05/18

Principal
Vivekananda College
Thakurpukur Kol-63


269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 14.06.2018

A departmental meeting will be held on 21.06.2018 at 12:00 PM to discuss the following.

Agenda:
1. Introduction of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

14/6/18

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 21.06.2018 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2018-19.

**Signatures of teachers present in the meeting**

1. 21/06/2018.
2. Sutapa Kumar (Rai) 21/6/18
3. Meenakshi Mukhopadhyay 21/06/18
4. 21.6.18
5. Asis Kumar Pal 21/06/18.
6. Rinku Halder Saha 21/6/18
7. Ishita Roy. 21/6/18

# Dept. of Botany
# Vivekananda College

Date: 25.06.2018

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Introduction of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 10.05.2018, the Dept. of Botany is introducing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2018-19. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

25/6/18.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 21.06.2018.
2. Course brochures of the three aforementioned add-on courses.

# ADD-ON COURSE

# BIOSTATISTICS WITH 'R'

Session: 2018-19

Dept. of Botany

**Vivekananda College**

# Add-on Course on Biostatistics with R

**Course Details:**

Biological data are robust and often complex. Interpreting biological phenomena is, thus, vastly dependent on the results of statistical analyses. As these data are robust, analyzing biological data with statistical methods needs knowledge about statistical tools and modern-day software. This add-on course will familiarize students about statistical methods relevant to biological data and the use of the most frequently used software R and its GUI (graphical user interface) R Studio.

**Course Curriculum:**

| Topic | Hours |
|---|---|
| **Theory** | **20** |
| Introduction to data and variables; data types: numeric, logical, string and ordinal | 2 |
| Sampling methods, frequency distribution: Examples from biological data | 2 |
| Descriptive statistics: Mean, mode, median, standard deviation and standard error | 4 |
| Probability: Additive and multiplicative rules; applications in biological data | 2 |
| Correlation and Regression: Examples from biological data | 4 |
| Statistical softwares: R and R Studio | 2 |
| Introduction to command line in R | 2 |
| Data structures and importing data in R and R Studio | 2 |
| **Practical** | **10** |
| Introduction to R and R Studio | 2 |
| Descriptive statistics, correlation and regression with R | 2 |
| Data visualization package: ggplot<br>Visualization of bar plot, histogram and scatterplot | 4 |
| Clustering and heatmap analysis with R | 2 |

**After Completing the Course, Students will be able to:**

1. Learn basic skills of statistics relevant to biological data
2. Install and use R and R Studio in Linux and Windows
3. Visualize and analyze data
4. Perform hypothesis tests, interpret statistical results (e.g., p-values)

**Course Coordinators**:

Dr. Meenakshi Mukhopadhyay
Dr. Ashutosh Mukherjee

**Resource Persons:**

Dr. Meenakshi Mukhopadhyay
Dr. Sutapa Kumar (Rai)
Dr. Ashutosh Mukherjee

## Dept. of Botany

## Vivekananda College

The following is the schedule of the add-on-course on "Biostatistics with R" for the session 2018-19.

| No | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| | **Theory** | | |
| 1. | Introduction to data &variables; data types: numeric, logical, string & ordinal | 01.09.18 3-5 PM | MM |
| 2. | Sampling methods, frequency distribution, examples from biological data | 08.09.18 3-5 PM | MM |
| 3. | Descriptive statistics: mean, mode, median, standard deviation, standard error-Session 1 | 15.09.18 4-5 PM | SK |
| 4. | Descriptive statistics: mean, mode, median, standard deviation, standard error-Session 2 | 06.10.18 3-5 PM | SK |
| 5. | Probability: additive & multiplicative rules, application in biological data | 13.10.18 3-5 PM | SK |
| 6. | Correlation & regression, examples from biological data-Session 1 | 10.11.18 3-5 PM | MM |
| 7. | Correlation & regression, examples from biological data-Session 2 | 17.11.18 3-5 PM | MM |
| 8. | Statistical software: R & R studio | 8.12.18 3-5 PM | AM |
| 9 | Introduction to command in R | 15.12.18 3-5 PM | AM |
| 10. | Data structure & importing data in R & R studio | 22.12.18 3-5 PM | AM |
| | **Practical** | | |
| 11. | Introduction to R & R studio | 05.01.19 3-5 PM | AM |
| 12. | Descriptive statistics, Correlation & Regression with R | 02.02.19 3-5 PM | MM & SK |
| 13. | Data visualization: ggplot" visualization of bar plot; histogram & scatter plot | 09.02.19 3-5 PM | AM |
| 14. | Clustering & heat map analysis with R | 16.2.19 3-5 PM | AM |
| | **Evaluation** | | |
| 15. | Submission of assignments | 23.2.19 3-6 PM | AM |

Theory Room S109; Practical Room S103

**MM**: Meenakshi Mukhopadhyay, **AM**: Ashutosh Mukherjee, **SK**: Sutapa Kumar (Rai)

Meenakshi Mukhopadhyay 25/6/18

**Course Coordinators** 25/6/18.

# 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.

04/5/18
Co-ordinator
I Q A C
Vivekananda College
Kolkata-700 063

# 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.

10/05/18

Principal
Vivekananda College
Thakurpukur Kol-63


269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 14.06.2018

A departmental meeting will be held on 21.06.2018 at 12:00 PM to discuss the following.

Agenda:
1. Introduction of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

14/6/18

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 21.06.2018 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2018-19.

**Signatures of teachers present in the meeting**

1. 21/06/2018.
2. Sutapa Kumar (Rai) 21/6/18
3. Meenakshi Mukhopadhyay 21/06/18
4. 21.6.18
5. Asis Kumar Pal 21/06/18.
6. Rinku Halder Saha 21/6/18
7. Ishita Roy. 21/6/18

# Dept. of Botany
# Vivekananda College

Date: 25.06.2018

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Introduction of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 10.05.2018, the Dept. of Botany is introducing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2018-19. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

25/6/18.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 21.06.2018.
2. Course brochures of the three aforementioned add-on courses.

Course Brochure

# Add-On Course

# Introduction to Indigenous Medicinal Plants

Session 2018-19

Department of Botany
Vivekananda College

Add-On Course: Session 2018-19

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Introduction

Medicinal plants possess healing powers due to their array of natural products, and these plant species are the sources of drugs that can prevent or treat diseases in humans or animals. The plant kingdom is a veritable source of diverse molecules, including secondary metabolites that help them endure the environment and multiply by providing protection from stress, deterring marauders, and attracting dispersers. These phytochemicals can also affect our body, and mind, and their therapeutic properties can ease suffering from illness. Traditionally, medicinal plants have been used to make crude drugs containing active constituents. Presently, these fine chemicals have been isolated, characterized, and constitute modern pharmaceutical drugs, or serve as their precursors or prototypes. The worldwide bioprospecting of medicinal plants, largely in tropical biomes, represents the careful analysis of these natural products, including their pharmacological action from *in vitro* models to clinical trials. However, the increasing demand and consequent over-extraction from the wild has drastically depleted the natural populations of many medicinal plants. Domestication and cultivation of medicinal plant species has often been challenging. Biotechnological approaches can play a key role in the sustainable use and conservation of threatened and endangered indigenous medicinal plant species.

India has a rich heritage in indigenous medicinal plants. The history of medicine, essentially herbal medicine, in South Asia can be traced back to the remote past. Ayurveda, the pan-Indian traditional system of medicine is believed to have originated in ca. 2nd millennium BCE, and is attributed to the fabled physician Dhanvantari. The *Rigveda* (ca. 1,500 BCE) mentions the sacred herb *soma* as one of the earliest references to a medicinal plant in the Sanskrit literature. The *Atharvaveda* (ca. 1,200 BCE) includes spells and charms along with nearly 300 medicinal plants and their products. *Charaka Samhita* (ca. 200 CE) has chapters called *Chikitsa Sthana* (therapeutics) and *Kalpa Sthana* (pharmaceutics) for identifying and classifying medicinal plants, preparation of herbal formulations, and mentions nearly 500 medicinal plant species. The *Sushruta Samhita* (*c*. 600 CE) deals with *shalya-tantra* (surgery), and cites 700 medicinal plant species. The *Ashtangahrdayam Samhita* by Vagbhata (ca. 800 CE) lists nearly 900 medicinal plant species. Historically, Ayurveda has influenced other traditional systems of medicine across Asia, including Sowa-Rigpa (ca. 1200 CE) in Tibet. Ancient contacts with Greece and Rome, and later with Arabia and Persia, contributed to the enrichment of the Indian material materia. Siddha is another indigenous medicinal system that has historical roots in the southern part of India, and is a brilliant achievement and symbol of Tamil culture. This ancient tradition of medicine was innovated by the Dravidian civilizations of India, and is linked to the Harappan culture or even older megalithic cultures. Unani is yet another indigenous medicinal science that is now mostly practiced in South Asian, and is based on ancient Greek (Unani or Yunani in Arabic and Persian) system in its Perso-Arabic form, with influences from distant ancient cultures such as far Egypt, Syria, Iraq, China and India during the Golden Age of Islam. This is a relatively recent traditional system of medicine in India, and is a prominent aspect of the Muslim cultures in South Asia. In addition to these classical (codified) systems of indigenous medicinal knowledge, there are a plethora of folk (non-codified) healing systems that are practices across tribal and rural corners of India. More than 800 medicinal plants species are utilized in diverse folk medicine across South Asia.

Add-On Course: Session 2018-19

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

India is a megadiverse country with only 2.4% of the world's land area, but accounts for 7-8% of all recorded species. The Himalayas, Western Ghats, Indo-Burma and Sundaland are the biodiversity hotspots of India. Presently, India has rich and diverse vegetation that includes over 45,000 species of plants. About 15,000 to 20,000 of these plant species have medicinal value, but only 7,000 to 7,500 plant species are used for medicinal purpose by classical and folk systems of indigenous medicine. The traditional use of plants and plant-parts has been a deep-rooted practical knowledge in the culture and livelihood of the people living in the remote parts of India, where herbal medicine still provides the primary healthcare. In recent times people from all walks of life, as well as the Indian diaspora across the globe, are switching over to traditional herbal medicine, as well as nutraceuticals and cosmeceuticals, as these are effective, safe, and inexpensive. Growing medicinal herbs at home is also a pastime with multiple benefits. These plants can be used as herbal remedies to prevent and treat unremitting and emergent diseases. Many of these are also sources of food, nutrients, flavouring agents for culinary use. Some of them can purify the air. Still others have aesthetic or spiritual values. Above all, growing and using these plants helps in preserving our intangible cultural heritage in the form of cultural practices and ecological knowledge. In the large scale, growing medicinal plants can be a source of self-employment in general, and women's empowerment in particular.

## Course Objective

- To sensitize the students about our rich heritage in medicinal plant wealth.
- To familiarize them with the most common medicinal plants that are valuable in indigenous systems of medicine.
- To give them an overview of the diversity of active principals in common medicinal plants, including those used by the modern pharmaceutical industry.
- To acquaint them with threatened and endangered medicinal plants.
- To provide them with a general idea about the diverse strategies for sustainable use and conservation of our medicinal plant resources, including the basics of the application of plant biotechnology in this field.

## Course Outcome

- The students will spread social awareness about the immense socio-economic and cultural value of indigenous medicinal plants.
- They will gain expertise in identifying the most common indigenous medicinal plants in their localities.
- They will develop basic skills in laboratory techniques dealing with the pharmacologically active components of common medicinal plants.
- They can monitor local populations of threatened and endangered medicinal plants, including as part of citizen science networks.
- They will get employment opportunities in the area of community health services, and secure self-employment prospects in medicinal plant resource collection, processing, marketing, and setting up of nurseries for propagating and marketing of common medicinal plants used for traditional herbal remedies.

Add-On Course: Session 2018-19

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Structure

The following is the curriculum for the add-on course: "Introduction to Indigenous Medicinal Plants" (Session 2018-19)

| No. | Topic | No. of Hours |
|---|---|---|
| | Module I: Theory | |
| 1 | Brief historical context of medicinal plants from pre-historical, ancient, medieval and modern periods, with emphasis on South Asia | 2 |
| 2 | Overview of the current status and future prospects of medicinal plants, with examples of indigenous medicinal plants | 2 |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms including *Taxus wallichian*a | 1 |
| 4 | Medicinal lichens and fungi | 1 |
| 5 | Medicinal monocots, including *Aloe vera*, *Curcuma longa*, *Gloriosa superba*, and *Zingiber officinale* | 1 |
| 6 | Medicinal dicots, including *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Eclipta alba*, *Holarrhena anti-dysenterica , Justicia adhatoda*, *Mentha arvensis*, *Ocimum sanctum*, *Rauvolfia serpentina*, *Terminalia chebula,* and *Vitex negundo* | 3 |
| 7 | Important threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 2 |
| 8 | Overview of phytochemical diversity in medicinal plants, with examples of plant-derived medicinal compounds, including alkaloids of *Rauvolfia serpentina*, tannins of *Terminalia chebula*, and resins of *Curcuma longa* and *Zingiber officinale* | 4 |
| 9 | Role of plant biotechnology in medicinal plants utilization, with examples of indigenous medicinal plants, including *Rauvolfia serpentina*, and *Taxus wallichian*a | 4 |
| | Module II: Practical | |
| 10 | Identification of twigs of common Indian medicinal plants: *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Mentha arvensis*, *Ocimum sanctum*, and *Vitex negundo,* and useful plant parts: rhizome (*Curcuma longa/ Zingiber officinale*), bark (*Terminalia arjuna*), leaf (*Aloe vera/Justicia adhatoda*), fruit (*Terminalia chebula*), whole plant (*Eclipta alba*) | 2 |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants: alkaloids (root of *Rauvolfia serpentina*), tannins (fruit of *Terminalia chebula*), and resins (rhizome of *Curcuma longa/ Zingiber officinale*) | 4 |
| 12 | Visits to Medicinal Plant Gardens, both in campus (*Sushruta Udyana*) and off campus (Agri-Horticultural Society of India) | 4 |
| | **Total Training Hours** | **30** |

NB: Certificates will be issued to only those enrolled students who have attended at least 75% of the classes, and the grades in their certificates will be awarded based on their performance in the evaluation conducted after the completion of the course.

