॥ 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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एनईपी–२०२० सुधारित श्रेयांक आराखडयानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २२ एप्रिल २०२६ रोजी संपन्न झालेल्या मा.विद्यापरिषद बैठकीतील विषय क्र.०४/६४–२०२६ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण–२०२० सुधारित श्रेयांक आराखडयानुसार पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यास मा.विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी.एस्सी. प्रथम वर्षाचे खालील विषयाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यात येत आहे.

01	B.Sc. I Year Botany	06	B.Sc. I Year Geology
02	B.Sc. I Year Chemistry	07	B.Sc. I Year Enviornment & Earth Science
03	B.Sc. I Year Mathematics	08	B.Sc. I Year Statistics
04	B.Sc. I Year Zoology	09	B.Sc. I Year Dairy Science
05	B.Sc. I Year Microbiology	10	B.Sc. I Year Agrochemical & Fertilizers

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.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/परिपत्रक/पदवी/बीएस्सी/२०२६–२७/ 66
दिनांक : २२.०६.२०२६

सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :–
१) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. प्र.कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ
३) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा,प्रस्तुत विद्यापीठ.
४) मा. संचालक, परिक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. यांना देवून कळविण्यात येते की, परिपत्रक अभ्यासक्रम संकेतस्थळावर प्रसिध्द करण्यात यावेत.

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

B. Sc. First Year

Agrochemicals and Fertilizers

- ❖ Teaching scheme
- ❖ Examination Scheme
- ❖ Syllabus

To be Implemented from

Academic Year 2026-2027

Agrochemicals and Fertilizers

Programme Objectives:

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.

a. To know well the soils of our region in their physical, chemical and biological aspects.

b. To understand the basic components of soil, their origin and various physicochemical properties

c. To manage the soil in various ways so as to improve their fertility and productivity

d. To understand the proper methods of soil testing to select proper fertilizers and suitable crops aiming for higher production

e. The nutritional aspects of the various food components are considered for balanced nutrition.

Programme Outcomes:

The curriculum will help gain following 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. To manage the biological properties of soil by adding organic manures.
7. The ultimate outcome should be the increased productivity of soils with better management so as to improve crop yield.
8. To gain and spread the knowledge about nutritional components of food, their sources, balanced nutrition and their role in human health.

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	--
	SAGFCP1101	**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**	**Soil, Plant and Water Analysis**	--	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**	20	20	20	30	--	--	50
	SAGFCP1101	**Practical Based on SAGFCT1101**	--	--	--	--	20	30	50
Optional 2	SDSCCT1101		20	20	20	30	--	--	50
	SDSCCP1102		--	--	--	--	20	30	50
Optional 3	SDSCCT1101		20	20	20	30	--	--	50
	SDSCCP1102		--	--	--	--	20	30	50
Generic Elective	**SAGFGE1101**	**Agriculture Science and Technology-I**	20	20	20	30	--	--	50
Skill Based Course	**SAGFSC1101**	**Soil, Plant and Water Analysis**	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	20	20	20	30	--	--	50
Ability Enhancement Course (MIL)	AECMIL1101	L2 – MIL (Basket 3)	20	20	20	30	--	--	50
Indian Knowledge System	IKSXXX1101	Select from **Basket 5**	20	20	20	30	--	--	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	--
	SAGFCP1151	**Practical Based on SAGFCT1151**	-	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**	**Food science and Nutrition**	--	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)*

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	**SAGFCT1151**	**Agricultural Biochemistry**	20	20	20	30	--	--	50
	SAGFCP1151	**Practical Based on SAGFCT 1151**	--	--	--	--	20	30	50
Optional 2	SDSCCT1151		20	20	20	30	--	--	50
	SDSCCP1152		--	--	--	--	20	30	50
Optional 3	SDSCCT1151		20	20	20	30	--	--	50
	SDSCCP1152		--	--	--	--	20	30	50
Generic Elective	**SAGFGE1151**	**Agriculture Science and Technology-II**	20	20	20	30	--	--	50
Skill Based Course	**SAGFSC1151**	**Food science and Nutrition**	--	--	--	--	20	30	50
Ability Enhancement Course	AECENG1151	L1 – Compulsory English	20	20	20	30	--	--	50
Ability Enhancement Course (MIL)	AECMIL1151	L2 – MIL (Basket 3)	20	20	20	30	--	--	50
Indian Knowledge System	IKSXXX1151	Select from Basket 5	20	20	20	30	--	--	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:

1) Students enrolling in this course should have a basic understanding of soil composition, soil types, physical and chemical properties of soil, and essential concepts of soil fertility and nutrient management.
2) Familiarity with soil–plant relationships and basic soil analysis techniques is also recommended.

