॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

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website: srtmun.ac.in

E-mail: bos@srtmun.ac.in

शैक्षणिक वर्ष २०२४–२५ पासून राष्ट्रीय शैक्षणिक धोरणानुसार लागू केलेल्या विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी प्रथम वर्षाच्या सुधारित (दुरूस्ती) अभ्यासक्रमा बाबत..

..

प रि प त्र क

संदर्भ:– १. जा.क्र.शै–१/एनईपी/विवत्रंविपदवी/२०२४–२५/१२३ दिनांक २०/०६/२०२४

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, संदर्भीय परिपत्रकान्वये दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या मा. विद्यापरिषदेच्या बैठकीतील विषय क्र. १५/५९–२०२४ अन्वये मान्यता दिल्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरणानुसार पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्यात आलेले आहेत. तथापी वरील संदर्भीय परिपत्रका अन्वये प्रकाशित केलेल्या अभ्यासक्रमामध्ये अभ्यासमंडळानी किरकोळ दुरूस्ती करून अभ्यासक्रम सादर केला असून मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा यांच्या मान्यतेने दुरूस्ती केलेले खालील अभ्यासक्रम लागू करण्यात येत आहेत.

01	B. Sc. I year Agrochemical and Fertilizer
02	B. Sc. I year Chemistry (General)
03	B. Sc. I year Biochemistry

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

सहाय्यक.कुलसचिव
शैक्षणिक अभ्यासमंडळ विभाग

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शैक्षणिक–१/परिपत्रक/एनईपीयुजीदुरूस्ती/S&T/
२०२४–२५/284
दिनांक : ०८.१०.२०२४

प्रत माहिती व पुढील कार्यवाहीस्तव.

०१. मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
०२. मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
०३. मा. संचालक, सर्व संबधित संकुले, प्रस्तुत विद्यापीठ.
०४. मा. प्राचार्य, सर्व संबधित महाविद्यालये, प्रस्तुत विद्यापीठ.
०५.सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. यानां देवून कळविण्यात येते की, सदरील परिपत्रक विद्यापीठाच्या संकेतस्थळावर प्रसिध्द करण्यात यावे.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

Credit Framework and Course Structure

(As Per National Education Policy- 2020)

Faculty of Science and Technology

Subject: Agrochemicals and Fertilizers

- ❖ Teaching scheme
- ❖ Examination Scheme
- ❖ Syllabus

To be Implemented from

Academic Year 2024-2025

B. Sc. First Year Semester I *(Level 4.5)*

Sub. Code: AGF

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs./ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	**SAGFCT1101**	**Fundamentals of Soil Science**	02	--	**04**	02	--
	SAGFCP1102	**Practical Based on SAGFCT1101**	-	02			04
Optional 2	SDSCCT1101		02	--	**04**	02	--
	SDSCCP1102		-	02			04
Optional 3	SDSCCT1101		02	--	**04**	02	--
	SDSCCP1102		-	02			04
Generic Electives *(from other Faculty)*	**SAGFGE1101**	**Agriculture Science and Technology-I**	02	--	**02**	02	--
Skill Based Course *(related to Major)*	**SAGFSC1101**	**Problematic Soils and their Management**	--	02	**02**	--	04
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	02	--	**02**	02	--
Ability Enhancement Course (MIL)	AECMIL1101	L2 – MIL (Basket 3)	02	--	**02**	02	--
Indian Knowledge System (IKS)	IKSXXX1101	Select from Basket 5	02	--	**02**	02	--
Total Credits			**14**	**08**	**22**	**14**	**16**

B. Sc. First Year Semester I *(Level 4.5)*

Sub. Code: AGF

Examination Scheme

[20% Continuous Assessment (***CA***) and 80% End Semester Assessment (***ESA***)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	Course Name (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	**SAGFCT1101**	**Fundamentals of Soil Science**	10	10	10	40	--	--	50
	SAGFCP1102	**Practical Based on SAGFCT1101**	--	--	--	--	10	40	50
Optional 2	SDSCCT1101		10	10	10	40	--	--	50
	SDSCCP1102		--	--	--	--	10	40	50
Optional 3	SDSCCT1101		10	10	10	40	--	--	50
	SDSCCP1102		--	--	--	--	10	40	50
Generic Elective	**SAGFGE1101**	**Agriculture Science and Technology-I**	10	10	10	40	--	--	50
Skill Based Course	**SAGFSC1101**	**Problematic Soils and their Management**	--	--	--	--	10	40	50
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	10	10	10	40	--	--	50
Ability Enhancement Course (MIL)	AECMIL1101	L2 – MIL (Basket 3)	10	10	10	40	--	--	50
Indian Knowledge System	IKSXXX1101	Select from **Basket 5**	10	10	10	40	--	--	50