## Course Coordinators

- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor

## Resource Persons

- **Prof. Meenakshi Mukhopadhyay**, M.Sc.
  Associate Professor & Head
- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor
- **Dr. Asis Kumar Pal**, M.Sc., B.Ed., Ph.D.
  Assistant Professor
- **Dr. Ashutosh Mukherjee**, M.Sc., Ph.D.
  Assistant Professor
- **Prof. Rinku Halder Sahu**, M.Sc.
  State Aided College Teacher
- **Prof. Ishita Roy**, M.Sc.
  State Aided College Teacher

## Recommended Books


- Ali, M. (2004) *Text Book of Pharmacognosy*. New Delhi: CBS Publishers & Distributors.
- Chaudhuri, A.B. (2007) *Endangered Medicinal Plants*. New Delhi: Daya Publishing House.
- Jain, S.K. (1995) *Manual of Ethnobotany*. Jodhpur: Scientific Publishers.
- Jha, T.B. & B. Ghosh (2005) *Plant Tissue Culture*: Basic and Applied. Kolkata: Platinum Publishers.
- Joshi, M.C. (2007) *Hand-book of Indian Medicinal* Plants. Jodhpur: Scientific Publishers, India.
- Kirtikar, K.R. & B.D. Basu (1995) *Indian Medicinal Plants* (Vol. I—IV). Dehradun: Bishan Singh Mahendrapal Singh.
- Paria N.D. (Ed.) (2010) *Medicinal Plant Resources of South Bengal* (Vol. II). Kolkata: Research Wing, Directorate of Forests, Government of West Bengal.
- Paria, N.D. (Ed.) (2005) *Medicinal Plant Resources of South Bengal* (Vol. I). Research Wing, Directorate of Forests, Government of West Bengal.
- Trease, E.C. & W.C. Evans (2009) *Pharmacognosy* (Ed. XVI). Philadelphia: W.B. Saunders Ltd.
- Trivedi, P.C. (2006) *Medicinal Plants: Ethnobotanical Approach*. New Delhi: Agrobios India.
- Wallis, T.E. (2005) *Text Book of Pharmacognosy* (Ed. V). New Delhi: CBS Publishers & Distributors.


Department of Botany
Vivekananda College
**269 Diamond Harbour Road**
**Kolkata 700063**

# Dept. of Botany
# Vivekananda College

The following is the schedule for add-on course on: "Introduction to Indigenous Medicinal Plants" for B.Sc. Part II Botany Hons. students in the academic session 2018-19:

| No. | Topic (in brief) | Date (Time) | Assigned Teacher |
|---|---|---|---|
| | Theory | | |
| 1 | Brief history of medicinal plants with emphasis on South Asia | 01.09.2018 (3-5 PM) | KNC |
| 2 | Overview of current status and future prospects of medicinal plants | 08.09.2018 (3-5 PM) | KNC |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms | 15.09.2018 (3-4 PM) | SK |
| 4 | Medicinal lichens and fungi | 15.09.2018 (4-5 PM) | AKP |
| 5 | Medicinal monocots | 22.09.2018 (3-4 PM) | SK |
| 6 | Medicinal dicots | 22.09.2018 (4-5 PM)<br>29.09.2018 (3-5 PM) | SK |
| 7 | Threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 06.10.2018 (3-5 PM) | KNC |
| 8 | Overview of phytochemical diversity in medicinal plants | 03.11.2018 (3-5 PM)<br>10.11.2018 (3-5 PM) | MM |
| 9 | Role of plant biotechnology in medicinal plants utilization | 17.11.2018 (3-5 PM)<br>25.11.2018 (3-5 PM) | AM |
| | Practical | | |
| 10 | Laboratory identification of twigs and useful parts of common Indian medicinal plants | 01.12.2018 (3-5 PM) | RSH & IR |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants | 08.12.2018 (3-5 PM)<br>15.12.2018 (3-5 PM) | AKP & AM |
| 12 | Visit to the in-campus medicinal plant garden *Sushruta Udyana* | 05.01.2019 (3-5 PM) | RSH & IR |
| | Visit to the medicinal plant garden of Agri-Horticultural Society of India, Alipore | 19.01.2019 (3-5 PM) | SK & KNC |
| | Evaluation | | |
| 13 | Submission of project reports on specific indigenous medicinal plants and viva-voce | 09.02.2019 (3-5 PM) | SK & KNC |

Theory Class: Room No. S110
Practical Class: Room No. S101
SK: Sutapa Kumar (Rai), MM: Meenakshi Mukhopadhyay, KNC: Kuntal Narayan Chaudhuri, AKP: Asis Kumar Pal, AM: Ashutosh Mukherjee, RSH: Rinku Sahu-Halder, IR: Ishita Roy

Sutapa Kumar (Rai) 25/6/18

Kuchaudhuri 25.6.18

**Course Coordinators**

# 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.

04/5/18
Co-ordinator
I Q A C
Vivekananda College
Kolkata-700 063

# 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.

10/05/18

Principal
Vivekananda College
Thakurpukur Kol-63


269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 14.06.2018

A departmental meeting will be held on 21.06.2018 at 12:00 PM to discuss the following.

Agenda:
1. Introduction of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

14/6/18

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 21.06.2018 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2018-19.

**Signatures of teachers present in the meeting**

1. 21/06/2018.
2. Sutapa Kumar (Rai) 21/6/18
3. Meenakshi Mukhopadhyay 21/06/18
4. 21.6.18
5. Asis Kumar Pal 21/06/18.
6. Rinku Halder Saha 21/6/18
7. Ishita Roy. 21/6/18

# Dept. of Botany
# Vivekananda College

Date: 25.06.2018

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Introduction of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 10.05.2018, the Dept. of Botany is introducing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2018-19. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

25/6/18.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 21.06.2018.
2. Course brochures of the three aforementioned add-on courses.

Add-on course on

# Mushroom Cultivation Technology


Department of Botany

Vivekananda College, Thakurpukur

Kolkata – 700 063


**Session 2018-19**

Add-On Course on:

# Mushroom Cultivation Technology

Organised by:

Department of Botany,

Vivekananda College

Joint Convenors:

Dr. Asis Kumar Pal

Dr. Ashutosh Mukherjee

**Course Objectives:**

- To aware students about the food values and medicinal importance of mushroom
- Enable the students to identify edible and poisonous mushrooms
- Provide hands on training for the preparation spawn production and of bed for mushroom cultivation with special reference to Oyster mushroom (*Pleurotus* sp.)
- Give the students exposure to the experiences of experts and functioning mushroom farms
- Inform the students about different recipes and products of mushroom
- Preservation and processing techniques of mushroom
- To gain knowledge about the cost-benefit ratio of Oyster mushroom cultivation
- Help the students to learn a means of self-employment and income generation

**Course outcome:**

- Identification of edible types of mushroom
- Gain the knowledge of cultivation of Oyster mushroom and its spawn production
- Diseases and pest management of mushrooms
- Entrepreneurship, self-employment, income generation and Woman empowerment

**Syllabus: Theory (14 Hours)**

**Introduction to mushrooms (2 Hours)**

Overview of Mushrooms - Importance of mushrooms as food and medicine, History and Scope of mushroom cultivation, Edible and Poisonous Mushrooms

**Common edible mushrooms (2 Hours)**

Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus* sp.) and paddy straw mushroom (*Volvariella volvcea*).

**Principles of mushroom cultivation (4 Hours)**

Structure and construction of mushroom house. Sterilization of substrates. Spawn production - culture media preparation- production of pure culture, mother spawn, and multiplication of spawn. Mushroom bed preparation. Spawning, spawn running, harvesting. Cultivation of oyster mushroom.

**Disease management (2 Hours)**

Limitations of Oyster mushroom cultivation - diseases, pests and nematodes, moulds, bactgerial diseases and their management strategies.

**Health benefits of mushrooms (2 Hours) Theory**

Nutritional and medicinal values of mushrooms. Therapeutic aspects - antitumor effect

**Post harvest technology: (2 Hours) Theory**

Preservation of mushrooms- freezing, dry freezing, drying, canning, quality assurance and entrepreneurship. Value added products of mushrooms.

**Practical (16 Hours)**

Sterilization and sanitation of mushroom house, instruments and substrates (**2 Hours**)

Preparation of mother culture and media preparation (**4 Hours**)

Inoculation, incubation and spawn production (**4 Hours**)

**Cultivation of oyster mushroom using paddy straw/agricultural wastes**

Preparation of bed (**4 Hours**)

Inoculation of bed with spawn and placement of beds with proper care (**2 Hours**)

Watering, continuous observation and screening of beds and harvesting from healthy bed is an continuous process and will take 15-20 days.

**Further readings**


1. Purkayastha, R. P. and Chandra, A. (1976). Indian Edible Mushrooms. Firma KLM, Kolkata, India.
2. Marimuthu, T. et al. (1991). Oyster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
3. Nita Bhal. (2000). Hand bookon Mushrooms. 2nd ed.Vol.IandII. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
4. Pandey, R.K, Ghosh, S. K (1996). A Hand Book on Mushroom Cultivation. Emkey Publications.
5. Pathak,V.N. and Yadav, N.(1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
6. Tewari Pankaj Kapoor, S.C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

# Dept. of Botany
# Vivekananda College

The following is the schedule of the add-on course on "Mushroom Cultivation Technology" for the academic session 2018-19:

| No. | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| 1 | Introduction to Mushrooms (Theory) | 10/11/2018 03:00 PM – 05:00 PM | AKP |
| 2 | Common Edible mushrooms (Theory) | 17/11/2018 03:00 PM – 05:00 PM | MM |
| 3 | Principals of Mushroom Cultivation – Session 1 (Theory) | 24/11/2018 03:00 PM – 05:00 PM | AM |
| 4 | Principals of Mushroom Cultivation – Session 2 (Theory) | 01/12/2018 03:00 PM – 05:00 PM | AKP |
| 5 | Mushroom Disease Management (Theory) | 08/12/2018 03:00 PM – 05:00 PM | RHS |
| 6 | Health benefits of Mushrooms (Theory) | 15/12/2018 03:00 PM – 05:00 PM | IR |
| 7 | Post Harvest Technology (Theory) | 22/12/2018 03:00 PM – 05:00 PM | AKP |
| 8 | Sterilization & Sanitization of Mushroom house, instruments and substrates (Theory) | 02/02/2019 03:00 PM – 05:00 PM | IR |
| 9 | Preparation of Mother Culture & media preparation. (Practical) | 09/02/2019 03:00 PM – 05:00 PM | MM |
| 10 | Inoculation, Incubation & Spawn production. – Session 1 (Practical) | 16/02/2019 03:00 PM – 05:00 PM | RHS |
| 11 | Inoculation, Incubation & Spawn production. – Session 2 (Practical) | 23/02/2019 03:00 PM – 05:00 PM | AKP |
| 12 | Cultivation of Oyster Mushroom using Paddy Straw. Session 1 (Practical). | 02/03/2019 03:00 PM – 05:00 PM | AKP & MM |
| 13 | Cultivation of Oyster Mushroom using Paddy Straw. Session 2 (Practical). | 09/03/2019 03:00 PM – 05:00 PM | AKP & MM |
| 14 | Inoculation of bed with spawn (Practical) | 16/03/2019 03:00 PM – 05:00 PM | AKP |
| 15 | Evaluation by MCQ method | 23/03/2019 03:00 PM – 05:00 PM | IR & RHS |

**Theory :** Room S-104 **Practical :** Room S-101

(**AKP :** Asis Kumar Pal, **MM :** Meenakshi Mukhopadhyay, **AM :** Ashutosh Mukherjee, **IR :** Ishita Roy, **RHS :** Rinku Halder Sahu)

Asis Kumar Pal 25/06/18

25/6/18.

**Course Coordinators**

# 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
Co-ordinator
IQAC
Vivekananda College
Kolkata-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.

Ukpodder
08.5.19

Principal
Vivekananda College
Thakurpukur Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 01.07.2019

A departmental meeting will be held on 06.07.2019 at 12:00 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

1/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 06.07.2019 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2019-20.

