Rama University Uttar Pradesh, Kanpur

Ref: RU/FASAI/U6/2 **Dated:** 2016/06/11

Faculty of Agricultural Sciences & Allied Industries

Department of **B.Sc. Agriculture**

Minutes of Meeting

Boards of Studies

A meeting of Boards of Studies of **B.Sc. Agriculture** held on 11th June 2016 at 11:30 AM in Director Office. The following members were present:

1. Dr. H. S. Muker - Chairperson
2. Dr. Ateeq Khan - Member
3. Dr. Avanish Sharma - Member

The following members agreed to review the minutes in Kanpur.

1. Dr. V. K. Tripathi- External Member
2. Dr. A. K. Tiwari - External Member

Agenda:

1. Action Taken Report (ATR) on Minutes of Previous Meeting.

The BOS committee confirmed the minutes of the BOS meeting held on 8th June 2015.

2. Review of the existing programs and their curricula

S. No.	Item No.	Existing	Recommendation /Action Taken
1.	RU/FASAI/BOS/2016/06/11-002 To consider the revised evaluation scheme for **B.Sc. Agriculture** students admitted in the session 2016-17	In existing evaluation scheme for the said batch, total credits = 163. As per instructions of Dean Academics, the evaluation scheme shall be revised to accommodate the semester working in 6 days a week. The following changes were proposed: 1. Addition of topic	The BOS evaluate and approved the scheme for **B.Sc. Agriculture** students admitted in the session 2016-17 and accepted the as per recommendation of committee The BOS evaluated and approved the Addition of topic "Measurement and estimation of soil loss" in

		"Measurement and estimation of soil loss" in 1st Year course BSA 104- Fundamental of Soil and Water Conservation Engineering. 2. Addition of topic "Social Process" in 3rd Year V semester course BSA-538 Fundamental of Rural Sociology and Educational Psychology	Course BSA 104- Fundamental of Soil and Water Conservation Engineering. The BOS evaluate and approved the Addition of topic"Social Process" in 3rd Year V semester course BSA-538 Fundamental of Rural Sociology and Educational Psychology

3. Recommendation on New courses/Short term training

S. No.	Item No.	Feedback from Faculty/Student	Recommendation /Action Taken
1	N/A	N/A	N/A

4. Consideration of the curricula of the new programs

S. No.	Item No.	Feedback from Faculty/subject experts/Industries	Recommendation /Action Taken
1	N/A	N/A	N/A

5. Review of Teaching Process/Pedagogy

S. No.	Item No.	Existing	Recommendation /Action Taken
1	N/A	Conventional mode of teaching	Additional teaching tools adopted

6. Result Analysis: ---Summary of Result Analysis of the students' performance in the semester examination was presented and it was suggested that the course instructors should conduct remedial classes for the students whose performance was not found satisfactory.

7. Feedback Analysis:---Analysis was performed based on summary of already collected feedback from students regarding programme objective and programme outcome. The syllabus was interesting, challenging, satisfying and significant.

8. Any other issue with the permission of the Chair: ----N/A

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and conveyed later

(Chairman)

Encl.: Recommended Curricula attached for consideration and approval.

CC:
1. Dean
2. Registrar Office

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural sciences and Allied Industries

Program: Bachelor of Science in Agriculture

Report on Feedback on Curriculum by Stakeholders (2016-2017)

- The external experts reviewed the syllabus through mail and suggested "Measurement and estimation of soil loss" in 1st Year course BSA 104- Fundamental of Soil and Water Conservation Engineering should be included.

- The alumni recommended concentrating more on practical skills inapplication development.

- The faculty suggested that"Social Process" should be included in 3rd Year V semester course BSA-538 Fundamental of Rural Sociology and Educational Psychology.

BoS Chairman

Dean

RAMA UNIVERSITY UTTAR PRADESH, KANPUR

Faculty of Agricultural sciences and Allied Industries

Program: Bachelor of Science in Agriculture

Action Taken Report based on Feedback at BoS held on 11.06.2016

- The external experts reviewed the syllabus and suggested "Measurement and estimation of soil loss" in 1st Year course BSA 104- Fundamental of Soil and Water Conservation Engineering should be included.This topic was included.
- More emphasis to practical skills in application development was given.
- Topic "Social Process" was included in 3rd Year V semester course BSA-538 Fundamental of Rural Sociology and Educational Psychology.

BoS Chairman

Dean

Programme outcome:

PO-1: Understand the impact of the professional agricultural solutions in societal andenvironmental contexts, and demonstrate the knowledge of, and need for sustainabledevelopment.
PO-2: To demonstrate research based knowledge of the legal and ethical environment impactingagriculture organizations and exhibit an understanding and appreciation of the ethicalimplications of decisions.
PO-3: To demonstrate an understanding of and appreciation for the importance of the impact ofglobalization and diversity in modern agriculture organizations. Understanding of globalization,and NGO working.
PO-4: To demonstrate an ability to engage in critical thinking by analyzing situations andconstructing and selecting viable solutions to solve problems. Ability to work effectively with
others. To develops analytical ability and team work spirit.
PO-5: To understand and analyze the current events and issues that are occurring in agricultureand how they affect futuristic agriculture.
PO-6: Able to recognize and examine the relationships between inputs and outputs in theiragricultural field to make effective and profitable decisions. To understand mechanics ofagripreneurship.
PO-7: Understand how all aspects of agriculture combine and are used by scientists, marketers,producers and understand how employer characteristics and decision-making at various levelsenhance the success of an agricultural enterprise. To understand components of agri business andeconomics of market.
PO-8: Able to demonstrate critical thinking and problem solving skills as they apply to a varietyof animal and or plant production systems .To understand problem solving skills in cropproduction and animal husbandry.
PO-9: Knowledge of Weather codes and Symbols, Reading and Recording of weather andclimatic data. To get trained for climatologically records, soil data and soil nutrition.

Programme specific outcome:

PO-1:To develop critical and self-critical opinion and approach aiming at solving the mostimportant practical problems in the field of plant protection by applying gained competenciesand in accordance with high standards of academic integrity (ethics and moral) both in theprofession and in society as a whole. To develop competence to work in Government, public andprivate sectors.
PO-2: Demonstrate knowledge and understanding in horticulture section: The breadth anddepth of the profession of horticulture. Basic horticulture biology: taxonomy, anatomy,morphology, and physiology. The characteristics of the environment and their influence on plantgrowth and development. Current applications of horticultural principles and practices:propagation, pest management, production, maintenance, and business practices. Comprehensiveknowledge of horticultural production.
PO-3: This programme will also help students to enhance their employability for jobs indifferent sectors.

Programme Educational Outcome

B.Sc. Agriculture 4th Dean Committee

1. Instructing subjectrelated information along with emerging a connection between applied solutions and theory.
2. Inspire personal growth among students and boost their self-confidence, which will give them opportunities to be an integral part of the agro-industry.
3. Making the agriculture related subjects interesting through scientific and experimental evidence.
4. Develop problem-solving skills through practical applications and research.

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)
B. Sc. Agriculture 1st YEAR, SEMESTER-I

S.No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	**BSA-101**	Principles of Agronomy and Agricultural Meteorology	3	0	0	20	20	60	100	3
2.	**BSA - 102**	Principles of Genetics	3	0	0	20	20	60	100	3
3.	**BSA - 103**	Introduction to Soil Science	2	0	0	20	20	60	100	2
4.	**BSA - 104**	Fundamentals of Soil and Water Conservation Engineering	2	0	0	20	20	60	100	2
5.	**BSA - 105**	Plant Pathogens and Principles of Plant Pathology	3	0	0	20	20	60	100	3
6.	**BSA - 106**	Production technology of fruit crops	3	0	0	20	20	60	100	3
7.	**BSA - 107**	Introductory Agriculture (Ancient Heritage, Agriculture Scenario and Gender Equality in Agriculture)	2	0	0	20	20	60	100	2
PRACTICAL										
8.	**BSA-151**	Principles of Agronomy and Agricultural Meteorology (Lab)	0	0	1	30	20	50	100	1
9.	**BSA -**	Introduction to Soil Science (Lab)	0	0	1	30	20	50	100	1

Date: 11.06.2016

	152									
10.	**BSA - 153**	Production technology of fruit crops (Lab)	0	0	1	30	20	50	100	1
			18	**0**	**3**	**230**	**200**	**570**	**1000**	**21**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

1. Attendance: 5 Marks
2. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....
Name :
Date : **(Convener)**

External Members:

