# Chaudhary Charan Singh University, Meerut

Department of Botany

# SKILL DEVELOPMENT PAPERS

Offered By Department of Botany for the students of other faculties

2021-ONWARDS

NEP-2020

| Sl No | Semester | Title | Credits | Max. Marks |
|---|---|---|---|---|
| 1. | I | Mushroom Cultivation | 3 | 25+75 |
| 2. | II | Organic Farming | 3 | 25+75 |
| 3. | III | Pharmacognosy and Herbal Preparations | 3 | 25+75 |
| 4. | IV | Soil Health Assessment | 3 | 25+75 |

## SKILL DEVELOPMENT COURSES

## OFFERRED BY THE DEPARTMENT OF BOTANY

### I - Mushroom Cultivation

**CERTIFICATE COURSE B.Sc.-I**

| | | |
|---|---|---|
| Programme: ***Certificate Course*** | Year: **I** | Semester: **I/Paper-I** |
| Subject: **Botany** | | |
| Course Code: B04 | Course Title: **Mushroom Cultivation** | |

**Course outcomes:** After the completion of the course the students will be able:

1. To understand the instruments, techniques, lab etiquettes and good lab practices for working in a microbiologylaboratory.
2. Develop skills for cultivating and identifying mushrooms, using them for commercial purposes.
3. Will understand the pathology associated with mushrooms and their pre-harvest & post- harvest management.
4. Can start own enterprise on mushrooms

| | |
|---|---|
| Credits:**3** | **Skill Development/ Optional** |
| Max. Marks: **25+75** | Min. Passing Marks: |

Total No. of Lectures-Tutorials-Practical (in labs per week): **0-1-2**

| **Unit** | | **No. of T/P(15+60 hrs)** |
|---|---|---|
| **1.** | 1. Introduction to mushrooms and their significance<br>2. Mushroom spawn (seed) production/ procurement | **4T+6P** |
| **II** | **Mushroom cultivation**<br>1. Button mushroom<br>2. Pearl mushroom<br>3. Oyster mushroom<br>4. Paddy straw mushroom.<br>5. Milky mushroom. | **2T+ 24P** |
| **III** | 1. Cultivation of other economically and medicinally important mushrooms<br>2. Mushroom; Sectioning of gills of *Agaricus*.<br>3. Insect pest management in cultivated mushrooms<br>4. Disease management in cultivated mushrooms | **3T+ 6P** |
| **IV** | 1. Value addition to mushrooms (nutrient quality improvement)<br>2. Mushroom growing unit/ house | **3T+12P** |
| **V** | 1. Entrepreneurial skills and economics for small enterprise<br>2. Management of spent substrates and waste disposal of various mushroom<br>3. Health and Safety at workplace | **3T+ 12P** |

**Suggested Readings**:

***Course Books published in Hindi/English***


1. प्रयोगात्मक वनस्पति विज्ञान भाग–1 लेखक अशोक बेंद्रे तथा अशोक कुमार प्रकाशन रस्तोगी प्रकाशन मेरठ।
2. प्रायोगिक वनस्पति विज्ञान-I Dhankar - Sharma – Trivedi ISBN Code: 978-81-8142-697-0 65, RBD Publishing House Shivaji Nagar Civil Lines,Jaipur - 302006 ( Rajasthan )
3. प्रायोगिक वनस्पति विज्ञान बी.एस.सी.–1 एस बी अग्रवाल प्रकाशक : शिवलाल अग्रवाल एण्ड कम्पनी प्रकाशित वर्ष : 2018
4. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual)
5. Modern Mushroom Cultivation And Recipes (hindi) (hb)ISBN : 9788177545180Edition : 01Year : 2017Author : SinghRiti , Singh UCPublisher : Agrobios (India)

1. https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdf
2. http://nhb.gov.in/pdf/Cultivation.pdf
3. https://www.classcentral.com/course/swayam-vocational-mushroom-production-23137


**This course can be opted as an elective by the students of following subjects: Open to all but special for** B.Sc. Biotech, B.Sc. Microbiology, B.Sc. Agriculture, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS.