**Signatures of teachers present in the meeting**

1. 06/07/2019.
2. Sutapa Kumar (Rai) 6/7/2019
3. 6/7/19
4. 6.7.19
5. 6/7/19.
6. 6/7/19
7. 6/7/19

# Dept. of Botany
# Vivekananda College

Date: 10.07.2019

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 08.05.2019, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2019-20. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

10/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 06.07.2019.
2. Course brochures of the three aforementioned add-on courses.

# ADD-ON COURSE

# BIOSTATISTICS WITH 'R'

Session: 2019-20

Dept. of Botany

**Vivekananda College**

# Add-on Course on Biostatistics with R

**Course Details:**

Biological data are robust and often complex. Interpreting biological phenomena is, thus, vastly dependent on the results of statistical analyses. As these data are robust, analyzing biological data with statistical methods needs knowledge about statistical tools and modern-day software. This add-on course will familiarize students about statistical methods relevant to biological data and the use of the most frequently used software R and its GUI (graphical user interface) R Studio.

**Course Curriculum:**

| Topic | Hours |
|---|---|
| **Theory** | **20** |
| Introduction to data and variables; data types: numeric, logical, string and ordinal | 2 |
| Sampling methods, frequency distribution: Examples from biological data | 2 |
| Descriptive statistics: Mean, mode, median, standard deviation and standard error | 4 |
| Probability: Additive and multiplicative rules; applications in biological data | 2 |
| Correlation and Regression: Examples from biological data | 4 |
| Statistical softwares: R and R Studio | 2 |
| Introduction to command line in R | 2 |
| Data structures and importing data in R and R Studio | 2 |
| **Practical** | **10** |
| Introduction to R and R Studio | 2 |
| Descriptive statistics, correlation and regression with R | 2 |
| Data visualization package: ggplot<br>Visualization of bar plot, histogram and scatterplot | 4 |
| Clustering and heatmap analysis with R | 2 |

**After Completing the Course, Students will be able to:**

1. Learn basic skills of statistics relevant to biological data
2. Install and use R and R Studio in Linux and Windows
3. Visualize and analyze data
4. Perform hypothesis tests, interpret statistical results (e.g., p-values)

**Course Coordinators**:

Dr. Meenakshi Mukhopadhyay
Dr. Ashutosh Mukherjee

**Resource Persons:**

Dr. Meenakshi Mukhopadhyay
Dr. Sutapa Kumar (Rai)
Dr. Ashutosh Mukherjee

## Dept. of Botany

## Vivekananda College

The following is the schedule of the add-on-course on "Biostatistics with R" for the session 2019-20.

| No | Topic | Date & Time | Assigned teacher |
|---|---|---|---|
| | **THEORY** | | |
| 1. | Introduction to data &variables; data types: numeric, logical, string & ordinal | 3.8.19 3-5 PM | MM |
| 2. | Sampling methods, frequency distribution, examples from biological data | 10.8.19 3-5PM | SK |
| 3. | Descriptive statistics: mean, mode, median, standard deviation, standard error -session 1 | 17.8.19 3-5 PM | MM |
| 4. | Descriptive statistics: mean, mode, median, standard deviation, standard error -session 2 | 24.8.19 3-5 PM | SK |
| 5. | Probability: additive & multiplicative rules, application in biological data | 31.8.19 3-5 PM | SK |
| 6. | Correlation & regression, examples from biological data- session 1 | 7.9.19 3-5 PM | MM |
| 7. | Correlation & regression, examples from biological data- session 2 | 14.9.19 3-5 PM | MM |
| 8. | Statistical software: R & R studio | 21.9.19 3-5 PM | AM |
| 9 | Introduction to command in R | 9.11.19 3-5 PM | AM |
| 10. | Data structure & importing data in R & R studio ( | 16.11.19 3-5 PM | AM |
| | **PRACTICAL** | | |
| 11. | Introduction to R & R studio | 14.12.19 3-5 PM | AM |
| 12. | Descriptive statistics, Correlation & Regression with R | 21.12.19 3-5 PM | MM & SK |
| 13. | Data visualization: ggplot ; visualization of bar plot; histogram and & scatter plot | 4..1.20 3-5 PM | AM |
| 14. | Clustering & heat map analysis with R | 11.1.20 3-5 PM | AM |
| 15 | Evaluation | 1.2.20 3-5 PM | AM |

Theory Room S109
Practical Room S103
MM: Meenakshi Mukhopadhyay, AM: Ashutosh Mukherjee, SK: Sutapa Kumar (Rai)

Meenakshi Mukhopadhyay 10/07/19

**Course Coordinators**

# 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
Co-ordinator
IQAC
Vivekananda College
Kolkata-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.

Ukpodder
08.5.19

Principal
Vivekananda College
Thakurpukur Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 01.07.2019

A departmental meeting will be held on 06.07.2019 at 12:00 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

1/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 06.07.2019 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2019-20.

**Signatures of teachers present in the meeting**

1. 06/07/2019.
2. Sutapa Kumar (Rai) 6/7/2019
3. 6/7/19
4. 6.7.19
5. 6/7/19.
6. 6/7/19
7. 6/7/19

# Dept. of Botany
# Vivekananda College

Date: 10.07.2019

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 08.05.2019, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2019-20. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

10/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 06.07.2019.
2. Course brochures of the three aforementioned add-on courses.

Course Brochure

# Add-On Course

# Introduction to Indigenous Medicinal Plants

Session 2019-20

Department of Botany
Vivekananda College

Add-On Course: Session 2019-20

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Introduction

Medicinal plants possess healing powers due to their array of natural products, and these plant species are the sources of drugs that can prevent or treat diseases in humans or animals. The plant kingdom is a veritable source of diverse molecules, including secondary metabolites that help them endure the environment and multiply by providing protection from stress, deterring marauders, and attracting dispersers. These phytochemicals can also affect our body, and mind, and their therapeutic properties can ease suffering from illness. Traditionally, medicinal plants have been used to make crude drugs containing active constituents. Presently, these fine chemicals have been isolated, characterized, and constitute modern pharmaceutical drugs, or serve as their precursors or prototypes. The worldwide bioprospecting of medicinal plants, largely in tropical biomes, represents the careful analysis of these natural products, including their pharmacological action from *in vitro* models to clinical trials. However, the increasing demand and consequent over-extraction from the wild has drastically depleted the natural populations of many medicinal plants. Domestication and cultivation of medicinal plant species has often been challenging. Biotechnological approaches can play a key role in the sustainable use and conservation of threatened and endangered indigenous medicinal plant species.

India has a rich heritage in indigenous medicinal plants. The history of medicine, essentially herbal medicine, in South Asia can be traced back to the remote past. Ayurveda, the pan-Indian traditional system of medicine is believed to have originated in ca. 2nd millennium BCE, and is attributed to the fabled physician Dhanvantari. The *Rigveda* (ca. 1,500 BCE) mentions the sacred herb *soma* as one of the earliest references to a medicinal plant in the Sanskrit literature. The *Atharvaveda* (ca. 1,200 BCE) includes spells and charms along with nearly 300 medicinal plants and their products. *Charaka Samhita* (ca. 200 CE) has chapters called *Chikitsa Sthana* (therapeutics) and *Kalpa Sthana* (pharmaceutics) for identifying and classifying medicinal plants, preparation of herbal formulations, and mentions nearly 500 medicinal plant species. The *Sushruta Samhita* (*c*. 600 CE) deals with *shalya-tantra* (surgery), and cites 700 medicinal plant species. The *Ashtangahrdayam Samhita* by Vagbhata (ca. 800 CE) lists nearly 900 medicinal plant species. Historically, Ayurveda has influenced other traditional systems of medicine across Asia, including Sowa-Rigpa (ca. 1200 CE) in Tibet. Ancient contacts with Greece and Rome, and later with Arabia and Persia, contributed to the enrichment of the Indian material materia. Siddha is another indigenous medicinal system that has historical roots in the southern part of India, and is a brilliant achievement and symbol of Tamil culture. This ancient tradition of medicine was innovated by the Dravidian civilizations of India, and is linked to the Harappan culture or even older megalithic cultures. Unani is yet another indigenous medicinal science that is now mostly practiced in South Asian, and is based on ancient Greek (Unani or Yunani in Arabic and Persian) system in its Perso-Arabic form, with influences from distant ancient cultures such as far Egypt, Syria, Iraq, China and India during the Golden Age of Islam. This is a relatively recent traditional system of medicine in India, and is a prominent aspect of the Muslim cultures in South Asia. In addition to these classical (codified) systems of indigenous medicinal knowledge, there are a plethora of folk (non-codified) healing systems that are practices across tribal and rural corners of India. More than 800 medicinal plants species are utilized in diverse folk medicine across South Asia.

Add-On Course: Session 2019-20

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

India is a megadiverse country with only 2.4% of the world's land area, but accounts for 7-8% of all recorded species. The Himalayas, Western Ghats, Indo-Burma and Sundaland are the biodiversity hotspots of India. Presently, India has rich and diverse vegetation that includes over 45,000 species of plants. About 15,000 to 20,000 of these plant species have medicinal value, but only 7,000 to 7,500 plant species are used for medicinal purpose by classical and folk systems of indigenous medicine. The traditional use of plants and plant-parts has been a deep-rooted practical knowledge in the culture and livelihood of the people living in the remote parts of India, where herbal medicine still provides the primary healthcare. In recent times people from all walks of life, as well as the Indian diaspora across the globe, are switching over to traditional herbal medicine, as well as nutraceuticals and cosmeceuticals, as these are effective, safe, and inexpensive. Growing medicinal herbs at home is also a pastime with multiple benefits. These plants can be used as herbal remedies to prevent and treat unremitting and emergent diseases. Many of these are also sources of food, nutrients, flavouring agents for culinary use. Some of them can purify the air. Still others have aesthetic or spiritual values. Above all, growing and using these plants helps in preserving our intangible cultural heritage in the form of cultural practices and ecological knowledge. In the large scale, growing medicinal plants can be a source of self-employment in general, and women's empowerment in particular.

## Course Objective

- To sensitize the students about our rich heritage in medicinal plant wealth.
- To familiarize them with the most common medicinal plants that are valuable in indigenous systems of medicine.
- To give them an overview of the diversity of active principals in common medicinal plants, including those used by the modern pharmaceutical industry.
- To acquaint them with threatened and endangered medicinal plants.
- To provide them with a general idea about the diverse strategies for sustainable use and conservation of our medicinal plant resources, including the basics of the application of plant biotechnology in this field.

## Course Outcome

- The students will spread social awareness about the immense socio-economic and cultural value of indigenous medicinal plants.
- They will gain expertise in identifying the most common indigenous medicinal plants in their localities.
- They will develop basic skills in laboratory techniques dealing with the pharmacologically active components of common medicinal plants.
- They can monitor local populations of threatened and endangered medicinal plants, including as part of citizen science networks.
- They will get employment opportunities in the area of community health services, and secure self-employment prospects in medicinal plant resource collection, processing, marketing, and setting up of nurseries for propagating and marketing of common medicinal plants used for traditional herbal remedies.

Add-On Course: Session 2019-20

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Structure

The following is the curriculum for the add-on course: "Introduction to Indigenous Medicinal Plants" (Session 2019-20)

| No. | Topic | No. of Hours |
|---|---|---|
| | Module I: Theory | |
| 1 | Brief historical context of medicinal plants from pre-historical, ancient, medieval and modern periods, with emphasis on South Asia | 2 |
| 2 | Overview of the current status and future prospects of medicinal plants, with examples of indigenous medicinal plants | 2 |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms including *Taxus wallichian*a | 1 |
| 4 | Medicinal lichens and fungi | 1 |
| 5 | Medicinal monocots, including *Aloe vera*, *Curcuma longa*, *Gloriosa superba*, and *Zingiber officinale* | 1 |
| 6 | Medicinal dicots, including *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Eclipta alba*, *Holarrhena anti-dysenterica , Justicia adhatoda*, *Mentha arvensis*, *Ocimum sanctum*, *Rauvolfia serpentina*, *Terminalia chebula,* and *Vitex negundo* | 3 |
| 7 | Important threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 2 |
| 8 | Overview of phytochemical diversity in medicinal plants, with examples of plant-derived medicinal compounds, including alkaloids of *Rauvolfia serpentina*, tannins of *Terminalia chebula*, and resins of *Curcuma longa* and *Zingiber officinale* | 4 |
| 9 | Role of plant biotechnology in medicinal plants utilization, with examples of indigenous medicinal plants, including *Rauvolfia serpentina*, and *Taxus wallichian*a | 4 |
| | Module II: Practical | |
| 10 | Identification of twigs of common Indian medicinal plants: *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Mentha arvensis*, *Ocimum sanctum*, and *Vitex negundo,* and useful plant parts: rhizome (*Curcuma longa/ Zingiber officinale*), bark (*Terminalia arjuna*), leaf (*Aloe vera/Justicia adhatoda*), fruit (*Terminalia chebula*), whole plant (*Eclipta alba*) | 2 |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants: alkaloids (root of *Rauvolfia serpentina*), tannins (fruit of *Terminalia chebula*), and resins (rhizome of *Curcuma longa/ Zingiber officinale*) | 4 |
| 12 | Visits to Medicinal Plant Gardens, both in campus (*Sushruta Udyana*) and off campus (Agri-Horticultural Society of India) | 4 |
| | **Total Training Hours** | **30** |

NB: Certificates will be issued to only those enrolled students who have attended at least 75% of the classes, and the grades in their certificates will be awarded based on their performance in the evaluation conducted after the completion of the course.