B. Sc. First Year Semester II *(Level 4.5)*

Sub. Code: AGF

Teaching Scheme

	Course Code	Course Name	Credits Assigned			Teaching Scheme (Hrs./ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	**SAGFCT1151**	**Agricultural Biochemistry**	02	--	**04**	02	--
	SAGFCP1152	**Practical Based on SAGFCT 1151**	-	02			04
Optional 2	SDSCCT1151		02	--	**04**	02	--
	SDSCCP1152		-	02			04
Optional 3	SDSCCT1151		02	--	**04**	02	--
	SDSCCP1152		-	02			04
Generic Electives *(from other Faculty)*	**SAGFGE1151**	**Agriculture Science and Technology-II**	02	--	**02**	02	--
Skill Based Course *(related to Major)*	**SAGFSC1151**	**Soil Fertility Management**	--	02	**02**	--	04
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	02	--	**02**	02	--
Ability Enhancement Course (MIL)	AECMIL1151	L2 – MIL (Basket 3)	02	--	**02**	02	--
Indian Knowledge System (IKS)	IKSXXX1151	Select from **Basket 5**	02	--	**02**	02	--
Total Credits			**14**	**08**	**22**	**14**	**16**

B. Sc. First Year Semester II *(Level 4.5)* Sub. Code: AGF

Examination Scheme

[20% Continuous Assessment (***CA***) and 80% End Semester Assessment (***ESA***)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Test I (4)	Test II (5)	Average of T1 & T2 (6)	Total (7)	CA (8)	ESA (9)	
Optional 1	SAGFCT1151	**Agricultural Biochemistry**	10	10	10	40	--	--	50
	SAGFCP1152	**Practical Based on SAGFCT 1151**	--	--	--	--	10	40	50
Optional 2	SDSCCT1151		10	10	10	40	--	--	50
	SDSCCP1152		--	--	--	--	10	40	50
Optional 3	SDSCCT1151		10	10	10	40	--	--	50
	SDSCCP1152		--	--	--	--	10	40	50
Generic Elective	SAGFGE1151	**Agriculture Science and Technology-II**	10	10	10	40	--	--	50
Skill Based Course	SAGFSC1151	**Soil Fertility Management**	--	--	--	--	10	40	50
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	10	10	10	40	--	--	50
Ability Enhancement Course (MIL)	AECMIL1151	L2 – MIL (Basket 3)	10	10	10	40	--	--	50
Indian Knowledge System	IKSXXX1151	Select from Basket 5	10	10	10	40	--	--	50

Syllabus for B. Sc. First Year

Subject: Agrochemicals and Fertilizers

Semester – I

As Per National Education Policy- 2020

National Education Policy 2020

B.Sc. Agrochemicals and Fertilizers, I Year (Semester - I)

Major Core Theory Course

Course Code – SAGFCT1101

Title of the Course: FUNDAMENTALS OF SOIL SCIENCE

[Credits: 2 (Marks: 50)] **(Total Periods: 30 Hours)**

Course pre-requisite:

The world is facing unprecedented food shortages due to several natural and manmade factors. Food security has become a major focus of policy of governments all over the world. The Indian scenario is not much better. After IT revolutions the next and most urgent need is another green revolution in agriculture to feed the humans. It can best be done by, among other methods, creation of well taught and trained manpower in the field of agriculture. The NEP 2020 aims at producing such a manpower for raising quality and higher production from India's fields. India being a chiefly agrarian economy and focus of future development would be agriculture. The subject Agrochemicals and Fertilizers aim to cater to the needs of the agriculture and required manpower of the region. The revised syllabus at B.Sc. First year has been designed with well-defined objectives.

Course objectives:

1. To know well the soils of our region in their physical, chemical and biological aspects.
2. To understand the basic components of soil, their origin and various physicochemical properties
3. To manage the soil in various ways so as to improve their fertility and productivity
4. To understand the proper methods of soil testing to select proper fertilizers and suitable crops aiming for higher production.

Course outcomes:

1. Creation of skilled and trained manpower for agriculture sector
2. Application of latest technology to understand the physicochemical properties of soils
3. To access the soil health parameters and help in government programs of soil health card distribution.
4. To carry out soil fertility and productivity mapping for better management of soil resources
5. To correlate the soil properties with the choice of proper fertilizer doses.
6. The ultimate outcome should be the increased productivity of soils with better management so as to improve crop yield.