Signature: 1..... 2.....
3.....
Name :
Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2016-17)
B. Sc. Agriculture (Honours)
1st YEAR, SEMESTER-II

S.No	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	**BSA-208**	Introductory Nematology	2	0	0	20	20	60	100	2
2.	**BSA-209**	Water Management including micro irrigation	3	0	0	20	20	60	100	3
3.	**BSA-210**	Principles of Seed Technology	1	0	0	20	20	60	100	1
4.	**BSA-211**	Dimensions of Agricultural Extension	1	0	0	20	20	60	100	1
5.	**BSA-212**	Protected cultivation and Post Harvest Technology	2	0	0	20	20	60	100	2
6.	**BSA-213**	Introduction to Computer Application	1	0	0	20	20	60	100	1
7.	**BSA-214**	Soil Chemistry, Soil Fertility and Nutrient Management	3	0	0	20	20	60	100	3
8.	**BSA-215**	Principles of Plant Breeding	2	0	0	20	20	60	100	2
9.	**BSA-216**	Comprehension and Communication Skills in English	1	0	0	20	20	60	100	1
PRACTICAL										
10.	**BSA-254**	Protected Cultivation and Post Harvest Technology Lab	0	0	1	5	5	10	20	1
11.	**BSA-255**	Introduction to Computer Application Lab	0	0	1	5	5	10	20	1
12.	**BSA-256**	Principles of Plant Breeding Lab	0	0	1	5	5	10	20	1

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Date: 11.06.2016

13.	**BSA-257**	Comprehension and Communication Skills in English Lab	0	0	1	5	5	10	20	1
14.	**BSA-258**	Principles of Seed Technology Lab	0	0	1	5	5	10	20	1
		TOTAL	**16**	**0**	**5**	**205**	**205**	**590**	**1000**	**21**

L - Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE - Mid Term Examination, ETE - End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

3. Attendance: 5 Marks
4. Assignments/ Quiz / Seminar/Term paper /Project: 15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 20 marks
b. Second Mid Term Examination: 20 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 20 marks
b. Second Mid Term Examination: 20 marks

ETE - End Term Examination: 40 Marks

Internal Members:

Signature: 1..... 2.....

3.....

Name :

Date :

(Convener)

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

External Members:

Signature: 1..... 2.....

3.....

Name :

Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2017-18)
B. Sc.Agriculture (Honours)
2nd YEAR, SEMESTER-III

S.No	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-317	Field Crop I (Kharif)	2	0	0	20	20	60	100	2
2.	BSA-318	Insect Morphology and Systematics	2	0	0	20	20	60	100	2
3.	BSA-319	Principles of Agriculture Economics	2	0	0	20	20	60	100	2
4.	BSA-320	Farm Power and Machinery	1	0	0	10	10	30	50	1
5.	BSA-321	Agriculture Microbiology	1	0	0	10	10	30	50	1
6.	BSA-322	Statistics	1	0	0	10	10	30	50	1
7.	BSA-323	Production Technology of Vegetables and Flowers	2	0	0	20	20	60	100	2
8.	BSA-324	Livestock production and Management	2	0	0	20	20	60	100	2
PRACTICAL										
9.	BSA-359	Field Crop I (Kharif) Lab	0	0	1	10	15	25	50	1
10.	BSA-360	Insect Morphology and Systematics Lab	0	0	1	10	15	25	50	1
11.	BSA-361	Farm Power and Machinery Lab	0	0	1	10	15	25	50	1
12.	BSA-362	Agriculture Microbiology	0	0	1	10	15	25	50	1
13.	BSA-363	Statistics Lab	0	0	1	10	15	25	50	1
14.	BSA-	Production	0	0	1	10	15	25	50	1

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

	364	Technology of Vegetables and Flowers Lab								
15.	**BSA-365**	Livestock production and Management Lab	0	0	1	10	15	25	50	1
		TOTAL	**13**	**0**	**7**	**200**	**235**	**565**	**1000**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

5. Attendance: 5 Marks
6. Assignments/ Quiz / Seminar/Term paper /Project: 15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....
Name :
Date : **(Convener)**

External Members:

Signature: 1..... 2.....
3.....
Name :
Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme

(Effective from the Session 2017-18)
B. Sc.Agriculture (Honors)
2nd YEAR, SEMESTER-IV

S.No	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-425	Field Crop II (Rabi)	2	0	0	20	20	60	100	2
2.	BSA-426	Manures, Fertilizers and Agro-Chemicals	3	0	0	20	20	60	100	3
3.	BSA-427	Insect Ecology and Integrated Pest management including beneficial insects	3	0	0	20	20	60	100	3
4.	BSA-428	Agriculture finance and co-operation	1	0	0	10	10	30	50	1
5.	BSA-429	Diseases of field crops and their management	2	0	0	20	20	60	100	2
6.	BSA-430	Production Technology of spices, aromatics, medicinal and plantation crops	2	0	0	20	20	60	100	2
7.	BSA-431	Breeding of field / horticultural crops	2	0	0	20	20	60	100	2
8.	BSA-432	Processing of milk and milk Products	1	0	0	10	10	30	50	1
PRACTICAL										
9.	BSA-466	Field Crop II (Rabi) Lab	0	0	1	10	15	25	50	1
10.	BSA-467	Agriculture finance and co-operation Lab	0	0	1	10	15	25	50	1
11.	BSA-468	Diseases of field crops and their management Lab	0	0	1	10	15	25	50	1
12.	BSA-469	Production	0	0	1	10	15	25	50	1

Date: 11.06.2016

		Technology of spices, aromatics, medicinal and plantation crops Lab								
13.	**BSA-470**	Breeding of field / horticultural crops Lab	0	0	1	10	15	25	50	1
14.	**BSA-471**	Processing of milk and milk Products Lab	0	0	1	10	15	25	50	1
		TOTAL	**16**	**0**	**6**	**200**	**230**	**570**	**1000**	**22**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

7. Attendance: 5 Marks
8. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....
Name :
Date : **(Convener)**

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

External Members:

Signature: 1..... 2.....

3.....

Name :
Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2018-19)
B. Sc. Agriculture (Honours)
3rd YEAR, SEMESTER-V

S. No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	BSA-533	Farming Systems and Sustainable Agriculture	1	0	0	10	10	30	50	1
2.	BSA-534	Biochemistry	2	0	0	20	20	60	100	2
3.	BSA-535	Crop Pests and Stored grain pests and their management	2	0	0	20	20	60	100	2
4.	BSA-536	Agricultural marketing trade and prices	1	0	0	10	10	30	50	1
5.	BSA-537	Fundamental of Agri-business management (including product development , appraisal and monitoring)	1	0	0	10	10	30	50	1
6.	BSA-538	Fundamentals of Rural Sociology and Educational Psychology	2	0	0	20	20	60	100	2
7.	BSA-539	Post-harvest management and value addition of fruits and vegetables	1	0	0	10	10	30	50	1
8.	BSA-540	Disease of Horticultural Crops and their management	2	0	0	20	20	60	100	2
PRACTICAL										

Date: 11.06.2016

9.	BSA-572	Farming Systems and Sustainable Agriculture Lab	0	0	1	10	15	25	50	1
10.	BSA-573	Biochemistry Lab	0	0	1	10	15	25	50	1
11.	BSA-574	Crop Pests and Stored grain pests and their management Lab	0	0	1	10	15	25	50	1
12.	BSA-575	Agricultural marketing trade and prices Lab	0	0	1	10	15	25	50	1
13.	BSA-576	Post-harvest management and value addition of fruits and vegetables Lab	0	0	1	10	15	25	50	1
14.	BSA-577	Fundamental of Agri-business management (including product development , appraisal and monitoring) Lab	0	0	1	10	15	25	50	1
15.	BSA-578	Disease of Horticultural Crops and their Management Lab	0	0	1	10	15	25	50	1
16.	BSA-579	Practical Crop Production I (Cereals, pulses and fodder crops) Lab	0	0	1	10	15	25	50	1
		TOTAL	**12**	**0**	**8**	**200**	**240**	**560**	**1000**	**20**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

9. Attendance: 5 Marks
10. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....
Name :
Date :

(Convener)

External Members:

Signature: 1..... 2.....
3.....
Name :
Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2018-19)
B. Sc. Agriculture (Honours)
3rd YEAR, SEMESTER-VI