## Course Coordinators

- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor

## Resource Persons

- **Prof. Meenakshi Mukhopadhyay**, M.Sc.
  Associate Professor & Head
- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor
- **Dr. Asis Kumar Pal**, M.Sc., B.Ed., Ph.D.
  Assistant Professor
- **Dr. Ashutosh Mukherjee**, M.Sc., Ph.D.
  Assistant Professor
- **Prof. Rinku Halder Sahu**, M.Sc.
  State Aided College Teacher
- **Prof. Ishita Roy**, M.Sc.
  State Aided College Teacher

## Recommended Books


- Ali, M. (2004) *Text Book of Pharmacognosy*. New Delhi: CBS Publishers & Distributors.
- Chaudhuri, A.B. (2007) *Endangered Medicinal Plants*. New Delhi: Daya Publishing House.
- Jain, S.K. (1995) *Manual of Ethnobotany*. Jodhpur: Scientific Publishers.
- Jha, T.B. & B. Ghosh (2005) *Plant Tissue Culture*: Basic and Applied. Kolkata: Platinum Publishers.
- Joshi, M.C. (2007) *Hand-book of Indian Medicinal* Plants. Jodhpur: Scientific Publishers, India.
- Kirtikar, K.R. & B.D. Basu (1995) *Indian Medicinal Plants* (Vol. I—IV). Dehradun: Bishan Singh Mahendrapal Singh.
- Paria N.D. (Ed.) (2010) *Medicinal Plant Resources of South Bengal* (Vol. II). Kolkata: Research Wing, Directorate of Forests, Government of West Bengal.
- Paria, N.D. (Ed.) (2005) *Medicinal Plant Resources of South Bengal* (Vol. I). Research Wing, Directorate of Forests, Government of West Bengal.
- Trease, E.C. & W.C. Evans (2009) *Pharmacognosy* (Ed. XVI). Philadelphia: W.B. Saunders Ltd.
- Trivedi, P.C. (2006) *Medicinal Plants: Ethnobotanical Approach*. New Delhi: Agrobios India.
- Wallis, T.E. (2005) *Text Book of Pharmacognosy* (Ed. V). New Delhi: CBS Publishers & Distributors.


Department of Botany
Vivekananda College
**269 Diamond Harbour Road**
**Kolkata 700063**

# Dept. of Botany
# Vivekananda College

The following is the schedule for add-on course on: "Introduction to Indigenous Medicinal Plants" for B.Sc. Semester III Botany Hons. students in the academic session 2019-20:

| No. | Topic (in brief) | Date (Time) | Assigned Teacher |
|---|---|---|---|
| | Theory | | |
| 1 | Brief history of medicinal plants with emphasis on South Asia | 07.09.2019 (3-5 PM) | KNC |
| 2 | Overview of current status and future prospects of medicinal plants | 14.09.2019 (3-5 PM) | KNC |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms | 21.09.2019 (3-4 PM) | SK |
| 4 | Medicinal lichens and fungi | 21.09.2019 (4-5 PM) | AKP |
| 5 | Medicinal monocots | 19.10.2019 (3-4 PM) | SK |
| 6 | Medicinal dicots | 19.10.2019 (4-5 PM)<br>26.10.2019 (3-5 PM) | SK |
| 7 | Threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 09.11.2019 (3-5 PM) | KNC |
| 8 | Overview of phytochemical diversity in medicinal plants | 17.11.2019 (3-5 PM)<br>23.11.2019 (3-5 PM) | MM |
| 9 | Role of plant biotechnology in medicinal plants utilization | 30.11.2019 (3-5 PM)<br>07.12.2019 (3-5 PM) | AM |
| | Practical | | |
| 10 | Laboratory identification of twigs and useful parts of common Indian medicinal plants | 14.12.2019 (3-5 PM) | RSH & IR |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants | 21.12.2019 (3-5 PM)<br>04.01.2020 (3-5 PM) | AKP & AM |
| 12 | Visit to the in-campus medicinal plant garden *Sushruta Udyana* | 11.01.2020 (3-5 PM) | RSH & IR |
| | Visit to the medicinal plant garden of Agri-Horticultural Society of India, Alipore | 18.01.2020 (3-5 PM) | SK & KNC |
| | Evaluation | | |
| 13 | Submission of project reports on specific indigenous medicinal plants and viva-voce | 01.02.2020 (3-5 PM) | SK & KNC |

Theory Class: Room No. S110
Practical Class: Room No. S101
SK: Sutapa Kumar (Rai), MM: Meenakshi Mukhopadhyay, KNC: Kuntal Narayan Chaudhuri, AKP: Asis Kumar Pal, AM: Ashutosh Mukherjee, RSH: Rinku Sahu-Halder, IR: Ishita Roy

Sutapa Kumar (Rai) 10/7/19

10.7.19

**Course Coordinators**

# 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
Co-ordinator
IQAC
Vivekananda College
Kolkata-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.

Ukpodder
08.5.19

Principal
Vivekananda College
Thakurpukur Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 01.07.2019

A departmental meeting will be held on 06.07.2019 at 12:00 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

1/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 06.07.2019 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2019-20.

**Signatures of teachers present in the meeting**

1. 06/07/2019.
2. Sutapa Kumar (Rai) 6/7/2019
3. 6/7/19
4. 6.7.19
5. 6/7/19.
6. 6/7/19
7. 6/7/19

# Dept. of Botany
# Vivekananda College

Date: 10.07.2019

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 08.05.2019, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2019-20. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

10/7/19

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 06.07.2019.
2. Course brochures of the three aforementioned add-on courses.

Add-on course on

# Mushroom Cultivation Technology

Department of Botany

Vivekananda College, Thakurpukur

Kolkata – 700 063

**Session 2019-20**

Add-On Course on:

# Mushroom Cultivation Technology

Organised by:

Department of Botany,

Vivekananda College

Joint Convenors:

Dr. Asis Kumar Pal

Dr. Ashutosh Mukherjee

**Course Objectives:**

- To aware students about the food values and medicinal importance of mushroom
- Enable the students to identify edible and poisonous mushrooms
- Provide hands on training for the preparation spawn production and of bed for mushroom cultivation with special reference to Oyster mushroom (*Pleurotus* sp.)
- Give the students exposure to the experiences of experts and functioning mushroom farms
- Inform the students about different recipes and products of mushroom
- Preservation and processing techniques of mushroom
- To gain knowledge about the cost-benefit ratio of Oyster mushroom cultivation
- Help the students to learn a means of self-employment and income generation

**Course outcome:**

- Identification of edible types of mushroom
- Gain the knowledge of cultivation of Oyster mushroom and its spawn production
- Diseases and pest management of mushrooms
- Entrepreneurship, self-employment, income generation and Woman empowerment

**Syllabus: Theory (14 Hours)**

**Introduction to mushrooms (2 Hours)**

Overview of Mushrooms - Importance of mushrooms as food and medicine, History and Scope of mushroom cultivation, Edible and Poisonous Mushrooms

**Common edible mushrooms (2 Hours)**

Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus* sp.) and paddy straw mushroom (*Volvariella volvcea*).

**Principles of mushroom cultivation (4 Hours)**

Structure and construction of mushroom house. Sterilization of substrates. Spawn production - culture media preparation- production of pure culture, mother spawn, and multiplication of spawn. Mushroom bed preparation. Spawning, spawn running, harvesting. Cultivation of oyster mushroom.

**Disease management (2 Hours)**

Limitations of Oyster mushroom cultivation - diseases, pests and nematodes, moulds, bactgerial diseases and their management strategies.

**Health benefits of mushrooms (2 Hours) Theory**

Nutritional and medicinal values of mushrooms. Therapeutic aspects - antitumor effect

**Post harvest technology: (2 Hours) Theory**

Preservation of mushrooms- freezing, dry freezing, drying, canning, quality assurance and entrepreneurship. Value added products of mushrooms.

**Practical (16 Hours)**

Sterilization and sanitation of mushroom house, instruments and substrates (**2 Hours**)

Preparation of mother culture and media preparation (**4 Hours**)

Inoculation, incubation and spawn production (**4 Hours**)

**Cultivation of oyster mushroom using paddy straw/agricultural wastes**

Preparation of bed (**4 Hours**)

Inoculation of bed with spawn and placement of beds with proper care (**2 Hours**)

Watering, continuous observation and screening of beds and harvesting from healthy bed is an continuous process and will take 15-20 days.

**Further readings**


1. Purkayastha, R. P. and Chandra, A. (1976). Indian Edible Mushrooms. Firma KLM, Kolkata, India.
2. Marimuthu, T. et al. (1991). Oyster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
3. Nita Bhal. (2000). Hand bookon Mushrooms. 2nd ed.Vol.IandII. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
4. Pandey, R.K, Ghosh, S. K (1996). A Hand Book on Mushroom Cultivation. Emkey Publications.
5. Pathak,V.N. and Yadav, N.(1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
6. Tewari Pankaj Kapoor, S.C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

# Dept. of Botany
# Vivekananda College

The following is the schedule of the add-on course on "Mushroom Cultivation Technology" for the academic session 2019-2020:

| No. | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| 1 | Introduction to Mushrooms (Theory) | 09/11/2019 03:00 PM – 05:00 PM | AKP |
| 2 | Common Edible mushrooms (Theory) | 16/11/2019 03:00 PM – 05:00 PM | MM |
| 3 | Principals of Mushroom Cultivation – Session 1 (Theory) | 23/11/2019 03:00 PM – 05:00 PM | AM |
| 4 | Principals of Mushroom Cultivation – Session 2 (Theory) | 30/11/2019 03:00 PM – 05:00 PM | AKP |
| 5 | Mushroom Disease Management (Theory) | 07/12/2019 03:00 PM – 05:00 PM | RHS |
| 6 | Health benefits of Mushrooms (Theory) | 14/12/2019 03:00 PM – 05:00 PM | IR |
| 7 | Post Harvest Technology (Theory) | 21/12/2019 03:00 PM – 05:00 PM | AKP |
| 8 | Sterilization & Sanitization of Mushroom house, instruments and substrates (Theory) | 04/01/2020 03:00 PM – 05:00 PM | IR |
| 9 | Preparation of Mother Culture & media preparation. (Practical) | 01/02/2020 03:00 PM – 05:00 PM | MM |
| 10 | Inoculation, Incubation & Spawn production. – Session 1 (Practical) | 08/02/2020 03:00 PM – 05:00 PM | RHS |
| 11 | Inoculation, Incubation & Spawn production. – Session 2 (Practical) | 15/02/2020 03:00 PM – 05:00 PM | AKP |
| 12 | Cultivation of Oyster Mushroom using Paddy Straw. Session 1 (Practical). | 22/02/2020 03:00 PM – 05:00 PM | AKP & MM |
| 13 | Cultivation of Oyster Mushroom using Paddy Straw. Session 2 (Practical). | 07/03/2020 03:00 PM – 05:00 PM | AKP & MM |
| 14 | Inoculation of bed with spawn (Practical) | 14/03/2020 03:00 PM – 05:00 PM | AKP |
| 15 | Evaluation by MCQ method | 21/03/2020 03:00 PM – 05:00 PM | IR & RHS |

**Theory :** Room S-104 **Practical :** Room S-101

(**AKP :** Asis Kumar Pal, **MM :** Meenakshi Mukhopadhyay, **AM :** Ashutosh Mukherjee, **IR :** Ishita Roy, **RHS :** Rinku Halder Sahu)

10/07/19

Course Coordinators 10/7/19

## 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 arerequested to take up the matter on an urgent basis.

21/9/21

Principal

Principal
Vivekananda College
Thakurpukur, Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 21.09.2021

A departmental meeting will be held on 28.09.2021 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

21/9/21.

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 28.09.2021 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2021-22.

**Signatures of teachers present in the meeting**

1. 28/09/2021.
2. Sutapa Kumar (Rai) 28/9/21
3. Meenakshi Mukhopadhyay 28/09/21
4. 28.9.21
5. Asis Kumar Pal 28/09/21
6. Rinku Halder Saha 28/9/21
7. Ishita Roy. 28/9/21

# Dept. of Botany
# Vivekananda College

Date: 30.09.2021

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 21.09.2021, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2021-22. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

30/09/2021.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 28.09.2021.
2. Course brochures of the three aforementioned add-on courses.

# ADD-ON COURSE

# BIOSTATISTICS WITH 'R'

Session: 2021-22

Dept. of Botany

**Vivekananda College**

# Add-on Course on Biostatistics with R

**Course Details:**

Biological data are robust and often complex. Interpreting biological phenomena is, thus, vastly dependent on the results of statistical analyses. As these data are robust, analyzing biological data with statistical methods needs knowledge about statistical tools and modern-day software. This add-on course will familiarize students about statistical methods relevant to biological data and the use of the most frequently used software R and its GUI (graphical user interface) R Studio.