**Suggested Continuous Evaluation Methods:**

Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

| Internal Assessment | Marks |
|---|---|
| Class Interaction | **5** |
| Quiz | **5** |
| Seminar/Assignment | **7** |
| Minor field work/excursion/lab visit/technology dissemination etc. | **8** |

**Course prerequisites:**

**Qualification:** To study this course, a student must have qualified 10+2 from any recognized board.
**Facilities: Smart and Interactive Class**
**Other Requisites: Video collection, Books, CDs, Access to On-line resources, Display Charts**
**Lab Requisites: A drum, a room, chemicals as per protocol, gunny bags, trays, racks, packaging material, inoculum, temperature and humidity control as per protocols.**

**Suggested equivalent online courses:**

https://community.plantae.org/tags/mooc
futurelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
https://microbiologysociety.org/publication/education-outreach-resources/basic-practical-microbiology-a-manual.html
https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf
http://allaboutalgae.com/benefits/
https://repository.cimmyt.org/xmlui/bitstream/handle/10883/3219/64331.pdf https://www.mooc-list.com/tags/microbiology
http://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8 171339239%5D%20%281984%29.pdf
https://www.coursera.org/courses?query=plantshttp://egyankosh.ac.in/handle/123456789/53530
https://www.classcentral.com/tag/microbiology https://www.edx.org/learn/microbiology https://www.mooc-list.com/tags/microbiology https://www.udemy.com/topic/microbiology/

## Skill Course II Offered by Botany Department- Organic farming

| CERTIFICATE COURSE B.Sc.-I | | |
|---|---|---|
| Programme: ***Certificate Course*** | Year: **I** | Semester: **II/Paper-II** |
| Offered by: **Botany** | | |
| Course Code: B04 | Course Title: **Organic farming** | |
| **Course outcomes:** After the completion of the course the students will be able:<br>1. Understand the instruments, techniques, lab etiquettes and good lab practices for field work<br>2. Develop skills for identifying organic supplements and preparing them from raw materials for safe agriculture/ horticulture.<br>3. Will understand the pathology associated with crops and their pre-harvest & post- harvest management.<br>4. Can start own enterprise on organic farming | | |
| Credits:**3** | **Skill Development Optional** | |
| Max. Marks: **25+75** | Min. Passing Marks: | |
| Total No. of Lectures-Tutorials-Practical (in labs per week): **0-1-2** | | |

| Unit | | No. of T/P (15+60hrs) |
|---|---|---|
| **1.** | 1. Introduction to organic farming and its significance<br>2. Concepts and Principles of Organic farming<br>3. Key indicators for organic farming, sustainable agriculture and climate change | **4T+6P** |
| **II** | 1. Input management.<br>2. compost production,<br>3. vermicomposting,<br>4. Compost quality,<br>5. Compost utilization and marketing | **2T+ 24P** |
| **III** | 1. Organic crop management: field crops, horticulture and plantation crops<br>2. Plant protection measures, biopesticides, natural predators, cultural practice | **3T+ 6P** |
| **IV** | 1. Rotation design for organic system,<br>2.Transition to organic agriculture,<br>3. Farming system | **3T+12P** |
| **V** | 1. Quality analysis of organic foods, Antioxidants and their natural source, organic food and human health<br>2. Standards of organic food and marketing | **3T+ 12P** |

**Suggested Readings**:

***Course Books published in Hindi,English***


1 प्रयोगात्मक वनस्पति विज्ञान भाग–2 लेखक अशोक बेंद्रे तथा अशोक कुमार प्रकाशन रस्तोगी प्रकाशन मेरठ।

2 प्रायोगिक वनस्पति विज्ञान-2 Dhankar - Sharma – Trivedi ISBN Code: 978-81-8142-697-0 65, RBD Publishing House Shivaji Nagar Civil Lines,Jaipur - 302006 ( Rajasthan )

3 प्रायोगिक वनस्पति विज्ञान बी.एस.सी.–2 एस बी अग्रवाल प्रकाशक : शिवलाल अग्रवाल एण्ड कम्पनी प्रकाशित वर्ष : 2018

4 Practical Botany (Part 2) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual)


**This course can be opted as an elective by the students of following subjects: Open to all but special for** B.Sc. Biotech, B.Sc. Agriculture, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS.