S. No.	Subject Code	Name of the subject	Periods			Evaluation Scheme			Total Marks	Credit
			L	T	P	CE	MTE	ETE		
THEORY SUBJECT										
1.	**BSA-641**	Production Economics and Farm Management	1	0	0	20	20	60	100	1
2.	**BSA-642**	Extension Methodologies for Transfer of Agricultural Technology	1	0	0	20	20	60	100	1
3.	**BSA-643**	Principles of Plant Bio-Technology	2	0	0	20	20	60	100	2
4.	**BSA-644**	Entrepreneurship Development and Communication Skills	2	0	0	20	20	60	100	2
5.	**BSA-645**	Organic Farming	3	0	0	20	20	60	100	3
6.	**BSA-646**	Environmental Science	2	0	0	20	20	60	100	2
7.	**BSA-647**	Weed Management	1	0	0	10	10	30	50	1
8.	**BSA-648**	Renewable Energy	2	0	0	20	20	60	100	2
PRACTICAL										
9.	**BSA-680**	Production Economics and Farm Management Lab	0	0	1	10	15	25	50	1
10.	**BSA-681**	Extension Methodologies for Transfer of Agricultural Technology Lab	0	0	1	10	15	25	50	1

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

11.	**BSA-682**	Principles of Plant Bio Technology Lab	0	0	1	10	15	25	50	1
12.	**BSA-683**	Weed Management Lab	0	0	1	10	15	25	50	1
13.	**BSA-684**	Practical Crop Production II (Oilseed and commercial crops Lab	0	0	1	10	15	25	50	1
		TOTAL	**14**	**0**	**5**	**200**	**225**	**575**	**1000**	**19**

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

11. Attendance: 5 Marks
12. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Internal Members:

Signature: 1..... 2.....
3.....
Name :
Date :

(Convener)

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

External Members:

Signature: 1..... 2.....

3.....

Name :

Date :

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-I

BSA 101- Principles of Agronomy and Agricultural Meteorology

L	T	P	CR
3	0	1	4

Course objective:-

To make student understand the concepts of agronomy, agricultural practices, atmosphere and weather phenomenon.

Course Contents

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Unit- I: Agronomy and its Scope

Agronomy- Definition, meaning and Scope of Agronomy, Relation of agronomy to other sciences. Role of agronomist, Agro-climatic zones of India and Uttar Pradesh by Planning Commission, Classification by ICAR. Agro-ecological zones of India. Boundaries and scale. National and International Research Institutions in India.

Unit-II: Earth and Atmosphere

Earth's atmosphere, composition and structure, Solar radiation, nature, properties, depletion, solar constant and energy balance,Atmospheric temperature, factors affecting, horizontal and vertical Distribution, variations and global warming

Unit-III: Agriculture Practices

Definition, objectives and classification of tillage and tillage implements, Crops stand establishment Planting geometry and its effect on growth and yield of the crop. Cropping systems and types of cropping system, Cropping patterns, Crop Rotation. Farming system, Cropping Scheme, Cropping intensity, Mixed Farming, Harvesting and Harvesting Index,

Unit-IV: Agriculture Meteorology

Agriculture Meteorology -weather and climate, micro-climate, weather elements, Air pressure variation Wind : factors affecting, cyclones and anticyclones and general circulation Atmospheric humidity, vapour pressure and saturation, process of condensation, formation of dew, fog, mist, snow, rain and hail Formation and classification of clouds. Introduction to monsoon, basics of weather forecasting.

Course Learning Outcomes (CLO)

1. In modern terminology however the word has come to mean and denote a branch of science dealing with all aspects of crop cultivation and production. A study of agronomy often involves a summoning of resources from related disciplines such as Botany, Soil Science, Irrigation, plant protection, Plant Genetics and Breeding, Agrometeorology etc.
2. In a more fundamental sense it can be categorized as an applied Science, the object of which is crop cultivation and management for the purpose of producing food for humans, feed for animals as well as raw materials for the industry.

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3. Knowledge about Indian Agriculture and importance, present status, scope and future prospect. Cropping seasons of India. Soil formation, classification, physical, chemical properties. Identification of important crops and crop seeds.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	-	-	2	2	-	-	3
CO2	1	3	-	3	3		-	2	-	-	-	3
CO3	2	3	1	3	3	-	-	2	-	-	-	3
Avg.	1.3	3	1	3	3			2	2			3

Recommended Text Books

1. Principles of Agronomy- S.R. Reddy (1999) Kalyani Publications, New Delhi.
2. Agriculture Meteorology - GSLHV Prasad Rao

Recommended Reference Books

1. Hand book of Agriculture – ICAR Publication (2000)
2. Introduction to Agronomy and Soil and Water management – V.G. Vaidya and K.K. Sahatrabudhe
3. Climatology - Lal, D.S. (1997), Sharda, Pustak Bhawan Publication, Allahabad
4. A practical guide on Agro meteorology - A.P K.K. Agrawal and. Upadhyay
5. Basic Principles of agriculture Meteorology - V. Radha Krishna Murthy

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Date: 11.06.2016

BSA 101- Principles of Agronomy and Agricultural Meteorology Lab

List of Experiments:

1. Study of tillage implements
2. Study of seeding equipments
3. Study of methods of sowing of field crops.
4. Study about manures, fertilizers and green manure crops / seeds (including calculation)
5. Methods of fertilizer application
6. Study of intercultivation implements and practices
7. Study of temperature, wind, rainfall and evaporation equipments.

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Date: 11.06.2016

1st Year, SEMESTER-I
BSA-102 Principles of Genetics

L	T	P	CR
3	0	0	3

Course objective:-
To make students familiar with the concepts of genetics, cell structure, gene and mutation.

Course content

Unit 1:	**30%**
Unit 2:	**20%**
Unit 3:	**30%**
Unit 4:	**20%**

Unit- I: Genetics and Gene action
Definition of Genetics and its importance, Mendel's laws of inheritance and exceptions to the laws.Types of gene action.Multiple alleles, Pleiotropism, Penetrance and expressivity Quantitative traits, qualitative traits and differences between them. Multiple factor hypothesis, Cytoplasmic inheritance, it's characteristics features and difference betweenchromosomal and cytoplasmic inheritance.

Unit-II: Cell structure and cell multiplication
Definition , Ultra structure of cell and cell organelles and their functions. Mitosis and meiosis, their significance and differences between them.

Unit –III: Gene and Chromosome
Lac operon and fine structure of gene. Study of chromosome structure, morphology, number and types, Karyotype and Idiogram, DNA and it's structure, function, types, modes of replication and repair RNA and its structure, function and types. Transcription, Translation, Genetic code and outline of protein synthesis. Crossing over and factors affecting it, Mechanism of crossing over and Cytological proof of crossing over Structural chromosomal aberrations. Numerical chromosomal aberrations (Polyploidy) and evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas.

Unit-IV: Mutation
Definition and it's characteristics features, Methods of inducing mutations and CIB technique, gene expression and differential gene activation.

Course learning outcome:
1. Comprehensive, detailed understanding of the chemical basis of heredity specially in crop plants to improve and develop the new varieties of plants.
2. Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc. he knowledge required to to design, execute, and analyze the results of genetic experimentation in plant systems.

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3. Insight into the mathematical, statistical, and computational basis of genetic analyses that use genome-scale data sets in systems biology settings. Understanding the role of genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	3	1	3	2	-	-	-	-	1	-	3
CO2	2	3	-	3	2		-	-	-	1	-	3
CO3	2	3	1	3	2	-	-	-	-	1	-	3
Avg.	2.3	3	2	3	2				-	1		3

Recommended Text Books-

1. Fundamentals of Genetics - B.D. Singh, Kalyani Publisher
2. Elements of Genetics - Phundan Singh, Kalyani Publisher

Recommended Reference Books-

1. Manual of Practical genetics - Singh, Chouhan and KatiyarKalyani Publisher
2. Cytogenetical practices - Choubey and Bhardwaj, Kalyani Publisher.

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Date: 11.06.2016

1st Year, SEMESTER-I
BSA-103 Introduction to Soil Science

L	T	P	CR
2	0	1	3

Course objective:
To make students to understand the soil, its physical properties, various factors affecting soil, and soil organic matter.

Course Content:

Unit 1:	**40%**
Unit 2:	**40%**
Unit 3:	**20%**

Unit-I: Soil and its Properties
Soil Pedological and Edapthological concepts, Origin of the earth, Earth's crust.Elementary knowledge of soil, classification and soils of India. Composition: rocks and minerals weathering. Soil formation factors and processes, Components of soils.Soil profile description.Diagnostic horizons. Soil physical properties, Soil texture, Textural classes, Particle size analysis. Soil structure classification, soil aggregates, their significance in crop production. Soil consistency, soil crusting, soil compaction, soil colors.Bulk density and particle density of soils and porosity, their significance and manipulation.