**Course Curriculum:**

| Topic | Hours |
|---|---|
| **Theory** | **20** |
| Introduction to data and variables; data types: numeric, logical, string and ordinal | 2 |
| Sampling methods, frequency distribution: Examples from biological data | 2 |
| Descriptive statistics: Mean, mode, median, standard deviation and standard error | 4 |
| Probability: Additive and multiplicative rules; applications in biological data | 2 |
| Correlation and Regression: Examples from biological data | 4 |
| Statistical softwares: R and R Studio | 2 |
| Introduction to command line in R | 2 |
| Data structures and importing data in R and R Studio | 2 |
| **Practical** | **10** |
| Introduction to R and R Studio | 2 |
| Descriptive statistics, correlation and regression with R | 2 |
| Data visualization package: ggplot<br>Visualization of bar plot, histogram and scatterplot | 4 |
| Clustering and heatmap analysis with R | 2 |

**After Completing the Course, Students will be able to:**

1. Learn basic skills of statistics relevant to biological data
2. Install and use R and R Studio in Linux and Windows
3. Visualize and analyze data
4. Perform hypothesis tests, interpret statistical results (e.g., p-values)

**Course Coordinators**:

Dr. Meenakshi Mukhopadhyay
Dr. Ashutosh Mukherjee

**Resource Persons:**

Dr. Meenakshi Mukhopadhyay
Dr. Sutapa Kumar (Rai)
Dr. Ashutosh Mukherjee

## Dept. of Botany

## Vivekananda College

**The following is the schedule of the add-on-course on "Biostatistics with R" for the session 2021-2022.**

| No | Topic | Date & Time | Assigned teacher |
|---|---|---|---|
| | **THEORY** | | |
| 1. | Introduction to data &variables; data types: numeric, logical, string & ordinal | 13.11.21 3-5 PM | MM |
| 2. | Sampling methods, frequency distribution, examples from biological data | 20.11.21 3-5PM | SK |
| 3. | Descriptive statistics: mean, mode, median, standard deviation, standard error -session 1 | 27.11.21 4-5 PM | SK |
| 4. | Descriptive statistics: mean, mode, median, standard deviation, standard error -session 2 | 4.12.21 3-5 PM | MM |
| 5. | Probability: additive & multiplicative rules, application in biological data | 11.12.21 3-5 PM | MM |
| 6. | Correlation & regression, examples from biological data-session 1 | 18.12.21 3-5 PM | MM |
| 7. | Correlation & regression, examples from biological data-session 2 | 8.1.22 3-5 PM | SK |
| 8. | Statistical software: R & R studio | 15.1.22 3-5 PM | AM |
| 9 | Introduction to command in R | 12.2.22 3-5 PM | AM |
| 10. | Data structure & importing data in R & R studio | 19.2 22 3-5 PM | AM |
| | PRACTICAL | | |
| 11. | Introduction to R & R studio (Prac) | 26.2.22 3-5 PM | AM |
| 12. | Descriptive statistics, Correlation & Regression with R (Prac) | 5.3.22 3-5 PM | MM & SK |
| 13. | Descriptive statistics, Correlation & Regression with R | 12.3.22 3-5 PM | AM |
| 14. | Data visualization: ggplot ; visualization of bar plot; histogram and & scatter plot | 26.3.22 3-5 PM | AM |
| 15 | Evaluation | 2.4.22 3-6 PM | AM |

Theory -Room **S109**; Practical Room **S103**

(**MM**: Meenakshi Mukhopadhyay, **AM**: Ashutosh Mukherjee, **SK**: Sutapa Kumar (Rai)

Meenakshi Mukhopadhyay 30/09/21

Ashutosh Mukherjee 2021/21.

**Course Coordinators**

## 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 arerequested to take up the matter on an urgent basis.

21/9/21

Principal

Principal
Vivekananda College
Thakurpukur, Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 21.09.2021

A departmental meeting will be held on 28.09.2021 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

21/9/21.

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 28.09.2021 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2021-22.

**Signatures of teachers present in the meeting**

1. 28/09/2021.
2. Sutapa Kumar (Rai) 28/9/21
3. Meenakshi Mukhopadhyay 28/09/21
4. 28.9.21
5. Asis Kumar Pal 28/09/21
6. Rinku Halder Saha 28/9/21
7. Ishita Roy. 28/9/21

# Dept. of Botany
# Vivekananda College

Date: 30.09.2021

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 21.09.2021, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2021-22. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

30/09/2021.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 28.09.2021.
2. Course brochures of the three aforementioned add-on courses.

Course Brochure

# Add-On Course

# Introduction to Indigenous Medicinal Plants

Session 2021-22

Department of Botany
Vivekananda College

Add-On Course: Session 2021-22

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Introduction

Medicinal plants possess healing powers due to their array of natural products, and these plant species are the sources of drugs that can prevent or treat diseases in humans or animals. The plant kingdom is a veritable source of diverse molecules, including secondary metabolites that help them endure the environment and multiply by providing protection from stress, deterring marauders, and attracting dispersers. These phytochemicals can also affect our body, and mind, and their therapeutic properties can ease suffering from illness. Traditionally, medicinal plants have been used to make crude drugs containing active constituents. Presently, these fine chemicals have been isolated, characterized, and constitute modern pharmaceutical drugs, or serve as their precursors or prototypes. The worldwide bioprospecting of medicinal plants, largely in tropical biomes, represents the careful analysis of these natural products, including their pharmacological action from *in vitro* models to clinical trials. However, the increasing demand and consequent over-extraction from the wild has drastically depleted the natural populations of many medicinal plants. Domestication and cultivation of medicinal plant species has often been challenging. Biotechnological approaches can play a key role in the sustainable use and conservation of threatened and endangered indigenous medicinal plant species.

India has a rich heritage in indigenous medicinal plants. The history of medicine, essentially herbal medicine, in South Asia can be traced back to the remote past. Ayurveda, the pan-Indian traditional system of medicine is believed to have originated in ca. 2nd millennium BCE, and is attributed to the fabled physician Dhanvantari. The *Rigveda* (ca. 1,500 BCE) mentions the sacred herb *soma* as one of the earliest references to a medicinal plant in the Sanskrit literature. The *Atharvaveda* (ca. 1,200 BCE) includes spells and charms along with nearly 300 medicinal plants and their products. *Charaka Samhita* (ca. 200 CE) has chapters called *Chikitsa Sthana* (therapeutics) and *Kalpa Sthana* (pharmaceutics) for identifying and classifying medicinal plants, preparation of herbal formulations, and mentions nearly 500 medicinal plant species. The *Sushruta Samhita* (*c*. 600 CE) deals with *shalya-tantra* (surgery), and cites 700 medicinal plant species. The *Ashtangahrdayam Samhita* by Vagbhata (ca. 800 CE) lists nearly 900 medicinal plant species. Historically, Ayurveda has influenced other traditional systems of medicine across Asia, including Sowa-Rigpa (ca. 1200 CE) in Tibet. Ancient contacts with Greece and Rome, and later with Arabia and Persia, contributed to the enrichment of the Indian material materia. Siddha is another indigenous medicinal system that has historical roots in the southern part of India, and is a brilliant achievement and symbol of Tamil culture. This ancient tradition of medicine was innovated by the Dravidian civilizations of India, and is linked to the Harappan culture or even older megalithic cultures. Unani is yet another indigenous medicinal science that is now mostly practiced in South Asian, and is based on ancient Greek (Unani or Yunani in Arabic and Persian) system in its Perso-Arabic form, with influences from distant ancient cultures such as far Egypt, Syria, Iraq, China and India during the Golden Age of Islam. This is a relatively recent traditional system of medicine in India, and is a prominent aspect of the Muslim cultures in South Asia. In addition to these classical (codified) systems of indigenous medicinal knowledge, there are a plethora of folk (non-codified) healing systems that are practices across tribal and rural corners of India. More than 800 medicinal plants species are utilized in diverse folk medicine across South Asia.

Add-On Course: Session 2021-22

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

India is a megadiverse country with only 2.4% of the world's land area, but accounts for 7-8% of all recorded species. The Himalayas, Western Ghats, Indo-Burma and Sundaland are the biodiversity hotspots of India. Presently, India has rich and diverse vegetation that includes over 45,000 species of plants. About 15,000 to 20,000 of these plant species have medicinal value, but only 7,000 to 7,500 plant species are used for medicinal purpose by classical and folk systems of indigenous medicine. The traditional use of plants and plant-parts has been a deep-rooted practical knowledge in the culture and livelihood of the people living in the remote parts of India, where herbal medicine still provides the primary healthcare. In recent times people from all walks of life, as well as the Indian diaspora across the globe, are switching over to traditional herbal medicine, as well as nutraceuticals and cosmeceuticals, as these are effective, safe, and inexpensive. Growing medicinal herbs at home is also a pastime with multiple benefits. These plants can be used as herbal remedies to prevent and treat unremitting and emergent diseases. Many of these are also sources of food, nutrients, flavouring agents for culinary use. Some of them can purify the air. Still others have aesthetic or spiritual values. Above all, growing and using these plants helps in preserving our intangible cultural heritage in the form of cultural practices and ecological knowledge. In the large scale, growing medicinal plants can be a source of self-employment in general, and women's empowerment in particular.

## Course Objective

- To sensitize the students about our rich heritage in medicinal plant wealth.
- To familiarize them with the most common medicinal plants that are valuable in indigenous systems of medicine.
- To give them an overview of the diversity of active principals in common medicinal plants, including those used by the modern pharmaceutical industry.
- To acquaint them with threatened and endangered medicinal plants.
- To provide them with a general idea about the diverse strategies for sustainable use and conservation of our medicinal plant resources, including the basics of the application of plant biotechnology in this field.

## Course Outcome

- The students will spread social awareness about the immense socio-economic and cultural value of indigenous medicinal plants.
- They will gain expertise in identifying the most common indigenous medicinal plants in their localities.
- They will develop basic skills in laboratory techniques dealing with the pharmacologically active components of common medicinal plants.
- They can monitor local populations of threatened and endangered medicinal plants, including as part of citizen science networks.
- They will get employment opportunities in the area of community health services, and secure self-employment prospects in medicinal plant resource collection, processing, marketing, and setting up of nurseries for propagating and marketing of common medicinal plants used for traditional herbal remedies.

Add-On Course: Session 2021-22

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Structure

The following is the curriculum for the add-on course: "Introduction to Indigenous Medicinal Plants" (Session 2021-22)

| No. | Topic | No. of Hours |
|---|---|---|
| | Module I: Theory | |
| 1 | Brief historical context of medicinal plants from pre-historical, ancient, medieval and modern periods, with emphasis on South Asia | 2 |
| 2 | Overview of the current status and future prospects of medicinal plants, with examples of indigenous medicinal plants | 2 |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms including *Taxus wallichian*a | 1 |
| 4 | Medicinal lichens and fungi | 1 |
| 5 | Medicinal monocots, including *Aloe vera*, *Curcuma longa*, *Gloriosa superba*, and *Zingiber officinale* | 1 |
| 6 | Medicinal dicots, including *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Eclipta alba*, *Holarrhena anti-dysenterica , Justicia adhatoda*, *Mentha arvensis*, *Ocimum sanctum*, *Rauvolfia serpentina*, *Terminalia chebula,* and *Vitex negundo* | 3 |
| 7 | Important threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 2 |
| 8 | Overview of phytochemical diversity in medicinal plants, with examples of plant-derived medicinal compounds, including alkaloids of *Rauvolfia serpentina*, tannins of *Terminalia chebula*, and resins of *Curcuma longa* and *Zingiber officinale* | 4 |
| 9 | Role of plant biotechnology in medicinal plants utilization, with examples of indigenous medicinal plants, including *Rauvolfia serpentina*, and *Taxus wallichian*a | 4 |
| | Module II: Practical | |
| 10 | Identification of twigs of common Indian medicinal plants: *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Mentha arvensis*, *Ocimum sanctum*, and *Vitex negundo,* and useful plant parts: rhizome (*Curcuma longa/ Zingiber officinale*), bark (*Terminalia arjuna*), leaf (*Aloe vera/Justicia adhatoda*), fruit (*Terminalia chebula*), whole plant (*Eclipta alba*) | 2 |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants: alkaloids (root of *Rauvolfia serpentina*), tannins (fruit of *Terminalia chebula*), and resins (rhizome of *Curcuma longa/ Zingiber officinale*) | 4 |
| 12 | Visits to Medicinal Plant Gardens, both in campus (*Sushruta Udyana*) and off campus (Agri-Horticultural Society of India) | 4 |
| | **Total Training Hours** | **30** |

NB: Certificates will be issued to only those enrolled students who have attended at least 75% of the classes, and the grades in their certificates will be awarded based on their performance in the evaluation conducted after the completion of the course.