CURRICULUM DETAILS: SAGFC1101: FUNDAMENTALS OF SOIL SCIENCE

Module No.	Unit No.	Topic	Hrs.
1.0		**Introduction of Soil**	**07**
	1.1	Definition of Soil, Scope of Soil Science, Soil Components, Functions of Soil	
	1.2	Rocks and Minerals: Classification and Properties	
	1.3	Weathering: Definition, Types and Factors responsible for weathering	
	1.4	Soil Profile: Definition, Soil Horizons and Typical Diagram of Soil Profile	
2.0		**Physical Properties of Soil**	**08**
	2.1	Soil Texture and Structure	
	2.2	Soil Air and Soil Temperature	
	2.3	Density and Porosity of Soil	
	2.4	Soil Color and Soil Consistence	
3.0		**Soil Colloids and Ion Exchange**	**07**
	3.1	Definition of Soil Colloids, Types and Properties	
	3.2	Importance of Ion Exchange, Cation Exchange Capacity (CEC), Anion Exchange Capacity	
	3.3	Soil Reaction: Relation of Soil pH and Nutrient Availability	
	3.4	Buffer Capacity of Soil	
4.0		**Soil Water and Organic Matter**	**08**
	4.1	Soil Water: Importance, Retention and movement of water in soil, Classification of Soil Water, Soil Moisture Constants	
	4.2	Sources, Factors affecting, composition and decomposition of soil organic matter, Role of organic matter	
	4.3	Soil Microorganisms: Important microbial processes in soil, Biological Nitrogen Fixation	
	4.4	Soil Fertility and Soil Productivity: Definition and Comparison	
		Total	**30**

Text Books and Reference Books:

1. Fundamentals of Soil Science: Dr. V. D. Patil and Dr. C. V. Mali
2. Principles of Soil Science: M. M. Rai.
3. Nature and properties of soil: Boolanann and Brady.
4. A textbook of soil science: Dr. J. A. Daji.
5. Introduction to Agronomy: Vaidya and Sahastrabuddhe.
6. Soil fertility and fertilizer: Tisdle and Nelson.
7. Soil science: P. S. Varma and V. K. Agarwal.
8. Soil Fertility: Theory and Practice by J. S. Kanwai
9. Dictionary of soil and water management by J. R. Kadam, B. P. Ghildyal.
10. Handbook of Agriculture: I. C. A. R. Publication
11. Introductory Soil Science by D. K. Das

National Education Policy 2020

B.Sc. Agrochemicals and Fertilizers, I Year (Semester - I)

Major Practical Course

Course Code – SAGFCP1102

Title of the Course: Practical based on SAGFCT1101

[Credits: 2 (Marks: 50)] **(Total Periods: 60 Hours)**

CURRICULUM DETAILS: SAGFCP1102: Practical based on SAGFCT1101

Sr. No	Practical Exercises	Hrs.
1.	Collection and preparation of soil sample	4
2.	Determination of bulk density of soil	4
3.	Determination of particle density of soil	4
4.	To determine organic carbon from soil samples	4
5.	To determine moisture percentage from soil	4
6.	Determination of soil colour by Munsell soil colour chart in field.	4
7.	Preparation of HCl extract of soil.	4
8.	Determination of Ferrous from HCl extract	4
9.	Determination of Calcium from HCl extract	4
10.	Determination of Phosphorous from HCl extract	4
11.	Determination of soil texture by Feel method	4
12.	Estimation of Cation exchange capacity of Soil	4
13.	Determination of soil pH	4
14.	Determination of Electrical Conductivity of Soil	4
15.	Determination of soil temperature by using soil thermometer	4
	Total	**60**

Text Books and Reference Books:

1. ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi- 110012. pp. 728
2. Das D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
3. Brady, N. C. 2016. The Nature and Properties of Soils. 15th edition Publisher: Pearson Education,