Unit-II: Factors affecting soil
Soil water, Retention and potentials, soil moisture constants.Movement of soil water, infiltration, percolation, permeability, drainage.Methods of determination of soil moisture.Thermal properties of soils, Soil temperature.Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth.Soil colloids, properties, nature, types and significance.Layer silicate clays, their genesis and sources of charges.Adsorption of ions, Ion exchange, CEC and AEC.Factors influencing ion exchange and its significance.

Unit-III: Soil and organic matters
Soil organic matter, composition, Decomposability, Humus Fractionation of organic matter. Carbon cycle, C:N ratio. Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Course Learning Outcomes:
1. At the end of the course, Students will be able to understand physical and chemical properties of soil and their effect on plant's health.
2. They will more aware about causes, effects and remedies to prevention and mitigation of soil pollution and have knowledge about soil forming rocks and minerals, their weathering and soil forming processes and climatic factors affect them.

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
3	2	-	3	2	1	-	-	-	1	-	2
	2	-	3	-	1	-	-	-	2	-	1
	2		3	2	1				1.5		3

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Recommended Text Books-

1. Fundamentals of Soil Science - ICAR Publication, New Delhi
2. The Nature and Properties of Soil - Brady, N.C. & Weil, R.R., Macmillan

Recommended Reference Books-

1. Soil Physics - M.C. Oswal, Oxford & IBH Publishing Co.
2. Soil Physics - Marshall, T.J., Holmes, J.W. & Rose, C.W., Cambridge Univ. Press
3. Text Book of Soil Physics - A.K. Saha, Kalyani Publication, New Delhi.

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Date: 11.06.2016

BSA-152 Introduction to Soil Science Lab

List of Experiments:

1. Study of a soil profile – Identification of rocks and minerals
2. Determination of bulk density and particle density.
3. Soil moisture determination, soil moisture constants – Field capacity infiltration rate, water holding capacity.
4. Soil temperature.
5. Collection and processing of soil for analysis – Organic carbon, pH, EC, soluble cations and anions.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-I

BSA-104 Fundamentals of Soil and Water Conservation Engineering

L	T	P	CR
2	0	0	2

Course Objective:

To make student acquaint with the principles of irrigation, soil sampling and soil erosion and conservation techniques.

Course content:

Unit 1:	**50%**
Unit 2:	**20%**
Unit 3:	**30%**

Unit-I: Irrigation and its Importance.

Definition, Importance of irrigation and water resources of the country, Flow irrigation and lift irrigation, Irrigation projects - classification and main irrigation projects of the country, Irrigation methods - surface methods, Irrigation methods - drip and sprinkler irrigation, Water conveyance systems - open channel and pipeline, Measurement of irrigation water – Basic terminology and units, volume time and velocity area method. Measurement of irrigation weirs, - water flumes and orifices/interceptor and relief drains Water lifting devices ,Centrifugal pump, Centrifugal pump - Installation, selection and power requirement, Operation and maintenance of centrifugal pump.

Unit-II: Soil Survey

Introduction to surveying and leveling. Survey equipment and chain survey. Cross staff survey and plotting procedure. Calculation of area of regular and irregular fields. Leveling - Terminology and equipment, Types of levels - Dumpy level, Calculation of reduced levels. Various types of leveling, Contour and contour survey, Plotting and interpretation of contours

Unit-III: Soil Erosion and Conservation

Soil erosion - Introduction and types of soil erosion, Water erosion - Factors affecting, Wind erosion - Factors affecting, Control measures to soil erosion - vegetative, Engineering measures to soil erosion. Measurement and estimation of soil loss

Course Learning Outcome:

1. In the end of the course students will understand various causes of soil erosion and forms of water erosion, classification of gully control measures or structures.
2. Course will give the knowledge of soil loss equation and it can estimate long – term annual soil loss and guide conservationists on proper cropping, management, and conservation practices.
3. This course will help the students to learn about Contour strip cropping designed tominimize soil erosion and Contour bunds which can save soils from erosion. By this course student get the knowledge about Grassed waterways designed to move surface water across farmland without causing soil erosion and various water harvesting techniques.

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4. Students will be able to understand the wind erosion, centrifugal pumps and various pressurized irrigation methods. So overall the importance of this technology in farm is given to students by teaching this course.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	2	2	3	3	-		-	2	-	-	2
CO2	2	1	2	3	3			-	1	-	-	2
CO3	3	1	2	3	3	-		-	1	-	-	2
CO4	3	1	2	3	2				1			2
Avg.	2.5	1.25	2	3	2.75				1			2

Recommended Text Books-

1. Principles of Agricultural Engineering Vol. II - Dr. A.M. Michael and Dr. T.P. Ojha
2. Irrigation – Theory and Practice - Dr. A.M. Michael
3. Surveying and Leveling - B.C. Punamia

Recommended Reference Books-

1. Introductory Soil and Water Conservation Engineering- BC Mal and Ashish Pandey
2. Soil erosion and its Control- Ayres QC, McGraw Hill
3. Land degradation- Barrow CJ, Cambridge University Press.

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Date: 11.06.2016

1st Year, SEMESTER-I

BSA-105 Plant Pathogens and Principles of Plant Pathology

L	T	P	CR
3	0	0	3

Course objective:

To introduce the concepts and principles of plant pathology to students.

Course content:

Unit 1:	**20%**
Unit 2:	**40%**
Unit 3:	**40%**

Unit-I: Introduction of Plant Pathology

Introduction, Importance of Plant Pathology in Agriculture. Nomenclature, Binomial System of nomenclature, Definition and objectives of Plant Pathology, History of Plant Pathology, Terms and Concepts in Plant Pathology.Survival of Plant Pathogens, Dispersal of Plant Pathogens.

Unit-II: Microorganisms and Prokaryotes

Definition, Different groups of microorganisms: Fungi, Bacteria Fastidious Vesicular bacteria phytoplasma,Spiroplasma, Viruses, Viriods, Algae, Protozoa, and Phanero-gamic Parasites with examples of diseases caused by them. Prokaryotes: Classification of Prokaryotes according to Bergey's Manual of Systematic Bacteriology. General Characters of fungi.Definition of fungus, somatic structures. Fungal tissues, modification of fungus thallus. Reproduction in fungi (Sexual and Asexual), Classification of fungi.Key to divisions and sub divisions.Phenomenon of infection – Pre penetration and post-penetration.

Unit-III: Plant disease and management

Pathogenesis - Role of enzymes, toxins, growth regulators and polysaccharide. Plant disease epidemiology, plant disease forecasting, remote sensing. General principles of Plant disease mgmt, importance and generalprinciples.Avoidance, exclusion, protection, Plant quarantine, and inspection Quarantine rules and regulations. Cultural Methods - Rougeing, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation hot weather ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage. Role and mechanisms of bio control and PGPR, Physical methods – Heat and Chemical methods, Methods of application of fungicides. Host Plant resistance – Application of biotechnology in Plant disease management, Development of disease resistant transgenic plants through gene cloning. Integrated plant disease management (IDM) - Concept, advantages and importance.

Course Learning Outcome:

1. Student will acquaint about concepts of plant pathogens, major disease causing organisms and their etiology. To provide specific knowledge about host pathogen interactions.
2. Recognition of plant disease is the first step in doing something about them. To give specific knowledge about environment and disease development.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	3	2	2	2	-		3	1	3
CO2	3	2	-	3	2	2	2	-	-	3	1	3
Avg.	3	2		3	2	2	2			3	1	3

Recommended Text Books-

1. Introduction to Principles of Plant Pathology - R.S. Singh
2. Fungicides in Plant Disease Control - Y.L. Nene and P.N. Thapaliyal

Recommended Reference Books-

1. Plant Pathology- G.N. Agrios
2. Plant Pathology- R.S. Mehrotra
3. A text book of modern Plant Pathology- Bilgramie and Dubey
4. Essentials of Plant Pathology- V.N Pathak
5. Introductory Plant Pathology- M.N. Kamath

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-I

BSA-106 Production Technology of Fruit Crops

L	T	P	CR
3	0	1	4

Course objectives:

To introduce the concepts of horticulture, and techniques used in production of fruit crops.

Course content:

Unit 1: 30%

Unit 2: 35%

Unit 3: 35%

Unit-I: Introduction of Horticulture

Definition and importance of Horticulture, Divisions of Horticulture, Climatic zones of Horticultural Crops in India and U.P.Area and production of important fruit crops in India and U.P.