## Course Coordinators

- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor

## Resource Persons

- **Prof. Meenakshi Mukhopadhyay**, M.Sc.
  Associate Professor & Head
- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor
- **Dr. Asis Kumar Pal**, M.Sc., B.Ed., Ph.D.
  Assistant Professor
- **Dr. Ashutosh Mukherjee**, M.Sc., Ph.D.
  Assistant Professor
- **Prof. Rinku Halder Sahu**, M.Sc.
  State Aided College Teacher
- **Prof. Ishita Roy**, M.Sc.
  State Aided College Teacher

## Recommended Books


- Ali, M. (2004) *Text Book of Pharmacognosy*. New Delhi: CBS Publishers & Distributors.
- Chaudhuri, A.B. (2007) *Endangered Medicinal Plants*. New Delhi: Daya Publishing House.
- Jain, S.K. (1995) *Manual of Ethnobotany*. Jodhpur: Scientific Publishers.
- Jha, T.B. & B. Ghosh (2005) *Plant Tissue Culture*: Basic and Applied. Kolkata: Platinum Publishers.
- Joshi, M.C. (2007) *Hand-book of Indian Medicinal* Plants. Jodhpur: Scientific Publishers, India.
- Kirtikar, K.R. & B.D. Basu (1995) *Indian Medicinal Plants* (Vol. I—IV). Dehradun: Bishan Singh Mahendrapal Singh.
- Paria N.D. (Ed.) (2010) *Medicinal Plant Resources of South Bengal* (Vol. II). Kolkata: Research Wing, Directorate of Forests, Government of West Bengal.
- Paria, N.D. (Ed.) (2005) *Medicinal Plant Resources of South Bengal* (Vol. I). Research Wing, Directorate of Forests, Government of West Bengal.
- Trease, E.C. & W.C. Evans (2009) *Pharmacognosy* (Ed. XVI). Philadelphia: W.B. Saunders Ltd.
- Trivedi, P.C. (2006) *Medicinal Plants: Ethnobotanical Approach*. New Delhi: Agrobios India.
- Wallis, T.E. (2005) *Text Book of Pharmacognosy* (Ed. V). New Delhi: CBS Publishers & Distributors.


Department of Botany
Vivekananda College
**269 Diamond Harbour Road**
**Kolkata 700063**

# Dept. of Botany
# Vivekananda College

The following is the schedule for add-on course on: "Introduction to Indigenous Medicinal Plants" for B.Sc. Semester III Botany Hons. students in the academic session 2021-22:

| No. | Topic (in brief) | Date (Time) | Assigned Teacher |
|---|---|---|---|
| | Theory | | |
| 1 | Brief history of medicinal plants with emphasis on South Asia | 13.11.2021 (3-5 PM) | KNC* |
| 2 | Overview of current status and future prospects of medicinal plants | 20.11.2021 (3-5 PM) | KNC* |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms | 27.11.2021 (3-4 PM) | SK* |
| 4 | Medicinal lichens and fungi | 27.11.2021 (4-5 PM) | AKP* |
| 5 | Medicinal monocots | 04.12.2021 (3-4 PM) | SK* |
| 6 | Medicinal dicots | 0412.2021 (4-5 PM)<br>11.12.2021 (3-5 PM) | SK* |
| 7 | Threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 18.12.2021 (3-5 PM) | KNC* |
| 8 | Overview of phytochemical diversity in medicinal plants | 08.01.2022 (3-5 PM)<br>15.01.2022 (3-5 PM) | MM* |
| 9 | Role of plant biotechnology in medicinal plants utilization | 22.01.2022 (3-5 PM)<br>29.01.2022 (3-5 PM) | AM* |
| | Practical | | |
| 10 | Laboratory identification of twigs and useful parts of common Indian medicinal plants | 05.03.2022 (3-5 PM) | RSH & IR |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants | 12.03.2022 (3-5 PM)<br>26.03.2022 (3-5 PM) | AKP & AM |
| 12 | Visit to the in-campus medicinal plant garden *Sushruta Udyana* | 02.04.2022 (3-5 PM) | RSH & IR |
| | Visit to the medicinal plant garden of Agri-Horticultural Society of India, Alipore | 09.04.2022 (3-5 PM) | SK & KNC |
| | Evaluation | | |
| 13 | Submission of project reports on specific indigenous medicinal plants and viva-voce | 23.04.2022 (3-5 PM) | SK & KNC |

Online Mode [*]:Theory Class

Offline Mode: Theory Class (Room No. S110), Practical Clas (Room No. S101)

SK: Sutapa Kumar (Rai), MM: Meenakshi Mukhopadhyay, KNC: Kuntal Narayan Chaudhuri, AKP: Asis Kumar Pal, AM: Ashutosh Mukherjee, RSH: Rinku Sahu-Halder, IR: Ishita Roy

Sutapa Kumar (Rai) 30/9/21

Chaudhuri 30.9.21

**Course Coordinators**

## 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 arerequested to take up the matter on an urgent basis.

21/9/21

Principal

Principal
Vivekananda College
Thakurpukur, Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063
Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

# Dept. of Botany
# Vivekananda College

## Notice

Date: 21.09.2021

A departmental meeting will be held on 28.09.2021 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

21/9/21.

**Head**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 28.09.2021 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2021-22.

**Signatures of teachers present in the meeting**

1. 28/09/2021.
2. Sutapa Kumar (Rai) 28/9/21
3. Meenakshi Mukhopadhyay 28/09/21
4. 28.9.21
5. Asis Kumar Pal 28/09/21
6. Rinku Halder Saha 28/9/21
7. Ishita Roy. 28/9/21

# Dept. of Botany
# Vivekananda College

Date: 30.09.2021

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 21.09.2021, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2021-22. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

30/09/2021.

**Head**
**Dept. of Botany**
**Vivekananda College**

Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 28.09.2021.
2. Course brochures of the three aforementioned add-on courses.

Add-on course on

# Mushroom Cultivation Technology


Department of Botany

Vivekananda College, Thakurpukur

Kolkata – 700 063



**Session 2021-22**

Add-On Course on:

# Mushroom Cultivation Technology

Organised by:

Department of Botany,

Vivekananda College

Joint Convenors:

Dr. Asis Kumar Pal

Dr. Ashutosh Mukherjee

**Course Objectives:**

- To aware students about the food values and medicinal importance of mushroom
- Enable the students to identify edible and poisonous mushrooms
- Provide hands on training for the preparation spawn production and of bed for mushroom cultivation with special reference to Oyster mushroom (*Pleurotus* sp.)
- Give the students exposure to the experiences of experts and functioning mushroom farms
- Inform the students about different recipes and products of mushroom
- Preservation and processing techniques of mushroom
- To gain knowledge about the cost-benefit ratio of Oyster mushroom cultivation
- Help the students to learn a means of self-employment and income generation

**Course outcome:**

- Identification of edible types of mushroom
- Gain the knowledge of cultivation of Oyster mushroom and its spawn production
- Diseases and pest management of mushrooms
- Entrepreneurship, self-employment, income generation and Woman empowerment

**Syllabus: Theory (14 Hours)**

**Introduction to mushrooms (2 Hours)**

Overview of Mushrooms - Importance of mushrooms as food and medicine, History and Scope of mushroom cultivation, Edible and Poisonous Mushrooms

**Common edible mushrooms (2 Hours)**

Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus* sp.) and paddy straw mushroom (*Volvariella volvcea*).

**Principles of mushroom cultivation (4 Hours)**

Structure and construction of mushroom house. Sterilization of substrates. Spawn production - culture media preparation- production of pure culture, mother spawn, and multiplication of spawn. Mushroom bed preparation. Spawning, spawn running, harvesting. Cultivation of oyster mushroom.

**Disease management (2 Hours)**

Limitations of Oyster mushroom cultivation - diseases, pests and nematodes, moulds, bactgerial diseases and their management strategies.

**Health benefits of mushrooms (2 Hours) Theory**

Nutritional and medicinal values of mushrooms. Therapeutic aspects - antitumor effect

**Post harvest technology: (2 Hours) Theory**

Preservation of mushrooms- freezing, dry freezing, drying, canning, quality assurance and entrepreneurship. Value added products of mushrooms.

**Practical (16 Hours)**

Sterilization and sanitation of mushroom house, instruments and substrates (**2 Hours**)

Preparation of mother culture and media preparation (**4 Hours**)

Inoculation, incubation and spawn production (**4 Hours**)

**Cultivation of oyster mushroom using paddy straw/agricultural wastes**

Preparation of bed (**4 Hours**)

Inoculation of bed with spawn and placement of beds with proper care (**2 Hours**)

Watering, continuous observation and screening of beds and harvesting from healthy bed is an continuous process and will take 15-20 days.

**Further readings**


1. Purkayastha, R. P. and Chandra, A. (1976). Indian Edible Mushrooms. Firma KLM, Kolkata, India.
2. Marimuthu, T. et al. (1991). Oyster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
3. Nita Bhal. (2000). Hand bookon Mushrooms. 2nd ed.Vol.IandII. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
4. Pandey, R.K, Ghosh, S. K (1996). A Hand Book on Mushroom Cultivation. Emkey Publications.
5. Pathak,V.N. and Yadav, N.(1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
6. Tewari Pankaj Kapoor, S.C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

# Dept. of Botany
# Vivekananda College

The following is the schedule of the add-on course (Online & Offline) on "Mushroom Cultivation Technology" for the academic session 2021-2022:

| No. | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| 1 | Introduction to Mushrooms (Theory)* | 13/11/2021 03:00 PM – 05:00 PM | AKP |
| 2 | Common Edible mushrooms (Theory)* | 20/11/2021 03:00 PM – 05:00 PM | MM |
| 3 | Principals of Mushroom Cultivation – Session 1 (Theory)* | 27/11/2021 03:00 PM – 05:00 PM | AM |
| 4 | Principals of Mushroom Cultivation – Session 2 (Theory)* | 04/12/2021 03:00 PM – 05:00 PM | AKP |
| 5 | Mushroom Disease Management (Theory)* | 11/12/2021 03:00 PM – 05:00 PM | RHS |
| 6 | Health benefits of Mushrooms (Theory)* | 18/12/2021 03:00 PM – 05:00 PM | IR |
| 7 | Post Harvest Technology (Theory)* | 08/01/2022 03:00 PM – 05:00 PM | AKP |
| 8 | Sterilization & Sanitization of Mushroom house, instruments and substrates (Theory)* | 15/01/2022 03:00 PM – 05:00 PM | IR |
| 9 | Preparation of Mother Culture & media preparation. (Practical) | 22/01/2022 03:00 PM – 05:00 PM | MM |
| 10 | Inoculation, Incubation & Spawn production. – Session 1 (Practical) | 29/01/2022 03:00 PM – 05:00 PM | RHS |
| 11 | Inoculation, Incubation & Spawn production. – Session 2 (Practical) | 12/02/2022 03:00 PM – 05:00 PM | AKP |
| 12 | Cultivation of Oyster Mushroom using Paddy Straw. Session 1 (Practical). | 19/02/2022 03:00 PM – 05:00 PM | AKP & MM |
| 13 | Cultivation of Oyster Mushroom using Paddy Straw. Session 2 (Practical). | 26/02/2022 03:00 PM – 05:00 PM | AKP & MM |
| 14 | Inoculation of bed with spawn (Practical) | 05/03/2022 03:00 PM – 05:00 PM | AKP |
| 15 | Evaluation by MCQ method | 12/03/2022 03:00 PM – 05:00 PM | IR & RHS |

***Theory :** Online Mode **Practical :** Offline Mode

**Practical :** Room – S101

(**AKP :** Asis Kumar Pal, **MM :** Meenakshi Mukhopadhyay, **AM :** Ashutosh Mukherjee, **IR :** Ishita Roy, **RHS :** Rinku Halder Sahu)

Asis Kumar Pal 20/09/21

Course Coordinators 20/09/2021.

## 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.
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 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

(033) 2497 6824
(033) 2497 6834

# 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.

24/6/22

Principal

Vivekananda College
Thakurpukur, Kol-63

# Dept. of Botany
# Vivekananda College

## Notice

Date: 20.09.2022

A departmental meeting will be held on 27.09.2022 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

Meenakshi Mukhopadhyay
20/09/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 27.09.2022 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2022-23.

**Signatures of teachers present in the meeting**

1. Meenakshi Mukhopadhyay 27/09/22
2. Sutapa Kumar (Rai) 27/9/22
3. 27.9.22
4. 27/09/22.
5. 27/09/2022.
6. 27/9/22
7. Ishita Roy. 27/9/22.

# Dept. of Botany
# Vivekananda College

Date: 01.11.2022

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 24.06.2022, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2022-23. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

Meenakshi Mukhopadhyay 01/11/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

Incharge / Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 27.09.2022.
2. Course brochures of the three aforementioned add-on courses.

# ADD-ON COURSE

# BIOSTATISTICS WITH 'R'

Session: 2022-23

Dept. of Botany

**Vivekananda College**

# Add-on Course on Biostatistics with R

**Course Details:**

Biological data are robust and often complex. Interpreting biological phenomena is, thus, vastly dependent on the results of statistical analyses. As these data are robust, analyzing biological data with statistical methods needs knowledge about statistical tools and modern-day software. This add-on course will familiarize students about statistical methods relevant to biological data and the use of the most frequently used software R and its GUI (graphical user interface) R Studio.