ISBN: 978-0133254488

4. Daji J A; Kadam J R; Patil N D.1996. Textbook of Soil Science Bombay Media Promoters and publishers Pvt. Ltd.
5. Biswas, T.D.; Mukherjee, S.K. 1995. Text Book of Soil Science 2nd sEd. Tata McGraw Hill Publisher, Delhi pp 433.
6. Somawanshi, et al. 2012. Laboratory Methods for Analysis of Soil, Irrigation Water and Plants., Department of Soil Science and Agricultural Chemistry, MPKV., Rahuri. revised Ed. pp. 307.
7. Jakson, M.L. 1973. Soil Chemical Analysis. Printice Hall, India, Pvt. Ltd. New Delhi. pp 498.
8. Page et. al. 1982. Methods of Soil Analysis, Part 1 and 2. Chemical and Microbiological Properties. 2nd Ed. Soil Science Soc. of America Am. Soc. Agron., Madison, Wisconsin, USA.
9. Klute, A. 1986. Methods of Chemical Analysis, 2nd Ed. American Soc. Agron.,Inc. and Soil Science Society of America. Madison, Wisconsin, USA.
10. Piper, C. S. 1966. Soil and Plant Analysis. Inters Science. Hans Publisher, Mumbai
11. Black, C. A. 1965. Soil Chemical Analysis, Part I and part II. American Soc. Agron.,Inc. and Soil Science Society of America. Madison, Wisconsin, USA.
12. Hesse, P. R. 1971. a Text Book of Soil Chemical Analysis. John Murray, London
13. Chora, S. L. and Kanwar, J. S. 1991. Analytical Agricultural Chemistry, Kalyani Publisher New Delhi
14. Chapman, H.D., and P.F. Pratt. 1961. Methods of analysis for soils, plants and waters. Division of Agricultural Sciences, University of California
15. Patil, V. D. and Mali C. V. 2007. Fundamentals of Soil Science, Aman Publication, Meerut.

National Education Policy 2020

B.Sc. Agrochemicals and Fertilizers, I Year (Semester - I)

Generic Elective Course

Course Code – SAGFGE 1101

Title of the Course: Agriculture Science and Technology-I

[No. of Credits: 2 Credit] **[Total: 30 Hours]**

CURRICULUM DETAILS: SAGFGE 1101: Agriculture Science and Technology-I

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0			**08**
	1.1	Introduction to Agriculture	
	1.2	Rock and Soil	
	1.3	Weather and Climate	
	1.4	Agriculture- A Modern Approach	
2.0			**07**
	2.1	Seeds and Sowing	
	2.2	Plant Nutrition	
	2.3	Irrigation Management	
	2.4	Cropping System	
3.0			**07**
	3.1	Tillage	
	3.2	Weed Management	
	3.3	Pest and Disease Control	
	3.4	Protection From Wild Animals	
4.0			**08**
	4.1	Waste Management	
	4.2	Horticultural Practices	
	4.3	Special Crops	
	4.4	Agro-tourism	

Text Books and Reference Books:

1. Introduction to Agronomy and Soil and Water Management- Dr. V. G. Vaidya, K. R. Shasrabuddhe, Continental Prakashan, Pune - 411 030.

2. Agronomy - S. C. Panda - 2008, Agrobios (India) Jodhpur - 342 002.
3. Principles of Crop Production - 2000 S. R. Reddy, Kalyani Publishers, Ludhiyana.
4. Principles of Agriculture - 2009, Ashok S. Jadhav, Sandip K. Raskar, Raj laxmi Prakashan.
5. Plant Breeding - Principles and Methods - 2005, B. D. Singh, Kalyani Publishers.
6. Agronomy of Field Crops - 2006. S. R. Reddy, Kalyani Publishers, Ludhiyana.
7. Seed Technology, 2002, Ratan Lal Agrawal, Oxford and IBH Publishing Co-op. Pvt. Ltd., Kolkata.
8. Plant Tissue Culture - M. K. Singh, Oxford and IBH Publishing Co. Pvt. Ltd. 2004.
9. Seed Science and Technology - A. K. Joshi, B. D. Singh, Kalyani Publishers.
10. Principles of Agronomy, 2011, - S. R. Reddy, Kalyani Publishers.
11. Seed Science and Technology, 2001 - Subir Sen, Nabinananda Ghosh, Kalyani Publishers.
12. Text Book of Soil Science - A Textbook - V. D. Patil, C. V. Mali, Phoneix Publications Parbhani.
13. Handbook of Horticulture -, 2002, I. C. A. R., New Delhi.
14. Munures and Fertilizers - K. S. Yawalar, J. P. Agarwal, S. Bokde, Agri-Horticultural Publishing House, Nagpur.
15. Basic Horticulture - Jitendra Singh, Kalyani Publishers, Ludhiyana.
16. Vegetable Crops - T. K. Bose, K. Kabir et. al., Naya Prokash, Kolkata.
17. Introductory Ornamental Horticulture - J. S. Arora, Kalyani Publishers.
18. A Class Book of Botany - A. C. Datta, Oxford Publication.
19. Waste Management and Environment V. PDPO, H. Ltob, U. Mander.