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: SAGFCT1101: FUNDAMENTALS OF SOIL SCIENCE

Module No.	Unit No.	Topic	Hrs.
1.0		**Introduction of Soil**	**07**
	1.1	Soil: Definition, Scope and importance of Soil Science, Soil Components, Functions of Soil	
	1.2	Rocks and Minerals: Definition, 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 Soil Structure: Definition, Importance, Factors affecting, Role of Soil Texture and Structure	
	2.2	Soil Air and Soil Temperature: Definition, Importance, Role	
	2.3	Density and Porosity of Soil: Definition, Importance, Factors	
	2.4	Soil Color and Soil Consistency: Introduction and definition	
3.0		**Soil Colloids and Ion Exchange**	**07**
	3.1	Soil Colloids: Definition, Types and general properties	
	3.2	Ion Exchange: Importance, Cation Exchange Capacity (CEC), Anion Exchange Capacity (AEC)	
	3.3	Soil Reaction & Buffering: Definition of pH, Buffer capacity	
	3.4	Relation of Soil pH and Nutrient Availability	
4.0		**Soil Water and Organic Matter**	**08**
	4.1	Soil Water: Importance, Classification of Soil Water, Soil Moisture Constants, Soil water movement	
	4.2	Soil organic matter: Definition, Sources, Decomposition, Role, Factors affecting soil organic matter	
	4.3	Soil Microorganisms: Important microbial processes in soil, Biological Nitrogen Fixation (BNF)	
	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 – SAGFCP1101

Title of the Course: Practical based on SAGFCT1101

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

CURRICULUM DETAILS: SAGFCP1101: Practical based on SAGFCT1101

Sr. No	Practical Exercises	Hrs.
1.	Collection and preparation of soil sample for analysis	4
2.	Study of general properties of minerals	4
3.	Study of rocks- Igneous, sedimentary and metamorphic	4
4.	Study of soil profile	4
5.	Determination of soil texture by feel method	4
6.	Determination of soil texture by mechanical analysis	4
7.	Determination of bulk density by clod coating method.	4
8.	Determination of particle density by pycnometer method and porosity of soil	4
9.	Determination of soil colour by Munsell soil colour chart	4
10.	Study of soil structure and aggregate analysis	4
11.	Determination of moisture content in soil by gravimetric method.	4
12.	Determination of water holding capacity	4
13.	Study of infiltration rate of soil	4
14.	Determination of pH and electrical conductivity of soil	4
15.	Estimation of organic carbon and organic matter content in soil	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. Richards, L.A. 1968. Diagnosis and Improvement of Saline Alkali Soils. Oxford and IBH Publication Co. Calcutta
14. Chora, S. L. and Kanwar, J. S. 1991. Analytical Agricultural Chemistry, Kalyani Publisher New Delhi
15. Chapman, H.D., and P.F. Pratt. 1961. Methods of analysis for soils, plants and waters. Division of Agricultural Sciences, University of California
16. Patil, V. D. and Mali C. V. 2007. Fundamentals of Soil Science, Aman Publication, Meerut.