Unit-II : Techniques used in Horticulture

Propagation methods and use of root stocks, Training and pruning methods.Use of growth regulators in fruit production, Establishment of orchard (selection of site, fencing, planning and layout, wind breaks, planting systems) high density planting.

Unit-III: Study about different Fruit Crops

Package of practices for cultivation of major fruit crops (Mango, Guava, Citrus, Banana, Grapes, Papaya, Sapota, Custard apple, Ber, Pomegranate, Jackfruit. Litchi, Apple, Pineapple, Falsa, Fig, Pear and Plum.

Course Learning Outcome:

1. Students will be able to identify plant vegetative structure. Students will understand basic principles, processes and plant propagation methods. Students will understand how to propagate plant, manage and harvest a variety of plant.

2. Students will learn how horticulture relates to the economy and environments, both currently and in the future.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	1	3	-	-	2	2	-	-	3	3
CO2	3	2	1	3	-		2	2	-	-	3	3
Avg	3	2	1	3			2	2			3	3

Recommended Text Books-

1. Fruits : Tropical and Substropical - Bose and Mitra
2. Plant propagation practices - Hortmann and Kester

Recommended Reference Books-

1. Fruit culture in India - Sham Singh

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2. Udhyan Vigyan - S.S. Shrivastava
3. Plant propagation - M.K. Sadhu
4. Fruit growing - J.S. Bal
5. Basic Horticulture - Jitendra Singh
6. Fruit growing in India - W.B. Hayes

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Date: 11.06.2016

BSA-153 Production Technology of Fruit Crops Lab

List of Experiments:

1. Study of horticultural tools and implements and their uses
2. Methods of pruning and training.
3. Layout and planting systems (traditional system and high density planting methods)
4. Description and identification of mango, guava, grape, papaya aonla and jackfruit.
5. Description and identification of banana, lemon, pomegranate, ber.
6. Irrigation methods in fruit crops including drip-micro irrigation methods of establishment of orchard

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-I
BSA-107 Introductory Agriculture
(Ancient Heritage, Agriculture Scenario and Gender Equity in Agriculture)

L	T	P	CR
2	0	0	2

Course objective:
To study ancient heritage, ancient Indian agriculture in civilized era and agriculture scenario of India. To introduce the development of agriculture education, research and extension in India.

Course content:

Unit 1:	**35%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**15%**

Unit-I: Indian Agriculture
Introductory Agriculture (Ancient Heritage, Agriculture Scenario and Gender Equity in Agriculture), Development of agriculture education, research and extension in India. Global issues related to agriculture (Food security, efficient use of natural resources, efficient use of knowledge of agricultural sciences, development of new plant types, multiple resistance crop varieties, commercialization of agriculture, sustainable agriculture and organic farming). Risk management in Indian agriculture (Production risks, marketing risks and financial risk Diversity of physiography, soil groups, marine, livestock, soil factors, weather factors, economic ecology, farming system approach, dry and irrigation agriculture.Value addition (Post harvest management and requirements of new technology.Crop Production as a basic component in Agriculture.Crop production as an art, science and business. Factors (environment and management) affecting crop production.

Unit-II: History of Agriculture Development
Ancient Indian Agriculture in civilized era (Agriculture in pre historic era) - Conservation of describable plants, collection and preservation of seeds, sowing of seeds, tilling of lands, shifting cultivation, weed control, fallowing of lands, the use of domestic wastes as plant nourishment and practice of green manuring and crop-rotation. History of Indian agriculture (Chronological agricultural technology development in India).Development of agriculture before independence. Development of agriculture after independence.

Unit-III: Modern Agriculture
Modern Indian Agriculture-Development of ideo plant types improved production technologies, intensive cropping systems, minimum/zero tillage, dryland agriculture, utilization of problematic and waste lands maintenance of soil-health and ecological balance and precision farming.

Unit-IV: Women In Agriculture
Manifested roles and task, work stress factors, nutritional and rural life standards, role of house hold in design making, drudgery reduction for farm women, women friendly agricultural technology,

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empowerment of women, group dynamics for farm women, rural women - the nucleus of agricultural extension and training.

Course Learning Outcomes:

1. Ancient Agricultural Practices & Its relevant to modern agriculture practices.
2. Traditional technical knowledge.Our Journey (Developments) in Agriculture and Vision for the Future.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	2	1										
Avg	2.5	1	-									

Recommended Text Book-

1. A History of Agriculture in India- M.S. Randhawa Vol. IV, ICAR New Delhi
2. The Role of women in Indian Agriculture in the globalize era.

Recommended Reference Book-

1. Principles of Agronomy- S.R. Reddy, Kalyani Publication, New Delhi.
2. Agricultural Economy - S. Sankaran, S. Chand and Company Publication.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-II
BSA-208 Introductory Nematology

L	T	P	CR
2	0	0	2

Course objective:
To introduce the principles and concepts of nematology to students.

Course content:

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

Unit-I: Nematodes
Introduction, Nematodes, habitat and diversity.History of Phytonematology, early and modern history, Land Mark historical events.Economic importance of plant parasitic nematodes and their general characteristics.Nematode general morphology and biology, shape, size, body organization and Symmetry.Outer body wall (Cuticle, Hypodermis, Musculature), Alimentary canal (Inner body tube) male and female reproductive systems, Nervous and excretory systems.

Unit-II: Biology of nematode
Biology of nematode life cycle, Embryo-genesis, hatching, moulting, feeding reproduction and biological races.Classification of nematodes up to family level with emphasis on groups containing economically important plant parasitic nematodes up to generic level with the help of keys and description.Above ground and below ground symptoms caused by nematodes.Interaction between plant parasitic nematodes and disease causing fungi bacteria and viruses.

Unit-III: Nematode Management
Different methods of nematodes management

a) Cultural methods - crop rotations, fallowing, flooding, propagation through healthy planting material, removal of infected plants, organic amendments, trap crops, time of sowing.
b) Physical methods: soil solarization and hot water treatment
c) Biological methods and chemical control.
d) Regulatory methods and integrated control.
e) Host resistant

Course Learning Outcome:
1. To be able to identify morphological characteristics, feeding habit and habitat of agriculturally important nematodes.
2. To be able to apply concepts and analytical approaches in evolutionary biology, genetics and other areas of nematode biology of the student's choice.
3. To be able to categorize nematodes based on basic ecological, behavioral, morphological, physiological, or developmental attributes.

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4. To be able to examine nematodes deeply within a biological level of analysis and make strategies for successful pest management strategy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	-	-	1	-	2	3-	2
CO2	3	2	1	2	3	-	-	2	-	2	1	2
CO3	2	2	1	2	2	-	-	2		1	1	1
CO4	2	2	1	2	1	-	-	2		1	1	1
Avg.	2.5	2	1.2	2	2.2	-		1.75		1.5	1.5	1.5

Recommended Text Books

1. Introductory Nematology - R.K. Walia and H.K. Bajaj
2. Plant Nematology - Pathak and B.S. Yadav
3. Plant Diseases - D.R. Dasgupta, Gopal Swaroop and P.K. Koshi

Recommended Reference Books

1. Plant Pathology- G.N. Agrios
2. Plant Nematology- Roland N Perry and Maurice Moens, CABI UK
3. Plant Parasitic Nematode in Temperate Agriculture- Ken Evans, David Truudgill, John Webster, CABI UK

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Date: 11.06.2016

1st Year, SEMESTER-II

BSA-209 Water Management including Micro irrigation

L	T	P	CR
3	0	0	3

Course objective:

To make student understand the concepts ofwater resources and irrigation development in India.To study the principles of irrigation.

Course content:

Unit 1: **50%**

Unit 2: **50%**

Unit- I: Irrigation

Definition and objectives.Water resources and irrigation development in India and U.P. Soil-Plant-Water relationships Methods of soil moisture estimation, evapo-transpiration and crop water requirement.Effective rainfall, scheduling of irrigation.Methods of irrigation (Surface, sprinkler and drip irrigation).

Unit-II: Water efficiency

Irrigation efficiency and water use efficiency, Conjunctive use of water, Irrigation water quality and its management, Water management of rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato. Agricultural drainage.