**Course prerequisites:**

**Qualification:** To study this course, a student must have qualified 10+2 from any recognized board.

**Facilities: Smart and Interactive Class**

**Other Requisites: Video collection, Books, CDs, Access to On-line resources, Display Charts**

**Lab Requisites: Drum, cowdung, soil, vegetable refuge, shed dry leaves, vessel, bamboo stick**

**Suggested equivalent online courses:**
https://www.classcentral.com/course/swayam-organic-farming-for-sustainable-agricultural-production-14222
https://community.plantae.org/tags/mooc
futurelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science

**Suggested Continuous Evaluation Methods:**
Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

| Internal Assessment | Marks |
|---|---|
| Class Interaction | **5** |
| Quiz | **5** |
| Seminar/Assignment | **7** |
| Minor field work/excursion/lab visit/technology dissemination etc. | **8** |

**Skill Development Course III**- Offered by Botany- **Pharmacognosy and Herbal Preparations**

| **DIPLOMA COURSE B.Sc.-I** | | |
|---|---|---|
| Programme: ***Diploma Course*** | Year:II | Semester: **III/ Paper-III** |
| Offered by **Botany** | | |
| Course Code: B04 | Course Title: **Pharmacognosy and Herbal Preparations** | |
| **Course outcomes:** After the completion of the course the students will be able:<br>5. Understand the instruments, techniques, lab etiquettes and good lab practices for field work<br>6. Develop skills for identifying organic supplements and preparing them from raw materials for safe agriculture/ horticulture.<br>7. Will understand the pathology associated with crops and their pre-harvest & post- harvest management.<br>8. Can start own enterprise on organic farming | | |
| Credits:**3** | **Skill Development Optional** | |
| Max. Marks: **25+75** | Min. Passing Marks: | |
| Total No. of Lectures-Tutorials-Practical (in labs per week): **0-1-2** | | |

| **Unit** | | **No. of T/P (15+60hrs)** |
|---|---|---|
| **1.** | 1 Ethnomedicine,<br>2. Ayurved<br>3. Modern medicine | **6T** |
| **II** | Methods of herbal medicine preparation<br>1. To Develop Capsules of herbs/<br>2. To Develop Herbal oils/<br>3. Develop Poultice/cream | **2T+ 24P** |
| **III** | Pharmacognosy: Organoleptic studies of plants:<br>1. Morphological studies of vegetative and floral parts.<br>2. Microscopic preparations of root, stem and leaf.<br>3. Stomatal number and stomatal index.<br>4. Vein islet number.<br>5. Palisade ratio.<br>6. Fibres and vessels (maceration).<br>7. Starch test<br>8. Proteins and lipid test | **3T+ 6P** |
| **IV** | 1. Determination of the percentage of foreign leaf in a drug composed of a mixture of leaves.<br>2. Dimensions of Calcium oxalate crystals in powdered crude drug. | **3T+12P** |
| **V** | 1 Preliminary phytochemical tests for alkaloids,<br>2.Terpenoids,<br>3. Glycosides,<br>4. Volatile oils,<br>5. Tannins & resins. | **3T+ 12P** |

**Suggested Readings**:

***Course Books published in Hindi / English***

1 प्रयोगात्मक वनस्पति विज्ञान भाग–2 लेखक अशोक बेंद्रे तथा अशोक कुमार प्रकाशन रस्तोगी प्रकाशन मेरठ।

2 प्रायोगिक वनस्पति विज्ञान-2 Dhankar - Sharma – Trivedi ISBN Code: 978-81-8142-697-0 65, RBD Publishing House Shivaji Nagar Civil Lines,Jaipur - 302006 ( Rajasthan )

3 फार्माकोग्नॉसी Shiva Kant, Pankaj Kumar Brahmiya : Thakur Publication

4. PHARMACOGNOSY ...Hindi Edition (Paperback, Hindi, Dr. Akancha Rashi, KHUSHAL JASWANI), RM Publication

5. Practical Botany (Part 2) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual)

6. Garud Puran, Geeta Press, Gorakhpur

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**Suggested Continuous Evaluation Methods:**

Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

| **Internal Assessment** | **Marks** |
|---|---|
| Class Interaction | **5** |
| Quiz | **5** |
| Seminar/Assignment | **7** |
| Minor field work/excursion/lab visit/technology dissemination etc. | **8** |

**Course prerequisites:**

**Qualification:** To study this course, a student must have qualified 10+2 from any recognized board.

**Facilities: Smart and Interactive Class**

**Other Requisites: Video collection, Books, CDs, Access to On-line resources, Display Charts**

**Lab Requisites: Mortar- Pestle, Soxhlet, Test tubes, Stand, Pipettes, Petri plates, Measuring cylinder, Chemicals as per protocol, Oven, Centrifuge, Spectrophotometer, Microscope, Forceps, Scalpel, Slides, Coverslips, Basic laboratory facilities for Chemistry and Botany**