**Course Curriculum:**

| Topic | Hours |
|---|---|
| **Theory** | **20** |
| Introduction to data and variables; data types: numeric, logical, string and ordinal | 2 |
| Sampling methods, frequency distribution: Examples from biological data | 2 |
| Descriptive statistics: Mean, mode, median, standard deviation and standard error | 4 |
| Probability: Additive and multiplicative rules; applications in biological data | 2 |
| Correlation and Regression: Examples from biological data | 4 |
| Statistical softwares: R and R Studio | 2 |
| Introduction to command line in R | 2 |
| Data structures and importing data in R and R Studio | 2 |
| **Practical** | **10** |
| Introduction to R and R Studio | 2 |
| Descriptive statistics, correlation and regression with R | 2 |
| Data visualization package: ggplot<br>Visualization of bar plot, histogram and scatterplot | 4 |
| Clustering and heatmap analysis with R | 2 |

**After Completing the Course, Students will be able to:**

1. Learn basic skills of statistics relevant to biological data
2. Install and use R and R Studio in Linux and Windows
3. Visualize and analyze data
4. Perform hypothesis tests, interpret statistical results (e.g., p-values)

**Course Coordinators**:

Dr. Meenakshi Mukhopadhyay
Dr. Ashutosh Mukherjee

**Resource Persons:**

Dr. Meenakshi Mukhopadhyay
Dr. Sutapa Kumar (Rai)
Dr. Ashutosh Mukherjee

## Dept. of Botany

## Vivekananda College

The following is the schedule of the add-on-course on "Biostatistics with R" for the session 2022-23.

| No | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| | **Theory** | | |
| 1. | Introduction to data &variables; data types: numeric, logical, string & ordinal | 13.8.22 3-5 PM | MM |
| 2. | Sampling methods, frequency distribution, examples from biological data | 20.8.22 3-5PM | MM |
| 3. | Descriptive statistics: mean, mode, median, standard deviation, standard error-Session 1 | 27.8.22 3-5 PM | SK |
| 4. | Descriptive statistics: mean, mode, median, standard deviation, standard error-Session 2 | 3.9.22 3-5 PM | SK |
| 5. | Probability: additive & multiplicative rules, application in biological data | 10.9.22 3-5 PM | SK |
| 6. | Correlation & regression, examples from biological data-Session 1 | 17.9.22 3-5 PM | MM |
| 7. | Correlation & regression, examples from biological data-Session 2 | 24.9.22 3-5 PM | MM |
| 8. | Statistical software: R & R studio | 5.11.22 3-5 PM | AM |
| 9 | Introduction to command in R | 12.11.22 3-5 PM | AM |
| 10. | Data structure & importing data in R & R studio | 19.11.22 3-5 PM | AM |
| | **Practical** | | |
| 11. | Introduction to R & R studio | 26.11.22 3-5 PM | AM |
| 12. | Descriptive statistics, Correlation & Regression with R | 3.12.22 3-5 PM | MM & SK |
| 13. | Data visualization: ggplot" visualization of bar plot; histogram & scatter plot | 10.12.22 3-5 PM | AM |
| 14. | Clustering & heat map analysis with R | 17.12.22 3-5 PM | AM |
| | **Evaluation** | | |
| 15. | Submission of assignments | 24.12.22 3-5 PM | AM |

Theory Room S109
Practical Room S103
MM: Meenakshi Mukhopadhyay, AM: Ashutosh Mukherjee, SK: Sutapa Kumar (Rai)

Meenakshi Mukhopadhyay 1/11/22
Ashutosh Mukherjee 1/12/22.

**Course Coordinators**

## 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.
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 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

(033) 2497 6824
(033) 2497 6834

# 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.

24/6/22

Principal

Vivekananda College
Thakurpukur, Kol-63

# Dept. of Botany
# Vivekananda College

## Notice

Date: 20.09.2022

A departmental meeting will be held on 27.09.2022 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

Meenakshi Mukhopadhyay
20/09/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 27.09.2022 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2022-23.

**Signatures of teachers present in the meeting**

1. Meenakshi Mukhopadhyay 27/09/22
2. Sutapa Kumar (Rai) 27/9/22
3. 27.9.22
4. 27/09/22.
5. 27/09/2022.
6. 27/9/22
7. Ishita Roy. 27/9/22.

# Dept. of Botany
# Vivekananda College

Date: 01.11.2022

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 24.06.2022, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2022-23. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

Meenakshi Mukhopadhyay 01/11/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

Incharge / Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 27.09.2022.
2. Course brochures of the three aforementioned add-on courses.

Course Brochure

# Add-On Course

# Introduction to Indigenous Medicinal Plants

Session 2022-23

Department of Botany
Vivekananda College

Add-On Course: Session 2022-23

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Introduction

Medicinal plants possess healing powers due to their array of natural products, and these plant species are the sources of drugs that can prevent or treat diseases in humans or animals. The plant kingdom is a veritable source of diverse molecules, including secondary metabolites that help them endure the environment and multiply by providing protection from stress, deterring marauders, and attracting dispersers. These phytochemicals can also affect our body, and mind, and their therapeutic properties can ease suffering from illness. Traditionally, medicinal plants have been used to make crude drugs containing active constituents. Presently, these fine chemicals have been isolated, characterized, and constitute modern pharmaceutical drugs, or serve as their precursors or prototypes. The worldwide bioprospecting of medicinal plants, largely in tropical biomes, represents the careful analysis of these natural products, including their pharmacological action from *in vitro* models to clinical trials. However, the increasing demand and consequent over-extraction from the wild has drastically depleted the natural populations of many medicinal plants. Domestication and cultivation of medicinal plant species has often been challenging. Biotechnological approaches can play a key role in the sustainable use and conservation of threatened and endangered indigenous medicinal plant species.

India has a rich heritage in indigenous medicinal plants. The history of medicine, essentially herbal medicine, in South Asia can be traced back to the remote past. Ayurveda, the pan-Indian traditional system of medicine is believed to have originated in ca. 2nd millennium BCE, and is attributed to the fabled physician Dhanvantari. The *Rigveda* (ca. 1,500 BCE) mentions the sacred herb *soma* as one of the earliest references to a medicinal plant in the Sanskrit literature. The *Atharvaveda* (ca. 1,200 BCE) includes spells and charms along with nearly 300 medicinal plants and their products. *Charaka Samhita* (ca. 200 CE) has chapters called *Chikitsa Sthana* (therapeutics) and *Kalpa Sthana* (pharmaceutics) for identifying and classifying medicinal plants, preparation of herbal formulations, and mentions nearly 500 medicinal plant species. The *Sushruta Samhita* (*c*. 600 CE) deals with *shalya-tantra* (surgery), and cites 700 medicinal plant species. The *Ashtangahrdayam Samhita* by Vagbhata (ca. 800 CE) lists nearly 900 medicinal plant species. Historically, Ayurveda has influenced other traditional systems of medicine across Asia, including Sowa-Rigpa (ca. 1200 CE) in Tibet. Ancient contacts with Greece and Rome, and later with Arabia and Persia, contributed to the enrichment of the Indian material materia. Siddha is another indigenous medicinal system that has historical roots in the southern part of India, and is a brilliant achievement and symbol of Tamil culture. This ancient tradition of medicine was innovated by the Dravidian civilizations of India, and is linked to the Harappan culture or even older megalithic cultures. Unani is yet another indigenous medicinal science that is now mostly practiced in South Asian, and is based on ancient Greek (Unani or Yunani in Arabic and Persian) system in its Perso-Arabic form, with influences from distant ancient cultures such as far Egypt, Syria, Iraq, China and India during the Golden Age of Islam. This is a relatively recent traditional system of medicine in India, and is a prominent aspect of the Muslim cultures in South Asia. In addition to these classical (codified) systems of indigenous medicinal knowledge, there are a plethora of folk (non-codified) healing systems that are practices across tribal and rural corners of India. More than 800 medicinal plants species are utilized in diverse folk medicine across South Asia.

Add-On Course: Session 2022-23

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

India is a megadiverse country with only 2.4% of the world's land area, but accounts for 7-8% of all recorded species. The Himalayas, Western Ghats, Indo-Burma and Sundaland are the biodiversity hotspots of India. Presently, India has rich and diverse vegetation that includes over 45,000 species of plants. About 15,000 to 20,000 of these plant species have medicinal value, but only 7,000 to 7,500 plant species are used for medicinal purpose by classical and folk systems of indigenous medicine. The traditional use of plants and plant-parts has been a deep-rooted practical knowledge in the culture and livelihood of the people living in the remote parts of India, where herbal medicine still provides the primary healthcare. In recent times people from all walks of life, as well as the Indian diaspora across the globe, are switching over to traditional herbal medicine, as well as nutraceuticals and cosmeceuticals, as these are effective, safe, and inexpensive. Growing medicinal herbs at home is also a pastime with multiple benefits. These plants can be used as herbal remedies to prevent and treat unremitting and emergent diseases. Many of these are also sources of food, nutrients, flavouring agents for culinary use. Some of them can purify the air. Still others have aesthetic or spiritual values. Above all, growing and using these plants helps in preserving our intangible cultural heritage in the form of cultural practices and ecological knowledge. In the large scale, growing medicinal plants can be a source of self-employment in general, and women's empowerment in particular.

## Course Objective

- To sensitize the students about our rich heritage in medicinal plant wealth.
- To familiarize them with the most common medicinal plants that are valuable in indigenous systems of medicine.
- To give them an overview of the diversity of active principals in common medicinal plants, including those used by the modern pharmaceutical industry.
- To acquaint them with threatened and endangered medicinal plants.
- To provide them with a general idea about the diverse strategies for sustainable use and conservation of our medicinal plant resources, including the basics of the application of plant biotechnology in this field.

## Course Outcome

- The students will spread social awareness about the immense socio-economic and cultural value of indigenous medicinal plants.
- They will gain expertise in identifying the most common indigenous medicinal plants in their localities.
- They will develop basic skills in laboratory techniques dealing with the pharmacologically active components of common medicinal plants.
- They can monitor local populations of threatened and endangered medicinal plants, including as part of citizen science networks.
- They will get employment opportunities in the area of community health services, and secure self-employment prospects in medicinal plant resource collection, processing, marketing, and setting up of nurseries for propagating and marketing of common medicinal plants used for traditional herbal remedies.

Add-On Course: Session 2022-23

**Introduction to Indigenous Medicinal Plants**

Dept. of Botany, Vivekananda College

## Course Structure

The following is the curriculum for the add-on course: "Introduction to Indigenous Medicinal Plants" (Session 2022-23)

| No. | Topic | No. of Hours |
|---|---|---|
| | Module I: Theory | |
| 1 | Brief historical context of medicinal plants from pre-historical, ancient, medieval and modern periods, with emphasis on South Asia | 2 |
| 2 | Overview of the current status and future prospects of medicinal plants, with examples of indigenous medicinal plants | 2 |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms including *Taxus wallichian*a | 1 |
| 4 | Medicinal lichens and fungi | 1 |
| 5 | Medicinal monocots, including *Aloe vera*, *Curcuma longa*, *Gloriosa superba*, and *Zingiber officinale* | 1 |
| 6 | Medicinal dicots, including *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Eclipta alba*, *Holarrhena anti-dysenterica , Justicia adhatoda*, *Mentha arvensis*, *Ocimum sanctum*, *Rauvolfia serpentina*, *Terminalia chebula,* and *Vitex negundo* | 3 |
| 7 | Important threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 2 |
| 8 | Overview of phytochemical diversity in medicinal plants, with examples of plant-derived medicinal compounds, including alkaloids of *Rauvolfia serpentina*, tannins of *Terminalia chebula*, and resins of *Curcuma longa* and *Zingiber officinale* | 4 |
| 9 | Role of plant biotechnology in medicinal plants utilization, with examples of indigenous medicinal plants, including *Rauvolfia serpentina*, and *Taxus wallichian*a | 4 |
| | Module II: Practical | |
| 10 | Identification of twigs of common Indian medicinal plants: *Andrographis paniculata*, *Azadirachta indica*, *Bacopa monnieri*, *Centella asiatica, Mentha arvensis*, *Ocimum sanctum*, and *Vitex negundo,* and useful plant parts: rhizome (*Curcuma longa/ Zingiber officinale*), bark (*Terminalia arjuna*), leaf (*Aloe vera/Justicia adhatoda*), fruit (*Terminalia chebula*), whole plant (*Eclipta alba*) | 2 |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants: alkaloids (root of *Rauvolfia serpentina*), tannins (fruit of *Terminalia chebula*), and resins (rhizome of *Curcuma longa/ Zingiber officinale*) | 4 |
| 12 | Visits to Medicinal Plant Gardens, both in campus (*Sushruta Udyana*) and off campus (Agri-Horticultural Society of India) | 4 |
| | **Total Training Hours** | **30** |

NB: Certificates will be issued to only those enrolled students who have attended at least 75% of the classes, and the grades in their certificates will be awarded based on their performance in the evaluation conducted after the completion of the course.