Course Learning Outcome:

1. After the course, students will be able to understand the various components of hydrologic cycle that affect the movement of water in the earth. Various stream flow measurements technique. The concepts of movement of ground water beneath the earth.
2. The basic requirements of irrigation and various irrigation techniques, requirements of the crops. Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design.
3. Basic components of river Training works. Apply math, science and technology in the field of water resource Engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	2	1	2	-	-	-	-	2	2	2
CO2	2	1	1	1	2	-	-	-	-	2	2	2
CO3	2	1	1	1	2	-	-	--	-	1	2	2
Avg	2	1	1.3	1	2	-		-	-	1.6	2	2

Recommended Text Books

1. Irrigation - Theory and Practices - Michael, A.M.
2. Water Management - Principles and - Singh, R.A. and Singh, S.R.C. Practices

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3. Principles of Agricultural Engineering - Michael, A.M. and Ojha, T.P. (1996), Vol. II, Jain Publication

Recommended Reference Books

1. Introduction to Agronomy, Soil and - Vaidya, V.G.andSahatrabudhe, Water Management
2. Irrigation and Drainage - Lank, D., Kalyani Publisher,
3. Manual on Irrigation Agronomy - Ahmed, M. and Mishra, R.D. (1987), Oxford and IBH Publication, New Delhi

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Date: 11.06.2016

1st Year, SEMESTER-II
BSA-210 Principles of Seed Technology

L	T	P	CR
1	0	1	2

Course objective:
To understand the principles of seed production and seed certification.

Course content:

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Unit-I: Seed Technology
Introduction of seed production: importance of seed production, seed policy, seed demand forecasting and planning for certified, foundation and breeder seed production. Deterioration of crop varieties, factors affecting deterioration and their control, maintenance of genetic purity during seed production.Seed quality, definition, characters of good quality seed.Different classes of seed, production of nucleus and breeder's seed, maintenance and multiplication of pre-release and newly released varieties in self and cross pollinated crops

Unit-II: Seed production
Seed production: foundation and certified seed production in Maize(varieties, hybrids, synthetics and composites), Rice (varieties and hybrids),Sorghum and bajra (varieties, hybrids, synthetics and composites), Cotton and sunflower (varieties and hybrids), Castor (varieties and hybrids), Tomato and brinjal (varieties and hybrids) Chillies and bhindi (varieties and hybrids),Onion, bottle gourd and ridge gourd (varieties and hybrids).

Unit-III: Seed Certification
Seed certification: phases of certification, procedure for seed certification, field inspection and field counts etc. Seed Act and Seed Act enforcement: Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories, Duties and powers of seed inspectors, Offences and penalties. Seed control order: Seed Control Order 1983, Seed Act 2000, other issues related to seed quality regulation, intellectual property rights, patenting, WTO, plant breeders rights Varietal identification- Grow-out test, electrophoresis.

Unit-IV: Drying of Seeds
Seed Drying: Forced air seed drying, principle, properties of air and their effect on seed drying, moisture equilibrium between seed and air, heat air drying, building requirements, types of air distribution system for seed drying, selection of crop dryers and systems of heated air drying, recommended temperature and depth of the seeds, management of seed drying, Seed processing plant: Planning and layout, establishment. Seed processing : Air screen machine and its working principle, different upgrading equipments and their use, establishing a seed testing laboratory, seed testing procedures for quality assessment

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Unit-V: Seed treatment

Seed treatment : importance of seed treatment, types of seed treatment, equipment used for seed treatment (slurry and mist-O-matic treater),Seed packing and seed storage : stages of seed storage, factors affecting seed longevity during storage, conditions required for good storage, general principle of seed storage, constructional features for good seed warehouse, measures for pest and disease control, temperature control. Seed marketing: Marketing structure, marketing organization, sales generation activities, promotional media, pricing policy, factors affecting seed marketing.

Course Learning Outcomes:-

1. Start a seed production program for fill full the requirement of quality seed in market and increase the income. Storage the pure variety seed to avoid the availability crises of pure variety seed due to adverse environmental conditions.
2. To supply the disease free seed in the market to get the environment friendly cultivation of crops. To increase the farm income by producing high yielding disease free quality seed and decrease the cost of cultivation also. Production of hybrid seed of different crops to increase the farm income.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	2	-	2	2	-	2		-	2	3	3
CO2	2	2	-	2	2		2		-	2	3	3
Avg.	2	2		2	2		2			2	3	3

Recommended Text Books

1. Seed Technology – Harpal Singh Tomar, Publisher of Agra
2. Seed Technology – R.L. Agrawal, Kalyani Publisher

Recommended Reference Books

1. Handbook of Seed Science and Technology- Amarjit S Basra
2. Principle of Seed Technology- Phundan Singh

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BSA-258 Principles of Seed Technology Lab

List of Experiments:

1. Seed sampling principles and procedures
2. Physical purity analysis of Field and Horticultural crops
3. Germination analysis of Field and Horticultural crops
4. Moisture tests of Field and Horticultural crops
5. Viability test of Field and Horticultural crops
6. Seed health test of Field and Horticultural crops
7. Vigour tests Field and Horticultural crops
8. Seed dormancy and breaking methods
9. Grow, out tests and electrophoresis for varietal identification
10. Visit to seed production plots of Maize, Sunflower, Bajra, Rice, Sorghum, Cotton, Chillie and vegetables (add or delete crops of the region)
11. Visit to Seed processing plants
12. Visit to Seed testing laboratories
13. Visit to grow out testing farms
14. Visit to Hybrid Seed Production farms
15. Varietal identification in seed production plots
16. Planting ratios, isolation distance, roughing etc.

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1st Year, SEMESTER-II
BSA-211 Dimensions of Agricultural Extension

L	T	P	CR
1	0	0	1

Course objective:
To make students understand the concept of extension education and give information about the development programme of pre and post independent era.

Course content:

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Unit- I: Extension Education
Meaning and Definition of Education, Formal, Informal and Non-formal education and their characteristic.Meaning, definitions, concept, objectives of Extension Education/Agricultural Extension, Principles of Extension Education.Meaning, definition and concept of Rural Development,Objectives of Rural Development.Importance of rural development, Problems in rural development.

Unit-II: Development programmes of pre and post-independence era
Pre-Shriniketan and Marthandam Project, Gurgaon Project and Gandhian Constructive ProgrammePost- Firka Development Programme, Etawah-Pilot Project and Nilokheri Experiment ProjectCommunity Development Programme- Meaning, definition, concepts, philosophy, principles and objectives.Differences between community development and extension education. National Extension Service – Meaning and objectives. Panchyati Raj System – Meaning of democratic decentralization of power, three tiers of Panchyati Raj System, Organizational setup. Powers, Functions of Panchayati Raj System.

Unit –III: Agriculture Development Programme
Agriculture Development Programme with reference to year of start, objectives and salient featuresIntensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP)Institution Village Linkage Programme (IVLP), Watershed Development Programme (WDP)National Agricultural Technology Project (NATP), Agricultural Technology and Management Agency (ATMA), Agricultural Technology Information Centre (ATIC).

Unit-IV: Social Justice and Poverty Alleviation Programmes
Integrated Tribal Development Agency (ITDA), Integrated Rural Development Programme (IRDP)Swarna Jayanti Gram SwarojgarYojana (SGSY), Prime Minster Employment Yojana (PMEY), New trends in extension, privatization.

Unit-V: Women Development Programmes
Development of Women and Children in Rural Areas (DWCRA), Rashtriya Mahila Kosh (RMK)Integrated Child Development Scheme (ICDS), Mahila Samridhi Yojana (MSY), Reorganized Extension System (T&V system) – salient features. Fortnight meetings, Monthly workshops, linkages, merits and demerits. Emergence of Broad Based Extension (BBE).

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Course Learning Outcomes:

1. At the end of the course, a student will be able to understand education; extension programme planning meaning, process, principles and steps in programme development.
2. Extension systems in India: extension efforts in pre-independence era. New trends in agriculture extension: privatization extension.
3. Monitoring and evaluation – concept and definition, monitoring, and evaluation of extension programmes, transfer of technology- concept and models.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	1	-	-	-	2	-	3
CO2	3	2	3	2	2	1	-	-	-	2	-	3
CO3	3	2	3	3	2	1	-	-	-	2	-	3
Avg	3	2	3	2.3	2	1				2		3

Recommended Text Books-

1. Extension Education in Community – Directorate of Extension, Development Ministry of Agriculture, Govt. of India
2. Education and Communication for – Dhama, O.P. and Bhatnagar, Development O.P., Oxford and IBH Publicity Co. New Delhi
3. An Introductory of Agricultural Extension – Mosher, A.T.
4. Extension Communication and Management - Ray G.L., Naya Prakashan 206 Bidhan Sarani,
5. Calcutta-6

Recommended Text Books-

1. Rural Development – Principles, Policies and Management – Singh, Katar, Sage Publications, New Delhi
2. Dimensions of Agriculture Extension – Singh, A.K. and K. Roy Burman, Aman Publication, Meerut
3. Text Book of Extension Education – Singh, Ranjeet, Oxford & IBH
4. Extension Education – Reddy, A.V.V., Laxmi Press, Baptala (AP)
5. An Introductory to Extension Education – Supe, S.V., Oxford& IBC Published Co. New Delhi

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Date: 11.06.2016

1st Year, SEMESTER-II
BSA-212 Protected Cultivation and Post-Harvest Technology

L	T	P	CR
2	0	1	3

Course objective:
To understand the greenhouse cultivation and post-harvest implements.