National Education Policy 2020

B.Sc. Agrochemicals and Fertilizers, I Year (Semester - I)

Skill Enhancement Course

Course Code – SAGFSC1101

Title of the Course: Problematic Soils and Their Management

[No. of Credits: 2 Credit] **[Total: 60 Hours]**

CURRICULUM DETAILS: SAGFSC 1101: Problematic Soils and Their Management

a) Theory:

1) Soil quality and health, Distribution of Waste land and problem soils in India, their categorization based on properties.
2) Reclamation and management of Saline and Sodic soils, Acid soils, Acid Sulphate soils,
3) Eroded and Compacted soils, Flooded soils, Polluted soils.
4) Irrigation water – quality and standards, utilization of saline water in agriculture.
5) Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems

b) Practicals:

Sr. No	Practical Exercises	Hrs. Required
1 & 2	Preparation of saturation paste extract.	8
3	Determination of pH and EC from irrigation water.	4
4 & 5	Determination of cations (Ca, Mg, Na and K) and computation of SAR	8
6	Determination of ESP of soils	4
7	Determination of gypsum requirement of sodic soil	4
8	Determination of calcium carbonate from soil	4
9	Determination of lime requirement of acidic soil	4
10	Collection of irrigation water and sewage water	4
11	Determination pH and EC from irrigation water	4
12 &13	Determination of cations (Ca, Mg, Na and K) from irrigation water	8
14 &15	Determination of anions (CO_3, HCO_3, Cl and SO_4) from irrigation water and RSC andSAR	8
	Total	**60**

Text Books and Reference Books:

1) Richards L. A..1954. Diagnosis and Improvement of Saline and Alkali Soils. UnitedState Department of Agriculture.
2) Maliwal, G. La. and Somanil, L. 2010. Nature Properties and Management of Sine andAlkali Soils. Agrotech Publishing Academy, Udaipur 313 002. pp. 335.
3) Mahendran, et al. Soil Resource Inventory and Management of Problematic [i.e.Problematic] Soils. Published by Agrotech Publishing Academy (2012) ISBN 10: 818321097X / ISBN 13: 9788183210973
4) Abrol, I. P., Yadav, J. S. P and Massoud, F. I. 1988. Salt-Affected Soils and their Management. FAO SOILS BULLETIN
5) Tyagi, N.K. and P.S. Minhas. 1998. Agricultural Salinity Management in IndiaPublished by CSRI., Kernel. (Price Rs. 500/-).
6) Yaduvanshi, N. P. S. 2008. Chemical Changes and Nutrient Transformation in Sodic/Poor Quality water Irrigated Soils. Published by CSRI Kernel.
7) Dey, P., Gupta, S. K. 2012. Diagnostics, Remediation and Management of Poor-Quality Waters: Lectures for Summer School by R. L. Meena, S. K. Gupta, R. K. Yadav and D. K. Sharma, 2011. Salinity Management for Sustainable Agriculture in Canal Commands.Published by CSRI Kernel.
8) Twenty-five years of research on management of salt affected soils & use of saline waterin agriculture, 1998 (Price Rs. 75/-). Published by CSRI., Kernel.
9) Patil, V. D. and Mali C. V. 2007. Fundamentals of Soil Science, Aman Publication, Meerut. 10)Das, D. K. Introductory Soil Science
11) Brady, N. C. 2016. The Nature and Properties of Soils. 15th edition Publisher: PearsonEducation, ISBN: 978-0133254488.
12) The chemistry of Soil – Firman Bear
13) Text Book of Pedology Concepts and Applications – J. Sehgal
14) FAO United Nations Soils Portal- FAO

Syllabus for B. Sc. First Year

Subject: Agrochemicals and Fertilizers

Semester – II

As Per National Education Policy- 2020

National Education Policy 2020

B.Sc. Agrochemicals and Fertilizers, I Year (Semester - II)

Major Core Theory Course

Course Code – SAGFCT 1151

Title of the Course: AGRICULTURAL BIOCHEMISTRY

[Credits: 2 (Marks: 50)] **(Total Periods: 30 Hours)**

Course objectives:

1. The nutritional aspects of the various food components are considered for balanced nutrition.
2. To gain knowledge about the principles that govern complex biological systems.
3. To analyze and understand the biochemical processes and metabolic pathways involved in crop growth, development, metabolism and stress responses.
4. To enhance understanding of students about fundamental biological processes critical for sustainable and productive agriculture.

Course outcomes:

1. To gain and spread the knowledge about nutritional components of food, their sources, balanced nutrition and their role in human health.
2. Designing sustainable farming practices and maximizing crop yields.
3. Providing insights into how biochemical reactions influence crop yield, nutritional content, and overall agricultural productivity.
4. This course will contribute to the advancement of efficient and environmentally conscious farming practices, ultimately addressing global issues related to food security and the optimization of agricultural systems.