## Course Coordinators

- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor

## Resource Persons

- **Prof. Meenakshi Mukhopadhyay**, M.Sc.
  Associate Professor & Head
- **Dr. Sutapa Kumar Rai**, M.Sc., Ph.D.
  Associate Professor
- **Dr. Kuntal Narayan Chaudhuri**, M.Sc., Ph.D.
  Assistant Professor
- **Dr. Asis Kumar Pal**, M.Sc., B.Ed., Ph.D.
  Assistant Professor
- **Dr. Ashutosh Mukherjee**, M.Sc., Ph.D.
  Assistant Professor
- **Prof. Rinku Halder Sahu**, M.Sc.
  State Aided College Teacher
- **Prof. Ishita Roy**, M.Sc.
  State Aided College Teacher

## Recommended Books


- Ali, M. (2004) *Text Book of Pharmacognosy*. New Delhi: CBS Publishers & Distributors.
- Chaudhuri, A.B. (2007) *Endangered Medicinal Plants*. New Delhi: Daya Publishing House.
- Jain, S.K. (1995) *Manual of Ethnobotany*. Jodhpur: Scientific Publishers.
- Jha, T.B. & B. Ghosh (2005) *Plant Tissue Culture*: Basic and Applied. Kolkata: Platinum Publishers.
- Joshi, M.C. (2007) *Hand-book of Indian Medicinal* Plants. Jodhpur: Scientific Publishers, India.
- Kirtikar, K.R. & B.D. Basu (1995) *Indian Medicinal Plants* (Vol. I—IV). Dehradun: Bishan Singh Mahendrapal Singh.
- Paria N.D. (Ed.) (2010) *Medicinal Plant Resources of South Bengal* (Vol. II). Kolkata: Research Wing, Directorate of Forests, Government of West Bengal.
- Paria, N.D. (Ed.) (2005) *Medicinal Plant Resources of South Bengal* (Vol. I). Research Wing, Directorate of Forests, Government of West Bengal.
- Trease, E.C. & W.C. Evans (2009) *Pharmacognosy* (Ed. XVI). Philadelphia: W.B. Saunders Ltd.
- Trivedi, P.C. (2006) *Medicinal Plants: Ethnobotanical Approach*. New Delhi: Agrobios India.
- Wallis, T.E. (2005) *Text Book of Pharmacognosy* (Ed. V). New Delhi: CBS Publishers & Distributors.


Department of Botany
Vivekananda College
**269 Diamond Harbour Road**
**Kolkata 700063**

# Dept. of Botany
# Vivekananda College

The following is the schedule for add-on course on: "Introduction to Indigenous Medicinal Plants" for B.Sc. Semester III Botany Hons. students in the academic session 2022-23:

| No. | Topic (in brief) | Date (Time) | Assigned Teacher |
|---|---|---|---|
| | Theory | | |
| 1 | Brief history of medicinal plants with emphasis on South Asia | 05.11.2022 (3-5 PM) | KNC |
| 2 | Overview of current status and future prospects of medicinal plants | 12.11.2022 (3-5 PM) | KNC |
| 3 | Medicinal algae, bryophytes, pteridophytes, and gymnosperms | 19.11.2022 (3-4 PM) | SK* |
| 4 | Medicinal lichens and fungi | 19.11.2022 (4-5 PM) | AKP |
| 5 | Medicinal monocots | 26.11.2022 (3-4 PM) | SK* |
| 6 | Medicinal dicots | 26.11.2022 (4-5 PM)<br>03.12.2022 (3-5 PM) | SK* |
| 7 | Threatened indigenous medicinal plants of India, and *in situ* and *ex situ* strategies for their conservation | 10.12.2022 (3-5 PM) | KNC |
| 8 | Overview of phytochemical diversity in medicinal plants | 17.12.2022 (3-5 PM)<br>24.12.2022 (3-5 PM) | MM |
| 9 | Role of plant biotechnology in medicinal plants utilization | 07.01.2023 (3-5 PM)<br>14.01.2023 (3-5 PM) | AM |
| | Practical | | |
| 10 | Laboratory identification of twigs and useful parts of common Indian medicinal plants | 18.03.2023 (3-5 PM) | RSH & IR |
| 11 | Extraction and detection of phytochemicals from common Indian medicinal plants | 25.03.2023 (3-5 PM)<br>01.04.2023 (3-5 PM) | AKP & AM |
| 12 | Visit to medicinal plant garden *Sushruta Udyana* in the campus | 08.04.2023 (3-5 PM) | RSH & IR |
| | Visit to medicinal plant garden of the Agri-Horticultural Society of India, Alipore | 29.04.2023 (3-5 PM) | SK & KNC |
| | Evaluation | | |
| 13 | Submission of project reports on specific indigenous medicinal plants and viva-voce | 06.05.2023 (3-5 PM) | SK & KNC |

Online Mode [*]: Theory Class
Offline Mode: Theory Class (Room No. S110), Practical Clas (Room No. S101)
SK: Sutapa Kumar (Rai), MM: Meenakshi Mukhopadhyay, KNC: Kuntal Narayan Chaudhuri, AKP: Asis Kumar Pal, AM: Ashutosh Mukherjee, RSH: Rinku Sahu-Halder, IR: Ishita Roy

Sutapa Kumar (Rai) 1/11/22

1.11.22

**Course Coordinators**

## 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.
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 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

(033) 2497 6824
(033) 2497 6834

# 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.

24/6/22

Principal

Vivekananda College
Thakurpukur, Kol-63

# Dept. of Botany
# Vivekananda College

## Notice

Date: 20.09.2022

A departmental meeting will be held on 27.09.2022 at 12:45 PM to discuss the following.

Agenda:
1. Continuation of add-on courses on: Mushroom Cultivation, Medicinal Plants, and Biostatistics, for B.Sc. Botany Honours students.

All faculty members are requested to be present.

Meenakshi Mukhopadhyay
20/09/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

# Dept. of Botany
# Vivekananda College

## Minutes of the Meeting

In the departmental meeting held on 27.09.2022 the teachers of the department have unanimously decided that:

1. Three 30-hr add-on courses on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators), "Introduction to Indigenous Medicinal Plants" for Semester III with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Semester V with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, would be offered to B.Sc. Botany Hons. students in the academic session 2022-23.

**Signatures of teachers present in the meeting**

1. Meenakshi Mukhopadhyay 27/09/22
2. Sutapa Kumar (Rai) 27/9/22
3. 27.9.22
4. 27/09/22.
5. 27/09/2022.
6. 27/9/22
7. Ishita Roy. 27/9/22.

# Dept. of Botany
# Vivekananda College

Date: 01.11.2022

To,
The Principal,
Vivekananda College,
Kolkata 700063

Sub: Continuation of add-on courses for B.Sc. Botany Honours students.

Dear Sir,

This is to inform you that with reference to you notice dated 24.06.2022, the Dept. of Botany is continuing the add-on course on: "Mushroom Cultivation Technology" for Semester I with Dr. Asis Kumar Pal and Dr. Ashutosh Mukherjee as course coordinators, "Introduction to Indigenous Medicinal Plants" for Part II with Dr. Sutapa Kumar (Rai) and Dr. Kuntal Narayan Chaudhuri as course coordinators, and "Biostatistics with R" for Part III with Prof. Meenakshi Mukhopadhyay and Dr. Ashutosh Mukherjee as course coordinators, for B.Sc. Botany Honours students in the academic year 2022-23. The courses will be scheduled on Saturdays, from 3:00 to 5:00 PM. The resource persons include the teachers of the department. Students will be issued certificates on successful completion of the course.

Looking forward to your kind cooperation in this regard.

Thanking you.

Yours sincerely.

Meenakshi Mukhopadhyay 01/11/22

**Head/In-Charge**
**Dept. of Botany**
**Vivekananda College**

Incharge / Head
Department of Botany
VIVEKANANDA COLLEGE
Kolkata-700 063

**Encl:**
1. Copy of resolutions of the departmental meeting held on 27.09.2022.
2. Course brochures of the three aforementioned add-on courses.

Add-on course on

# Mushroom Cultivation Technology

Department of Botany

Vivekananda College, Thakurpukur

Kolkata – 700 063

**Session 2022-23**

Add-On Course on:

# Mushroom Cultivation Technology

Organised by:

Department of Botany,

Vivekananda College

Joint Convenors:

Dr. Asis Kumar Pal

Dr. Ashutosh Mukherjee

**Course Objectives:**

- To aware students about the food values and medicinal importance of mushroom
- Enable the students to identify edible and poisonous mushrooms
- Provide hands on training for the preparation spawn production and of bed for mushroom cultivation with special reference to Oyster mushroom (*Pleurotus* sp.)
- Give the students exposure to the experiences of experts and functioning mushroom farms
- Inform the students about different recipes and products of mushroom
- Preservation and processing techniques of mushroom
- To gain knowledge about the cost-benefit ratio of Oyster mushroom cultivation
- Help the students to learn a means of self-employment and income generation

**Course outcome:**

- Identification of edible types of mushroom
- Gain the knowledge of cultivation of Oyster mushroom and its spawn production
- Diseases and pest management of mushrooms
- Entrepreneurship, self-employment, income generation and Woman empowerment

**Syllabus: Theory (14 Hours)**

**Introduction to mushrooms (2 Hours)**

Overview of Mushrooms - Importance of mushrooms as food and medicine, History and Scope of mushroom cultivation, Edible and Poisonous Mushrooms

**Common edible mushrooms (2 Hours)**

Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus* sp.) and paddy straw mushroom (*Volvariella volvcea*).

**Principles of mushroom cultivation (4 Hours)**

Structure and construction of mushroom house. Sterilization of substrates. Spawn production - culture media preparation- production of pure culture, mother spawn, and multiplication of spawn. Mushroom bed preparation. Spawning, spawn running, harvesting. Cultivation of oyster mushroom.

**Disease management (2 Hours)**

Limitations of Oyster mushroom cultivation - diseases, pests and nematodes, moulds, bactgerial diseases and their management strategies.

**Health benefits of mushrooms (2 Hours) Theory**

Nutritional and medicinal values of mushrooms. Therapeutic aspects - antitumor effect

**Post harvest technology: (2 Hours) Theory**

Preservation of mushrooms- freezing, dry freezing, drying, canning, quality assurance and entrepreneurship. Value added products of mushrooms.

**Practical (16 Hours)**

Sterilization and sanitation of mushroom house, instruments and substrates (**2 Hours**)

Preparation of mother culture and media preparation (**4 Hours**)

Inoculation, incubation and spawn production (**4 Hours**)

**Cultivation of oyster mushroom using paddy straw/agricultural wastes**

Preparation of bed (**4 Hours**)

Inoculation of bed with spawn and placement of beds with proper care (**2 Hours**)

Watering, continuous observation and screening of beds and harvesting from healthy bed is an continuous process and will take 15-20 days.

**Further readings**


1. Purkayastha, R. P. and Chandra, A. (1976). Indian Edible Mushrooms. Firma KLM, Kolkata, India.
2. Marimuthu, T. et al. (1991). Oyster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
3. Nita Bhal. (2000). Hand bookon Mushrooms. 2nd ed.Vol.IandII. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
4. Pandey, R.K, Ghosh, S. K (1996). A Hand Book on Mushroom Cultivation. Emkey Publications.
5. Pathak,V.N. and Yadav, N.(1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
6. Tewari Pankaj Kapoor, S.C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.

Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

# Dept. of Botany
# Vivekananda College

The following is the schedule of the add-on course on "Mushroom Cultivation Technology" for the academic session 2022-23:

| No. | Topic | Date & Time | Assigned Teacher |
|---|---|---|---|
| 1 | Introduction to Mushrooms (Theory) | 05/11/2022 03:00 PM – 05:00 PM | AKP |
| 2 | Common Edible mushrooms (Theory) | 12/11/2022 03:00 PM – 05:00 PM | MM |
| 3 | Principals of Mushroom Cultivation – Session 1 (Theory) | 19/11/2022 03:00 PM – 05:00 PM | AM |
| 4 | Principals of Mushroom Cultivation – Session 2 (Theory) | 26/11/2022 03:00 PM – 05:00 PM | AKP |
| 5 | Mushroom Disease Management (Theory) | 03/12/2022 03:00 PM – 05:00 PM | RHS |
| 6 | Health benefits of Mushrooms (Theory) | 10/12/2022 03:00 PM – 05:00 PM | IR |
| 7 | Post Harvest Technology (Theory) | 17/12/2022 03:00 PM – 05:00 PM | AKP |
| 8 | Sterilization & Sanitization of Mushroom house, instruments and substrates (Theory) | 24/12/2022 03:00 PM – 05:00 PM | IR |
| 9 | Preparation of Mother Culture & media preparation. (Practical) | 07/01/2023 03:00 PM – 05:00 PM | MM |
| 10 | Inoculation, Incubation & Spawn production. – Session 1 (Practical) | 14/01/2023 03:00 PM – 05:00 PM | RHS |
| 11 | Inoculation, Incubation & Spawn production. – Session 2 (Practical) | 21/01/2023 03:00 PM – 05:00 PM | AKP |
| 12 | Cultivation of Oyster Mushroom using Paddy Straw. Session 1 (Practical). | 28/01/2023 03:00 PM – 05:00 PM | AKP & MM |
| 13 | Cultivation of Oyster Mushroom using Paddy Straw. Session 2 (Practical). | 04/02/2023 03:00 PM – 05:00 PM | AKP & MM |
| 14 | Inoculation of bed with spawn (Practical) | 11/02/2023 03:00 PM – 05:00 PM | AKP |
| 15 | Evaluation by MCQ method | 25/02/2023 03:00 PM – 05:00 PM | IR & RHS |

**Theory :** Room S-104 **Practical :** Room S-101

(**AKP :** Asis Kumar Pal, **MM :** Meenakshi Mukhopadhyay, **AM :** Ashutosh Mukherjee, **IR :** Ishita Roy, **RHS :** Rinku Halder Sahu)

Asis Kumar Pal 01/11/22

Ashutosh Mukherjee 1/11/22.

**Course Coordinators**