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

Generic Elective Course

Course Code – SAGFGE1101

Title of the Course: Agriculture Science and Technology-I

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

CURRICULUM DETAILS: SAGFGE1101: 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: Soil, Plant and Water Analysis

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

1. Course Objectives:

1) To develop basic skills in analysis of soil, plant, and water samples
2) To understand nutrient status and quality parameters
3) To train students in laboratory techniques and interpretation of results
4) To support sustainable agriculture through scientific analysis

2. Course Outcomes (COs):

1) CO1: Perform basic soil, plant, and water analysis
2) CO2: Interpret analytical data for nutrient management
3) CO3: Identify soil fertility status and water quality
4) CO4: Apply laboratory skills in agricultural practices

Curriculum Details: SAGFSC1101: Soil, Plant and Water Analysis

Sr. No	Exercises	Hrs. Required
1	Study of soil sampling tools, collection and processing of soil for analysis.	4
2	Determination of soil pH using pH meter	4
3	Determination of electrical conductivity (EC) of soil extract	4
4	Estimation of soil organic carbon	4
5	Estimation of available nitrogen in soil	4
6	Estimation of available phosphorus in soil	4
7	Estimation of available potassium in soil	4
8	Collection and preparation of plant samples	4
9	Digestion of plant samples using acid digestion method	4
10	Estimation of nitrogen in plant samples	4
11	Estimation of phosphorus in plant samples	4
12	Estimation of potassium in plant samples	4
13	Determination of pH and EC of irrigation water	4
14	Determination of carbonate and bicarbonate in water	4
15	Calculation of Sodium Adsorption Ratio (SAR) and classification of irrigation water	4
	Total	**60**

Text Books and Reference Books:

1) C. A. Black 1965. Methods of Soil Analysis, Agronomy Monograph, American Society of Agronomy.
2) Marion LeRoy Jackson, Soil Chemical Analysis, Prentice Hall of India Pvt. Ltd., New Delhi.
3) S. L. Chopra and J.S. Kanwar 1976, Analytical Agricultural Chemistry, Kalyani Publishers, Ludhiana.
4) John L. Havlin, Samuel L. Tisdale, Werner L. Nelson, James D. Beaton, 8th (2021, Pearson) Soil Fertility and Fertilizers, Pearson Education / PHI Learning.
5) Plant Analysis Handbook by Yara International, Yash P. Kalra, Publisher: CRC Press / Taylor & Francis Group, First edition: 1997 (© 1998)
6) P. K. Gupta, Handbook of Soil, Plant and Water Analysis, Agrobios (India), Jodhpur.
7) Patil, V. D. and Mali C. V. 2007. Fundamentals of Soil Science, Aman Publication, Meerut.
8) K. H. Tan, Soil and Water Analysis, CRC Press / Taylor & Francis Group.
9) Manual on Soil, Plant and Water Analysis by Dhyan Singh P. K. Chhonkar, B.S. Dwivedi, Westville Publishing House, New Delhi
10) Motsara, M.R. and Roy, R.N. (2018) Guide to laboratory establishment for plant nutrient analysis. FAO Fertilizer and Plant Nutrition Bulletin (19).
11) Hesse, P.R. (1971). A Text of Soil Chemical Analysis, CBS Publishers and Distributors, Delhi.
12) Jackson, M. L. (1973). Soil Chemical Analysis. Prentice Hall of India Private Ltd., New Delhi.
13) Lindsay, W.L. and Norvell, W.A. (1978) Development of a DTPA TEST FOR Zn, Fe,Mn, and Cu. Soil Sci.Soc.Am.J., 42:421-28

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 – SAGFCT1151

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: SAGFCT1151: AGRICULTURAL BIOCHEMISTRY

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction to Biochemistry**	**07**
	1.1	Biochemistry: Definition, Scope and Importance of Biochemistry in Agriculture	
	1.2	Biomolecules - Definition, types, structure, properties and its applications	
	1.3	Carbohydrate: Introduction and Classification, Structure and properties of Glucose, biological significance of carbohydrates	
	1.4	Amino acids: Definition, structure, classification and properties of amino acids	
2.0		**Proteins, Lipids, Enzymes and Nucleic acids**	**08**
	2.1	Proteins: Introduction, definition, classification, properties and structure of proteins	
	2.2	Lipid: Introduction and classification, Structures and properties of fatty acids, biological significance of lipids	
	2.3	Enzymes: Definition, Classification, Chemical nature of enzymes, Factors affecting enzyme activity, Role of enzymes.	
	2.4	Nucleic acids: Importance and classification, structure and functions	
3.0		**Vitamins**	**08**
	3.1	Vitamins: 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 growth regulators and Hormones**	**07**
	4.1	Plant growth regulators: Introduction, Occurrence, Structure, Physiological role of following plant hormones	
	4.2	Auxins, Gibberellins Cytokinin	
	4.3	Abscisic acid and Ethylene	
	4.4	Applications of plant growth regulators in agriculture	
		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
14. Advanced Plant Physiology – Malcolm B. Wilkins
15. Introduction to Plant Physiology – William G. Hopkins