CURRICULUM DETAILS: SAGFCT 1151: AGRICULTURAL BIOCHEMISTRY

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction to Biochemistry**	**07**
	1.1	Definition, Scope and Importance of Biochemistry in Agriculture	
	1.2	Food: Definition, Functions of food, Balanced Nutrition and malnutrition	
	1.3	Biomolecules - Definition, types, structure, properties and its applications	
	1.4	Carbohydrate: Introduction and Classification, Structure and properties of Glucose, biological significance of carbohydrates	
2.0		**Amino acids, Proteins, Lipids and Enzymes**	**08**
	2.1	Amino acids: Definition, structure, classification and properties of amino acids	
	2.2	Proteins: Introduction, definition, classification, properties and structure of proteins	
	2.3	Lipid: Introduction and classification, Structures and properties of fatty acids, biological significance of lipids.	
	2.4	Enzymes: Definition, Classification, Chemical nature of enzymes, Factors affecting enzyme activity, Role of enzymes as biological catalysts.	
3.0		**Vitamins**	**08**
	3.1	Introduction, Classification, Properties, Functions and Deficiency Symptoms of Vitamins	
	3.2	Vitamin A, Vitamin D	
	3.3	Vitamin E, Vitamin K	
	3.4	Vitamin B and Vitamin C	
4.0		**Plant Hormones**	**07**
	4.1	Introduction, Occurrence, Structure, Physiological role of following plant hormones	
	4.2	Auxins, Gibberellins	
	4.3	Cytokinin	
	4.4	Abscisic acid and Ethylene	
		Total	**30**

Text Books and Reference Books:

1. Foods: Facts and principle by N. Shakuntala
2. Handbook of agriculture: I. C. A. R. Publications.
3. Plant physiology by Sunderam.
4. Plant biochemistry by Bonner.
5. Textbook of biochemistry by West and Todd.
6. Elementary biochemistry by J. L. Jain, Sanjay Jain and Nitin Jain.
7. Elements of biochemistry by Srivastava.
8. Fundamentals of food and nutrition by S. R. Mudambi and M. V. Rajgopal.
9. Fundamentals of biochemistry by B. P.; Pandey.
10. Introduction to modern biochemistry by P. Caifon.
11. Plant physiology and biochemistry by Agarwal.
12. A Text book of plant physiology by N. Datta
13. Food and nutrition by Swaminathan

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B.Sc. Agrochemicals and Fertilizers, I Year (Semester -II)

Major Practical Course

Course Code – SAGFCP 1152

Title of the Course: Practical based on SAGFCT 1151

[No. of Credits: 2 Credit] **[Total: 60 Hours]**

CURRICULUM DETAILS: SAGFCP 1152: Practical based on SAGFCT 1151

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1	Preparation of solution, pH & buffers	4
2	Estimation of reducing sugar	4
3	Estimation of non-reducing sugar	4
4	Determination of acid value from oil sample	4
5	Estimation of free amino acids by Ninhydrin method	4
6	Determination of saponification value from oil sample	4
7	Estimation of Vitamin C	4
8	Estimation of Starch	4
9	Qualitative tests for Oil	4
10	TLC for separation of sugars	4
11	Qualitative tests for Carbohydrates	4
12	Qualitative tests for Proteins	4
13	Qualitative tests for Lipids	4
14	Estimation of Iodine value of oil/fat	4
15	Visit to Food Industry	4
	Total	**60**

Text Books and Reference Books:

1. Bhatia S. C., 1984, Biochemistry in Agricultural Sciences, Shree Publication House, New Delhi. 246
2. Purohit S.S. 2009, Biochemistry - Fundamentals and Applications, Agrobios, Jodhpur
3. Singh M. 2011, A Textbook of Biochemistry, Dominant Publishers & Distributors, New Delhi
4. Veerkumari L. 2007, Biochemistry, MIP Publishers, Chennai
5. Jain J. L. *et.al.* 2005, Fundamentals of Biochemistry, S. Chand & Company Ltd., New Delhi
6. Rastogi S. C. 2003 - Biochemistry Tata McGraw-Hill Education, New Delhi.
7. Rama Rao A. V. S. S., 2002 A Textbook of Biochemistry. Edition, 9, illustrated. Publisher, Sangam Books Limited, New Delhi.
8. Com EE &Stumpf PK. 2010.Outlines of Biochemistry, 5th Ed. John Wiley Publications.
9. Donald Voet and Judith G. Voet. 2011. Biochemistry, 4th Ed. John Wiley and Sons, Inc., NY, USA.
10. Goodwin, TW & Mercer EI. 1983. Introduction to Plant Biochemistry. 2nd Ed. Oxford, New York. Pergaman Press.

