UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A ++' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(25/August/Adp./36)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised syllabus and Courses of studies of the subject of **Botany (Skill Enhancement Course)** for semester I, II and III for **Four Year Undergraduate Programme** as per **Nep-2020 (as given in annexure)** for the **Regular Candidates** for the examinations to be held in the years as per the details given below:-

Subject	Semester	Existing Code Course	New Code Course	For the examinations to be held in the year
Botany	Semester-I	USEBOT-104	USEBOT-111 (SEC)	Dec. 2025, 2026 and 2027
	Semester-II	USEBOT-204	USEBOT-211 (SEC)	May 2026, 2027 and 2028
	Semester-III	USEBOT-305	USEBOT-311 (SEC)	Dec. 2026, 2027 and 2028

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/25/ 6721-48
Dated: 21/8/25

Copy for information and necessary action to:

1. Dean, Faculty of **Life Science**
2. HOD/Convener, Board of Studies in **Botany**
3. All members of the Board of Studies
4. Sr. P.A.to the Controller of Examinations
5. Director, Centre for IT Enabled services and Management, University of Jammu for information and for uploading on University Website.
6. C.A. to the Controller of Examinations
7. Director, Computer Centre, University of Jammu.
8. Joint Registrar/Deputy Registrar/Asst. Registrar (Conf./Exam UG/Exam. Non Prof.)

20/8/25
Joint Registrar (Academic)

19/8 19/8/25

UNIVERSITY OF JAMMU
Syllabus for FYUG Program in
BOTANY (under CBCS as per NEP–2020)
UG SEMESTER–I
(For the examinations to be held in the years December 2025, 2026, 2027)

NURSERY AND GARDENING
(SKILL ENHANCEMENT COURSE)

Course No. USEBOT111 **Max. Marks: 75 (Theory-25, Practical-50)**

	Credits	Contact Hours	Units	Examination		
				Duration (hours)		Weightage (Marks)
				Mid Term Examination	Final Examination	
Theory	01	15	I	1½	-	25
Practical	02	60	II to III	-	3	50

Objectives:

The course aims to make students understand the theoretical and practical details of nursery and gardening. Knowledge so gained will provide them with the means for their self-employment and also of others.

Learning outcomes:

The students will be able to distinguish and choose the plant species amenable for nursery and gardening. They can develop their own nursery for livelihood and marketing purposes. The course will also equip the students with the basic skill needed to design and lay gardens.

Unit-I: Introduction to Nursery and Gardening

1.1 Definition and types of nurseries; physical resources for nurseries.
1.2 Selection of nursery site, ecological conditions, important nursery operations.
1.3 Definition and components of gardens with specific reference to Kew Botanical garden, AJC Bose Indian Botanic Garden, Kolkata and Lal Bagh Botanical Garden, Bangalore; types of gardening (landscape and homegardening).
1.4 Seed dormancy – causes and methods of breaking it; Seed germination, types and factors affecting it., artificial and natural methods of vegetative propagation; concept of soilless cultivation with special reference to aeroponics and hydroponics.

Unit-II: Practicals

2.1 Study of different types of Nurseries and their layout.
2.2 Study of different types of gardens (Botanical, Kitchen, roof top and vertical gardens).
2.3 Demonstration of formation of vertical gardens.
2.4 Equipment and implements used in nurseries and gardening.
2.5 Field trip to Botanical garden of University of Jammu or some important locally available

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nurseries.
2.6 Determination of pH, moisture content and water holding capacity of Garden Soils.
2.7 Exposure to propagation structures

Unit-III: Practicals

3.1 Gardening operations – Bed preparation, fertigation and irrigation.
3.2 Weed management, water management, drainage, trimming, pruning and thinning.
3.3 Seed viability test, sowing of seeds, raising and transplanting of seedlings.
3.4 Potting, repotting, depotting and mulching.
3.5 Demonstration of techniques of vegetative means of propagation (Cutting, grafting and layering).
3.6 Preparation of material for hydroponics and aeroponics.

Note for paper setters

Mid Term Examination

The question paper will be of **25 marks**. There shall be **2 Sections** in the question paper with pattern as follows:
Section-A shall comprise of **4** short answer type questions covering the entire first Unit. The students have to attempt all the **4** questions from this section. Each question carries 2½ marks.
Section-B shall comprise of a total of **6** questions from Unit I. Each question shall be of **5 marks**. The students have to attempt any **3** questions.

EVALUATION OF SKILLS: ***Final Examination***

The Evaluation of Skills will be internal. The Examination of Skills shall be of **50** marks. The evaluation of skills will be done internally through the Board of three Members (including the trainer of the Course).

Suggested readings:

1. Acquaah, G. (2009). Horticulture, Principles and Practices (4th edition). Pearson Publisher, PrenticeHall.
2. Bose, T.K and Mukerjee, D. (1977). Gardening in India. New Delhi Oxford & IBH Pub. Co. Pvt. Ltd.
3. Bose, T.K., Singh, L.J., Sandhu, M.K. and Maity, T.K. (2015). Ornamental plants and Garden design in Tropics and Subtropics (Vol 1 & 2). Daya Publishing House; A division of Astral International Pvt. Ltd.
4. Brukell, C. (2007). Encyclopedia of Gardening. Dorling Kindersley Ltd.
5. Hartman, H.T. (1959). Plant Propagation–Principles and Practices by Prentice. Hall International: London.