**Skill Development Course IV-** Offered by Botany Department**- Soil Health Assessment**

| **DIPLOMA COURSE B.Sc.-I** | | |
|---|---|---|
| Programme: ***Diploma Course*** | Year:II | Semester IV: **Paper-IV** |
| Offered by **Botany** | | |
| Course Code: B04 | Course Title: **Soil Health Assessment** | |
| Credits: **3** | **Skill Development Optional** | |
| Max. Marks: **25+75** | Minimum Passing Marks: | |
| Total No. of Lectures-Tutorials-Practical (in labs per week): **0-1-2** | | |

**Course outcomes:** After the completion of the course the students will be able:
**1.** To help farmers in suggesting the remedies for soil health
2. Suggesting the type of crop which can grow under existing soil condition
3. Understand the instruments, techniques and good lab practices for field work
4. Develop skills for identifying soil health issues and their management for safe agriculture/ horticulture.
5. Will understand to prepare soil health card for agricultural utility during pre-harvest & post- harvest management.
6. Can start own enterprise on soil health assessment

| **Unit** | | **No. of T/P (15+60hrs)** |
|---|---|---|
| **1.** | 1. Concept of soil health and its significance<br>2. Key indicators for soil health for sustainable agriculture<br>3. Soil Sample Collection (vertical and horizontal profiling) | **4T+6P** |
| **II** | Soil Physical Tests:<br>1. Soil texture.<br>2. Soil Moisture Content<br>3. Water Holding Capacity, Field Capacity<br>4. Soil Porosity<br>5. Soil Bulk Density<br>6. Soil Temperature | **2T+ 20P** |
| **III** | **Soil Chemical Tests**<br>1. Cation Exchange Capacity<br>2. Soil pH<br>3. Organic Carbon<br>4. Total Nitrogen<br>5. Exchangeable $Na^{+}$/ $K^{+}$/ $Ca^{2+}$<br>6. Available Phosphorus | **3T+ 20P** |
| **IV** | 1. Heavy metal analysis (Dithizone method)<br>2. Soil Seed bank and soil microbiota analysis | **3T+8P** |
| **V** | 1. Soil Classification<br>2. Soil Health Card preparation<br>3. Recommendation regarding utility of soil sample for suitable crops | **3T+ 6P** |

**Suggested Readings**:

***Course Books published in Hindi/ English.***


1. प्रयोगात्मक वनस्पति विज्ञान भाग–2 लेखक अशोक बेंद्रे तथा अशोक कुमार प्रकाशन रस्तोगी प्रकाशन मेरठ।
2. प्रायोगिक वनस्पति विज्ञान-2 Dhankar - Sharma – Trivedi ISBN Code: 978-81-8142-697-0 65, RBD Publishing House Shivaji Nagar Civil Lines,Jaipur - 302006 ( Rajasthan )
3. प्रायोगिक वनस्पति विज्ञान बी.एस.सी.–2 एस बी अग्रवाल प्रकाशक : शिवलाल अग्रवाल एण्ड कम्पनी प्रकाशित वर्ष : 2018
4. Practical Botany (Part 2) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual)
5. Piper, C.S. (1944) Soil and Plant Analysis, Interscience Publications, Inc. NY.
6. ICAR (2015) Soil Health Card, Ministry of Agriculture and Farmers Welfare, Govt. of India


**This course can be opted as an elective by the students of following subjects: Open to all but special for** B.Sc. Biotech, B.Sc. Microbiology, B.Sc. Agriculture, B.A. (Curators), B.A. Archaeology, B.A. Geology, BAMS.

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| Internal Assessment | Marks |
|---|---|
| Class Interaction | **5** |
| Quiz | **5** |
| Seminar/Assignment | **7** |
| Minor field work/excursion/lab visit/technology dissemination etc. | **8** |

**Course prerequisites:**

**Qualification:** To study this course, a student must have qualified 10+2 from any recognized board.

**Facilities: Smart and Interactive Class**

**Other Requisites: Video collection, Books, CDs, Access to On-line resources, Display Charts**

**Lab Requisites: pH meter, Soil testing kit, Glassware and chemicals as per protocols, Sieves and microsieves,**

**Suggested equivalent online courses:**