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

Major Practical Course

Course Code – SAGFCP1151

Title of the Course: Practical based on SAGFCT1151

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

CURRICULUM DETAILS: SAGFCP1151: Practical based on SAGFCT1151

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 – SAGFGE1151

Title of the Course: Agriculture Science and Technology-II

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

Curriculum Details: SAGFGE1151: 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 – SAGFSC1151

Title of the Course: Food Science and Nutrition

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

Course objectives:

1) To understand the basic principles of Food Science and Nutrition Science.
2) To study the classification and functions of essential nutrients in human health.
3) To develop knowledge of balanced diet planning for different age groups.
4) To understand food processing, preservation, and safety practices.
5) To promote awareness of healthy eating habits and prevention of nutritional deficiencies.

Course outcomes (COs):

1) Students will be able to explain fundamental concepts of Food Science and Nutrition Science.
2) Students will be able to identify and describe the functions and sources of major nutrients.
3) Students will be able to plan balanced diets for different age groups and physiological conditions.
4) Students will be able to apply principles of food safety, hygiene, and preservation in daily life.
5) Students will be able to analyze nutritional problems and suggest preventive measures.

CURRICULUM DETAILS: SAGFSC1151: Food Science and Nutrition

Sr. No.	Topics	Hrs. Required
1-2	Concepts of Food Science: Definition, functions of food, Properties of food: physical, chemical and sensory	8
3-4	Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions)	8
5-6	Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods)	8
7-8	Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying, high pressure processing, microwave processing, etc.)	8
9-10	Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders	8
11	Energy metabolism (carbohydrate, fat, proteins)	4
12	Balanced/ modified diets, Menu planning	4
13	New trends in food science and nutrition	4
14	Fortification and enrichment of food	4
15	National programmes and role of national and international agencies in improving nutritional status of the community.	4
	Total	**60**

Text Books and Reference Books:

1) Owen R, Fennema. 1996. Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA.
2) M. Shafiur Rahman. 2007. Handbook of Food Preservation, 2nd Ed. CRC Press, Boca Raton, FL, USA.
3) James G. Brennan. 2006. Food Processing Handbook. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
4) Fellows P. 2000. Food Processing Technology: Principles and Practice, 2nd Ed. CRC Press, Boca Raton, FL, USA.
5) William C. Frazier and & Dennis C. Westfoff. 1987. Food Microbiology, 4th Ed. Tata McGraw-Hill Education, New Delhi.
6) Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. 2008. Handbook of Nutrition and Food, 2nd Ed. CRC Press, Boca Raton, FL, USA.
7) Sehgal, S. and Raghuvanshi, R.S. (2007) Text Book of Community Nutrition. ICAR, New Delhi.
8) Agarwal, A and Udipi, S. (2014). Text Book of Human Nutrition. Jaypee Medical Publication, Delhi.
9) Peter Zeuthen and Leif Bùgh-Sùrensen. 2003. Food Preservation Techniques. CRC Press LLC, Boca Raton, FL, USA.
10) Joshi V.K. and Ashok Pandey. 1999. Biotechnology: Food Fermentation –Microbiology, Biochemistry and Technology, Vol. II. Educational Publishers & Distributors, New Delhi.
11) George J. Banwart. 1989. Basic Food Microbiology, 2nd Ed. Chapman & Hall, New York, USA.
12) Kalia, M. and Sood, S. (2010). Food Preservation and Processing. Revised Edition, Kalyani Publishers, New Delhi.
13) Swaminathan, M. (1999. Food Science, Chemistry and Experimental Foods. 2nded. The Banglore Printing and Publishing Co., Bangalore.
14) Fundamentals of food and nutrition by S. R. Mudambi and M. V. Rajgopal.
15) Brady, J.W. 2013. Introductory Food Chemistry. Comstock Publishing Associates, Cornell University Press, Ithaca, USA.