6. Kumar, N. (2010). Introduction to Horticulture (7th edition). Oxford & IBH Publishing Company Pvt.Ltd.
7. Rao, M.B. (2005). Textbook of Horticulture (2nd edition). Macmillan India Ltd.

UNIVERSITY OF JAMMU
Syllabus for FYUG Program in
BOTANY (under CBCS as per NEP–2020)
UG SEMESTER–II
(For the examinations to be held in the years May 2026, 2027, 2028)

BIO FERTILIZERS
(SKILL ENHANCEMENT COURSE)

Course No. USEBOT211

Max. Marks: 75 (Theory-25, Practical-50)

Course No. USEBOT211 **Max. Marks: 75 (Theory-25, Practical-50)**

	Credits	Contact Hours	Units	Examination		
				Duration (hours)		Weightage (Marks)
				Mid Term Examination	Final Examination	
Theory	01	15	I	1½	-	25
Practical	02	60	II to III	-	3	50

Unit–I: Introduction to bio-fertilizers

1.1 Bio fertilizers: definition, different sources, importance and comparison with conventional fertilizers.

1.2 Biological nitrogen fixation, symbiotic and asymbiotic. Importance of Nitrogenase; role of Cyanobacteria and *Azolla* in rice cultivation.

1.3 General account of the microbes commonly used as bio-fertilizers with special reference to *Rhizobium, Azospirillum* and *Azotobacter*.

1.4 Manures: definition, types and their importance. Green manure and Vermicompost.

Unit–II: Practicals

2.1 Hands on training on equipment required for biofertilizer preparation.

2.2 Demonstration of infrastructure required for biofertilizer.

2.3 Comparison of the root system of leguminous and non-leguminous plants.

2.4 Isolation of *Rhizobium,* from root nodules of legumes.

2.5 Collection of Cyanobacteria and *Azolla* from rice fields.

2.6 Study the morphology of *Azolla* and its use as biofertilizer.

2.7 Study and compare the effect of Biofertilizers on plant growth.

Unit–II: Practicals

3.1 Isolation of *Anabaena* from coralloid roots of *Cycas or* fronds of *Azolla.*

3.2 Mass multiplication of *Anabaena* and *Nostoc*.

3.3 Demonstration of bio-fertilizer and vermicompost preparation.

3.4 Preparation of farmyard manure (FMY).

3.5 Demonstration of solid waste management in small manageable units.

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3.6 Isolation of Mycorrhiza / Arbuscular mycorrhiza from roots of higher plants.
3.7 Exposure visit to nearby organic farm/ Agricultural University/KVK.

Note for paper setters

Mid Term Examination
The question paper will be of **25 marks**. There shall be **2 Sections** in the question paper with pattern as follows:
Section-A shall comprise of **4** short answer type questions covering the entire first Unit. The students have to attempt all the **4** questions from this section. Each question carries 2½ marks.
Section-B shall comprise of a total of **6** questions from Unit I. Each question shall be of **5 marks**. The students have to attempt any **3** questions.

EVALUATION OF SKILLS: ***Final Examination***
The Evaluation of Skills will be internal. The Examination of Skills shall be of **50** marks. The evaluation of skills will be done internally through the Board of three Members (including the trainer of the Course).

Suggested Readings

1. Bartha, A. (1998). Microbial Ecology: Fundamentals and applications. Benjamin/ Cummings, (4th edition).
2. Bhojiya, A. A., Jain, D. and Joshi, A. (2019). Manual on Bio fertilizer Research (Laboratory to Commercial Production) Apex Publishing House.
3. Das, D. K. (2002). Introduction to Soil Science. Kalyani Publisher 3rd edition.
4. Diaz, L. F., Bertoldi, M. and de Bidlingmaier, W. (2007). Compost Science and Technology, Elsevier, New York.
5. Gaur, A. C. (1990). Phosphate Solubilities, Micro-organizms and Bio fertilizers. Oxfordand IBH Publishing Co. New Delhi.
6. Kolay, A. K. (2007). Handbook of Manures and Fertilizers. Atlantic Publisher.
7. Mukerjee, N. and Ghosh, T.K. (1998). Agricultural Microbiology, Kalyani Publisher, NewDelhi.
8. Mukerjee, S. K. (2006). An Introduction to Soil Science. Tata Mc graw Hills ICAR.
9. NIIR Board (2012). The Complete Technology Book on Bio fertilizer and Organic Farming (2nd Revised Edition). NIIR Project Consultancy Services.
10. Russel, E. (2010). Soil Conditions and Plant Growth, Nabu Press Publisher.
11. Sathe, T.V. (2004). Vermiculture and organic Farming. Daya Publishers.
12. Subbha Rao, W.S. (1982). Bio fertilizers in Agriculture and Forestry. Oxford

and IBH Publishing Co., New Delhi.