Course content:

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**
Unit 5:	**20%**

Unit-I: Green House
History of green house.Types of green house.Planning of green house.Design of green house. Cooling and warming of green house. Principles of operation of the equipments used in green house. Low cost material of construction for green house. Construction of traditional green house.

Unit-II: Temperature maintenance in Green house
Solar heat transfer in green house.Generation of hot air currents and convective heat transfer.Irrigation system and equipment in green house. Cost estimation and economic analysis of cultivation in green house. Construction of green house.

Unit-III: Soil conditions in Green house
Soil type required flooding and leaching. Soil pasteurization, peat mass, mixtures, rock film nutrient film technique.Selection of crops for cultivation in green house.

Unit-IV: Post harvest Implements
Threshers: type of threshers. Multi crop threshers and their construction features. Thresher fault and their remedies.Maintenance of threshers.Winnowers, their working.Effect of speed on cleaning (winnowing) efficiency. Groundnut decorticator – working and construction features. Hand operated groundnut decorticator. Power operated groundnut decorticator. Different parts of "Power operated groundnut decorticator". Sheller's and their working principle. Rubber rolls Sheller's. Maize Sheller, their working and construction features.
Maintenance of shellers.

Unit-V: Drying of Grains and storage
Drying thin layer and deep bed.E.M.C. Moisture content (db) and Moisture content (wb) concept.Drying front.Different type dryers.Mixing type dryers.on mixing type dryers. LSU dryer.RPEC dryer.Storage Phenomenon.Changes in grain during storage.Effect of moisture and R.H. on stored grain.Bag and Bulk storage.Modification in traditional storage.deep and shallow bin. Bin design.

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Cleaning and grading. Cleaners and graders. Fruit grader – Principle. Effect of slope of grading bed on efficiency of grader

Course Learning Outcome:

1. To get knowledge about greenhouse technology, types of green houses and construction of green houses.
2. Course will give the knowledge of Greenhouse equipment, materials of construction for traditional and low cost green houses.
3. This course will help the students to learn about Irrigation systems used in greenhouses, shade net house in protected cultivation. By this course student get the concepts of cleaning and grading moisture measurement.
4. Students will be able to understand the Material handling equipment, principle and working.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
CO3	3	2	2	2	2	-	2	-			3	3
CO4	2	2	-	3		-	2	-			3	3
Avg	5.5	2	2.3	2.5	2	2	2			2	3	3

Recommended Text Books

1. Green house management for Horticultural Crops – S. Prasad/U. Kumar, Agrobio (India)
2. Unit operations of Agricultural Processing – K.M. Sahay and K.K. Singh, Vikas Publishing House, Pvt. Ltd.
3. Post-Harvest Technology of Cereals, Pulses and Oilseeds – Dr. A. Chakraverty, Oxford & IBH Publishing Co. Pvt. Ltd.

Recommended Reference Books

1. Post-Harvest Technology of Horticultural Crops- K.P. Sudheer, V Indira, New India Publishing, 2007
2. Food Processing Handbook- James G. Brennan, John Wiley & Sons
3. Food Preservation and Biodeterioration- Gary S. Tucker, John Wiley & Sons

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BSA-254 Protected Cultivation and Post-Harvest Technology Lab

List of Experiments:

1. Study/visit to functional and commercial green house.
2. Planning of green house under given requirement.
3. Study of the equipments used in green house.
4. Measurements of heat and moisture transfer in green house.
5. Preparation of estimates for construction of green house.
6. Study of the construction and their renewal
7. Identification of soil and preparation of nutrient film.
8. Study of maize Sheller.
9. Study of thresher.
20. Study of winnowers and cleaners.
11. Study of groundnut decorticator.
12. Study of Rice Sheller's.
13. Study of dryers.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-II

BSA-213 Introduction to Computer Application

L	T	P	CR
1	0	1	2

Course objective:

To introduce the computer application and operating system to students.

Course content:

Unit 1:	**30%**
Unit 2:	**50%**
Unit 3:	**20%**

Unit-I: Computer Applications

Introduction to Computers, Input and output Devices, Units of Memory Hardware, Software and Classification of computers.Types of processors. Booting of Computers, warm and cold booting, computer viruses, worms and vaccines

Unit-II: Operating Systems

DOS and DOS commands.Operating system WINDOWS and its elements. MS-WORD, features of word processing. Creating, Editing document in word. MS-EXCEL-Electronic spreadsheet, concept, packages Creating, editing and saving a spread sheet. Editing cell contents.Commands for work sheet.Use of in-built Statistical and other functions and writing expressions. Use of Data Analysis tools, correlation and Regression Entering expressions, creating graphs. T-test for two samples and ANOVA with one way classification Introduction to MS Power Point, features of power point package. Creating new presentation, power point views.Introduction to MS Access, concept of data base, creating data base. Creating tables in data base

Unit-III: Flow Charts and Internet

Principles of programming, flow charts, Algorithms, illustration through examples.Introduction to Internet World Wide Web, information retrieval.Introduction to electronic mail.Advantages of E-mail.

Course Learning Outcomes:

1. Understand analogy of computer. Basic knowledge of MS Office. Some basic knowledge of Internet and WWW.
2. Use of IT application and different IT tools in Agriculture. Use of Decision support systems, Agriculture Expert System and Soil Information Systems in Agriculture

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
Avg	3	2	2.5	2.5	2	2	2			2	3	3

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Recommended Text Books

1. Microsoft DOS - Peter Norton's Techmedia
2. Microsoft Office - Complete reference – BPB publication

Recommended Text Books

1. Computer Application in Business - R Parameswaran
2. Biostatistics, Computer Application and Bioinformatics- R. Sundaralingam, N. Arumugam, V. Kumaresan, A. Gopi, A. Meena,
3. Principles of Programming Languages - Gilles Dowek

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Date: 11.06.2016

BSA-255 Introduction to Computer Applications Lab

List of Experiments:

1. Study of computer components
2. Practice of DOS commands
3. Practicing windows operating system
4. Creating folders, copy and paste
5. Creating a document, saving and editing
6. Formatting document
7. Creating a table, merging of cells
8. Creating spread sheet and formatting
9. Entering expressions through formula tool bar and use of in-built functions, SUM, AVERAGE,
STDEV etc.
20. Creating Graphs in MS Excel
11. Preparing power point slides
12. Creating Data database
13. Creating tables in data base
14. Transforming the data of WORD, EXCEL and ACCESS to other formats
15. Internet browsing
16. Creating E-mail

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER-II

BSA-214 Soil Chemistry, Soil Fertility and Nutrient Management

L	T	P	CR
3	0	0	3

Course objective:

To enable the students to understand the soil nutrients, functions of micronutrients and soil testing.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**10%**

Unit-I: Soil Nutrients

Soil as a source of plant nutrients. Essential and beneficial elements, criteria of essentiality. Forms of nutrients in soil, mechanisms of nutrient transport to plants Functions of N and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of N to plants and Nitrogen use efficiency (NUE). Functions of P and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of P to plants and Phosphorus use efficiency (PUE) .Functions of K and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of K to plants and Potash use efficiency (PUE).

Unit-II: Micro Nutrients

Functions of S and measures to overcome deficiencies and toxicities. Factors affecting nutrient availability of S to plants and sulphur use efficiency (SUE). Functions of Ca and Mg and measures to overcome deficiencies and toxicities.Factors affecting nutrient availability of other Ca and Mg to plants.Functions of Fe and measures to overcome deficiencies and toxicities.Factors affecting nutrient availability of Fe to plants and Iron use efficiency (IUE) Functions of Zn and measures to overcome deficiencies and toxicities factors affecting nutrient availability of Zn to plants and Zinc use efficiency (ZUE).