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B.Sc. Agrochemicals and Fertilizers, I Year (Semester - II)

Generic Elective Course

Course Code – SAGFGE 1151

Title of the Course: Agriculture Science and Technology-II

[No. of Credits: 2 Credit] **[Total: 30 Hours]**

CURRICULUM DETAILS: SAGFGE 1151: Agriculture Science and Technology-II

Module No.	Unit No.	Topic	Hrs.
1.0			**08**
	1.1	Traditional Crops	
	1.2	Commercial Crops	
	1.3	Modes of Reproduction	
2.0			**07**
	2.1	Seed Production Technology	
	2.2	Farm Management	
	2.3	Nursery Management	
3.0			**08**
	3.1	Green House Technology	
	3.2	Seed Processing and Testing	
	3.3	Organic Farming	
4.0			**07**
	4.1	Agro-informatics	
	4.2	Agricultural Marketing	
	4.3	Preservation	
		Total	**30**

Text Books and Reference Books:

1. Introduction to Agronomy and Soil and Water Management - Dr. V. G. Vidya, K. R. Sahasrabuddhe, Continental Prakashan, Pune – 411030
2. Crop Production and Field Experimentation - Dr. V. G. Vidya, K. R. Shasrabuddhe, Dr. V. S. Khuspe. continental Prakashan, Pune – 411030
3. Principle of Agronomy - J. Yellamanda Reddy, G. H. Sankara Reddy - Kalyani Publishers.
4. Hand Book of Agriculture, I. C. A. R., New Delhi.
5. Plant Breeding - Principles and Methods - 2005, B. D. Singh, Kalyani Publishers.
6. Seed Science and Technology - A. K. Joshi, B. D. Singh, Kalyani Publishers.
7. Text Book of Soil Science - A Textbook - V. D. Patil, C. V. Mali, Phoneix Publications Parbhani.
8. Basic Horticulture - Jitendra Singh, Kalyani Publishers, Ludhiyana.
9. Vegetable Crops- T. K. Bose, K. Kabir et. al., Naya Prokash Kolkata.
10. Agriculture Science and Technology, Std XI and Std XII, 2018, Maharashtra State Board Secondary and Higher Secondary Education, Pune.
11. Textbook of Crop Production Std XI and Std XII - Maharashtra State Board of Secondary and Higher Secondary Education, Pune.

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B.Sc. Agrochemicals and Fertilizers, I Year (Semester - II)

Skill Enhancement Course

Course Code – SAGFSC 1151

Title of the Course: Soil Fertility Management

[No. of Credits: 2 Credit] **[Total: 30 Hours]**

CURRICULUM DETAILS: SAGFSC 1151: Soil Fertility Management

a) Theory:

1. Definition – Soil fertility and Plant nutrition.
2. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients
3. Factors affecting nutrient availability to plants.
4. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.
5. Soil fertility evaluation, Soil testing, Critical levels of different nutrients in soil.
6. Forms of nutrients in soil. Methods of fertilizer recommendations to crops.
7. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

b) Practical:

Sr. No	Practical Exercises	Hrs. Required
1.	Principle and application of Spectro-photometry / Colorimetry	4
2.	Principle and application of flame photometry and atomic absorption spectrophotometer (AAS)	4
3.	Determination of moisture from organic manures and its preparation for nutrientanalysis	4
4.	Determination of organic carbon from organic manures by ignition method	4
5.	Estimation of available nitrogen in soil (Alkaline permanganate method)	4
6.	Estimation of available phosphorus in soil	4
7.	Determination of available potassium in soil using flame photometer	4
8.	Determination of exchangeable Ca& Mg in soil by EDTA method	4
9.	Estimation of available sulphur in soil (Turbidity method)	4
10.	Determination of zinc content from micronutrient fertilizer (EDTA Method)	4
11.	Estimation of total N from plant sample by Micro Kjeldahl's method	4

12.	Plant analysis for P, K, secondary and micronutrients	4
13.	Fertilizer adulteration test / identification of adulteration in fertilizer / Detection ofadulteration in fertilizers (Rapid test)	4
14.	Determination of nitrate nitrogen content of potassium nitrate	4
15.	Determination of water-soluble phosphorus in superphosphate (Pemberton method)	4
	Total	**60**

Text Books and Reference Books:

1) Mariakulandi and Manickam (1975): Chemistry of fertilizers and manures.
2) Tandon H. L. S. (1994): Recycling of crop, animal, human and industrial Wastes in Agriculture. FDCO, Delhi
3) Krishna and Murthy (1978): Manual on compost and other organic manures.
4) Rakshit A. 2015. Manures Fertilizers and Pesticides Paperback – Import. CBS Publishing; 1ST edition, pp. 266.
5) James F. Power, Rajendra Prasad. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press Tayloer and Francis Group. Textbook -pp. 384. ISBN 9781566702546
6) ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi- 110 012. pp. 728.
7) Das D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
8) ICAR Handbook of manures and fertilizers (1971) publication.
9) Somawanshi, et al. 2012. Laboratory Methods for Analysis of Soil, Irrigation Water and Plants., Department of Soil Science and Agricultural Chemistry, MPKV., Rahuri. revised Ed. pp. 307.
10) Jakson, M.L. 1973. Soil Chemical Analysis. Printice Hall, India, Pvt. Ltd. New Delhi. pp 498
11) Chapman, H.D., and P.F. Pratt. 1961. Methods of analysis for soils, plants and waters. Division of Agricultural Sciences, University of California.
12) Brady, N. C. 2016. The Nature and Properties of Soils. 15th edition Publisher: Pearson Education, ISBN: 978-0133254488.
13) ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi- 110 012. pp. 728.
14) Das, D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
15) Tisdale, S. L. and Nelson, W. L. and Beaqton, J. D. 2010. Soil Fertility and fertilizers. 7th Ed. Macmillan Publishing Company, 445 Hutchinson Avenue, Columbus.
16) Yawalkar, K. S., Agarwal, J. P. and Bokde, S. 1967. Manures and Fertilizers

Guidelines for the Course Assessment:

A. Continuous Assessment (CA) (20% of the Maximum Marks) of theory and practical courses:

i. **For Theory Course:** CA shall form 20% of the Maximum Marks and shall be carried out over the entire semester. It shall be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (on remaining 40% syllabus) and average of the marks scored by a student in these two tests of a particular paper shall be taken as the **CA** score.

ii. **For Practical Course:** CA score of the practical course shall be marks scored by a student in the internal practical examination conducted by the concerned teacher.

B. End Semester Assessment (80% of the Maximum Marks) of theory and practical courses:

(For illustration a paper of 02 credits, 50 marks has been considered and shall be modified appropriately depending upon credits of the individual paper)

Question Paper Pattern of the ESA:

i. **ESA Question paper shall consist 6 questions, each of 10 marks**
ii. **Question No.1 shall be compulsory and shall be based on the entire syllabus**
iii. Students shall have to solve ***ANY THREE*** of the remaining Five Questions (i.e. from question 2 to 6)
iv. **Students shall have to solve a TOTAL of 4 Questions.**

C. Assessment of On Job Training (OJT) Course (for 04 credits):

a. Continuous assessment part (**40%, 40 marks out of 100**) of this course shall be done by the mentor of the student, where he /she is supposed to complete his On Job Training. This shall be based on the regularity, participation and performance of the students at the place of OJT.

b. Semester End Assessment (ESA) (**60% of the total marks, 60 marks out of 100**) of this course shall be done by a panel of examiners in two parts

i. based on the work report submitted by the student (**50% i.e. 30 marks)** and

ii. **Remaining 50%** (30 marks) shall be based on his presentation and viva-voce on the work carried to be assessed by the panel of examiners. This assessment shall be done along with practical examinations of respective courses / subjects.

D. Assessment of Field Project (FP) and Research Project (RP) (e.g. for 02 credits)

a. Continuous assessment part (**40%, 20 marks out of 50**) of this course shall be done by the mentor of the student and shall be based on regularity, experimental work and performance of the student.

b. Semester End Assessment (ESA) (**60% of the total marks, 30 marks out of 50**) of this course shall be done shall be done by a panel of examiners in two parts

i. based on the work report submitted by the student (**50% i.e. 30 marks)** and

ii. **Remaining 50%** (30 marks) shall be based on his presentation and viva-voce on the work carried out by the student. This assessment shall be done along with practical examinations of the respective courses / subjects.

E. Assessment of Co-Curricular courses (CCC):

a. Assessment of the CCC course shall be done by the respective course coordinator as a part of CA and be based on the regularity, performance of a student and his participation in various activities as prescribed in the regulations prepared in this regard.

b. The End Semester Assessment (ESA) of the CCC courses shall be done as per the regulations prepared in this regard and shall be done on the basis of the write-up, presentation by the student on the activities that he has carried out in a semester.

c. Students shall have freedom to opt for more than one CCC courses. However, score of the best performing CC shall be considered for preparing his result.

F. Syllabi, Teaching and Examination Scheme for the courses in Column 7 and Column 8 (AEC, VEC, IKS, CI, EVS, CCCs, etc.) shall be common for all the students from different faculties.

Note: Number of lectures required to cover syllabus of a course depends on the number of credits assigned to a particular course. One credit of theory corresponds to 15 Hours lecturing and for practical course one credit corresponds to 30 Hours. For example, for a course of two credits 30 lectures of one hour duration are assigned, while that for a three credit course45 lectures.

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