13. Subha Rao, N.S. (2000). Soil Microbiology, Oxford & IBH Publishers, New Delhi.
14. Tandon, H.L.S. (1992). Fertilizers, Organic Manures, Recyclable Wastes and Biofertilizers. Fertilizer Development and Consultation Organization, New Delhi.
15. Tandon, H.L.S. (2011). Bio fertilizers and Organic Fertilizers. Fertilizer Development and Consultation Organization, New Delhi.
16. Tate, R.L. (2012). Soil Microbiology (Second edition). Wiley India Pvt Ltd; pp 532.
17. Vayas, S.C, Vayas, S. and Modi, H.A. (1998). Bio-fertilizers and organic Farming Akta Prakashan, Nadiad.
18. Yadav, A.N. (2021). Production Technology for Bio agents and Bio fertilizers-A Laboratory Manual. Eternal University, Himachal Pradesh.
19. Rai M.K. (2005). Handbook of Microbial Bio fertilizers. The Haworth Press Inc., New York.

UNIVERSITY OF JAMMU
Syllabus for FYUG Program in
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UG SEMESTER–III
(For the examinations to be held in the years December 2026, 2027, 2028)

MUSHROOM CULTIVATION TECHNOLOGY

(SKILL ENHANCEMENT COURSE)

Course No. USEBOT311 **Max. Marks: 75 (Theory-25, Practical-50)**

	Credits	Contact Hours	Units	Examination		
				Duration (hours)		Weightage (Marks)
				Mid Term Examination	Final Examination	
Theory	01	15	I	1½	-	25
Practical	02	60	II to III	-	3	50

Objectives:

The course aims to make students understand the theoretical and practical details of mushroom cultivation. Knowledge so gained will provide them with the means for their self-employment and also of others.

Learning outcomes:

The students will be able to distinguish the various mushroom species for their nutritional, medicinal and other values. They can develop their own units for cultivation and value addition of edible mushrooms as also of medicinally important ones.

Unit I: Mushrooms: types, cultivation, storage and commercial prospects

1.1 Introduction to Mushrooms: General characteristics, structure and ecological significance; Classification and types of edible, medicinal, and poisonous mushrooms. Life cycles of *Agaricus* and *Morchella.*

1.2 Global and Indian scenario of mushroom production; economically important edible mushroom species in India.

1.3 Cultivation and harvesting techniques: Basic and advanced methods for indoor and outdoor cultivation of mushrooms. Substrate selection, sterilization, environmental control and harvesting techniques.

1.4 Post-harvest management and storage; value-added mushroom products: papads, soups, powders and nutraceuticals; role in sustainable rural development, self-employment and entrepreneurship.

Unit II: Practicals – Basic culturing and cultivation techniques

2.1 Demonstration of the infrastructure required for cultivation of mushrooms: substrates (locally available), polythene bags, vessels, low cost stove, sieves, culture rack. Setup of low-cost mushroom unit.

2.2 Media preparation and sterilization: preparation of PDA and other media; inoculation, sterilization and aseptic handling.

2.3 Pure culture and spawn development: Isolation of pure cultures; spawn preparation and maintenance; casing and harvesting.

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2.4 Substrate and bed preparation: Processing of locally available agro-waste substrates and mushroom bed formulation.

Unit III: Practicals – Advanced techniques and value addition

3.1 Composting and waste recycling: Low-cost composting using agricultural and horticultural residues.
3.2 Cultivation trials and growth analysis: Species-specific cultivation of *Pleurotus* and *Agaricus*; growth assessment.
3.3 Disease diagnostics and pathogen identification: Detection and treatment of fungal and bacterial infections.
3.4 Product development and enterprise exposure: Preparation of mushroom-based products; field visits to mushroom farm/ rural mushroom-based enterprise.

Note for paper setters

Mid Term Examination

The question paper will be of **25 marks**. There shall be **2 Sections** in the question paper with pattern as follows:

Section-A shall comprise of **4** short answer type questions covering the entire first Unit. The students have to attempt all the **4** questions from this section. Each question carries 2½ marks.

Section-B shall comprise of a total of **6** questions from Unit I. Each question shall be of **5 marks**. The students have to attempt any **3** questions.

EVALUATION OF SKILLS: ***Final Examination***

The Evaluation of Skills will be internal. The Examination of Skills shall be of **50** marks. The evaluation of skills will be done internally through the Board of three Members (including the trainer of the Course).

Suggested Readings:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
3. Aggarwal, A., Sharma, Y. P. and Jangra, E. (2022) A textbook on Mushroom Cultivation theory and Practice. Newrays Publishing House, New Delhi.
4. Arya, A. and Rusevska, K. (2022) Biology, Cultivation and Applications of Mushrooms. Singapore: Springer Nature Singapore.
5. Gogoi, R. Rathaiah, Y. and Borah, T.R. (2019) Mushroom Cultivation Technology. (n.p.): Scientific Publishers.
6. Miles, P. G. and Chang, S. 2004. Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact. United Kingdom: CRC Press.

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