Unit-III: Functions of Micronutrients

Functions of micronutrients and measures to overcome deficiencies and toxicities.Factors affecting nutrient availability of other micronutrients to plants. Problem soils – acid, salt affected and calcareous soils, characteristics, nutrient availabilities. Reclamation – mechanical, chemical and biological methods. Fertilizer and insecticides and their effect on soil water and air.

Unit-IV: Irrigation Water and soil testing

Irrigation water - Quality of irrigation water and its appraisal.Indian standards for water quality.Use of saline water for agriculture. Soil fertility – Different approaches for soil fertility evaluation methods, soil testing -chemical method. Critical levels of different nutrients in soil. Plant analysis - DRIS methods, critical levels in plants.Rapid tissue tests.Indicator plants.Biological method of soil fertility

evaluation. Soil test based fertilizer recommendations to crops. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Course Learning Outcome:

1. Knowledge of different manure and fertilizers used in different crops according to soil condition.
2. To understand essentiality of plant nutrients and mechanism of nutrient transport to plant and factor affecting nutrient availability.
3. To be able about procedure of soil testing and establish soil testing laboratory in future as an entrepreneur.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	2	-	-	2	-	2
CO2	3	2	2	2	3	2	2	-	-	2	-	2
CO3	3	2	2	2	3	-	2	-		2	-	3
Avg	3	2	2.3	2.3	3	2	2			2		2.3

Recommended Text Books-

1. Soil Fertility and Fertilizer - Samuel Tisdale & Werner nelson
2. Introductory Soil Science - D.K. Das
3. Manures and Fertilizers - K.S. Yawalkar, J.P. Agrawal and S. Bokde

Recommended Reference Books-

1. Principles of soil chemistry - Kim H Tan
2. Soil Chemistry- Daniel G. Strawn, George A. O'Connor and Hinrich L Bohn
3. Environmental Soil Chemistry- Donald Sparks

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Date: 11.06.2016

1st Year, SEMESTER-II
BSA-215 Principles of Plant Breeding

L	T	P	CR
2	0	1	3

Course objective:
To understand the principles of plant breeding and methods of breeding of crop plants.

Course content:

Unit 1:	**40%**
Unit 2:	**30%**
Unit 3:	**30%**

Unit-I: Plant Breeding
Classification of plants, botanical description, floral biology, emasculation and pollination techniques in cereals, millets, pulses, oil seeds, fibres, plantation crops etc.Aims and objectives of plant breeding Modes of reproduction, sexual, asexual, apomixis and their classification; significance in plant breeding.Modes of pollination, genetic consequences, differences between self and cross pollinated crops.

Unit-II: Methods of Breeding
Methods of breeding-introduction and acclimatization, selection, mass selection Johansson's pure line theory, genetic basis of pure line selection. Hybridization, aims and objectives, types of hybridization. Methods of handling of segregating generations, pedigree method, bulk method, back cross method and various modified methods. Incompatibility and male sterility and their utilization in crop improvement.

Unit-III: Heterosis and Improvement of varieties
Heterosis, inbreeding depression, various theories of heterosis, exploitation of hybrid vigour development of inbred lines, single cross and double cross hybrids. Population improvement programmes, recurrent selection, synthetics and composites. Methods of breeding for vegetatively propagated crops. Clonal selection.Mutation breeding.Ploidy breeding.Wide hybridization, significance in crop improvement.

Course Learning Outcome:

1. Establish the commercial plant breeding company to developed new superior crops varieties.
2. Develop the insect and disease resistant varieties for environment friendly management of disease and insect.
3. Serve the quality food in the market by developing high nutritive varieties.
4. Increase the farm yield to get higher income on farm by developing higher yield crop varieties.
5. Start a consultant company to guide & supply the better varieties to the farmers.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2		2	3	-	2	-	3
CO2	3	2	2	2	2		2	2	-	3	-	3
CO3	3	2	2	2	2	-	2	2		3	-	3
CO4	2	2	-	3		2	2	2	-	-	-	3
CO5	-	-	-	-	-	-	-	2	-	3	-	3
Avg	2.75	2	2.3	2.5	2	2	2	2.2		2.45		3

Recommended Text Books

1. Plant Breeding - B.D. Singh
2. Principles and Practices of Plant Breeding - J.R. Sharma
3. Breeding field crops - J.M. Poehlman and D.A. Sleper
4. Principles of Plant Breeding - R.C. Choudhary

Recommended Reference Books

1. Principles of Plant Breeding- Robert W. Allard
2. Principles of Plant Breeding - P D MeenaZ A Dar
3. Introductory Principles of Plant Breeding - R.C. Choudhary

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Date: 11.06.2016

BSA-256 Principles of Plant Breeding Lab

List of Experiments:

1. Botanical description and floral biology
2. Study of megasporogenesis and microsporogenesis
3. Fertilization and life cycle of an angiospermic plant
4. Plant Breeder's kit
5. Hybridization techniques and precautions to be taken
6. Floral morphology, selfing, emasculation and crossing techniques
7. Study of male sterility and incomparability in field crops: Rice and Sorghum, Maize & Wheat Bajra and Ragi, Sugarcane & coconut, Groundnut, Castor, Safflower and Sesamum, Red Gram Bengal gram and Green gram, Soybean and Black gram.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

1st Year, SEMESTER- II

BSA- 216 Comprehension and Communication Skills in English

L	T	P	CR
1	0	1	2

Course objective:

To enhance the communication skills of students.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**40%**

Unit-I: English Learning

Comprehension.Vocabulary-Synonyms-Antonyms, Idioms.Words Often Confused Homonyms and Homophones

Unit-II: Functional Grammar

Functional Grammar - Subject and Predicate, Tense, Usages of Tenses.Voice and their usages.Narration and their usages.Verb and its agreement with subject.Phrases and clauses.

Unit-III: Written Skills

Written Skills-Letter-Writing, types of letter-Business and Personal correspondence.Preparation of curriculum vitae.Job Applications.Professional Writing.Precise writing.Synopsis Writing. Interviews

Course Learning Outcome (COs):

1. At the end of the course students will be able to understand: Students will identify and explain their goals to the semester and also identify the needs of communication helps us meet .They will able to understand the common misconceptions about communication and the reasons, people use language.
2. Students can differentiate the action, interaction and transaction models of communication. They can define the process of both perception and listening .Students can recall the importance of listening effectively and can identify strategies for communicating the cultural awareness.
3. Students will able to introduce themselves to the class and begin getting to know one another and will apply communication strategies by preparing and participating in class discussion. Students will prepare and present messages with the intent of persuading an audience.
4. Students will able to analyze basic communication skills, intercultural communication skills, interpersonal communication skills and public- speaking skills. Students can demonstrate critical and innovative thinking. Display competence in oral, written and visual communication. They can able to use current technology related to the communication field.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-											3
CO2	-											3
CO3	-											3
CO4	-											3
												3

Recommended Text Books-

1. English Language and Indian Culture – Tribhuwan Nath Shukla
2. English Conversation Practice – Grant Taylor
3. A Course in Phonetics and Spoken English – J. Sethi and P.V. Dhamija
4. Objective English – Hari Mohan Prasad
5. High School English Grammar – Wren and Martinin

Recommended Reference Books-

1. Communication Skills, Second Edition - Kumar Sanjay
2. Communication Skills: A Workbook – Sanjay Kumar, PushpLata
3. Revised Communicate In English Reader – Rama Sagar

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Date: 11.06.2016

BSA- 257 Comprehension and Communication Skills in English Lab

List of Experiments:

1. Listening Comprehension
   - Short Talks
   - Lectures
   - Speeches
2. Communication
   - Spoken English
   - Oral Communication
   - Stress and Intonation
3. Presentation of Reports
   - Seminars and conferences
   - Physical Appearance
   - Body Language Posture
   - Features of Oral Presentation
   - Individual Presentation
4. Conversation
   - Face to face conversation
   - Reading Skills
   - Use of Dictionary
   - Telephonic Conversation

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER- III
BSA-317 Field Crops I (Kharif)

L	T	P	CR
1	0	1	2

Course objective:
To enable students to grow different Kharif season crops.

Course content:

Unit 1:	**40%**
Unit 2:	**30%**
Unit 3:	**30%**

Unit-I: Cereal and Pulses Crops
Different Kharif crops mentioned below will be taught under the following heads:
1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting. 10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures

Cereals – rice, maize, sorghum, pearl millets and minor millets (*kodo, kutki, ragi, sawan, cheena and kangni*)
Pulses – pigeon pea, mung bean and urd bean

Unit-II: Oilseed, Fodder and Forage Crops
Different Kharif crops mentioned below will be taught under the following heads:
1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state

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4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures.

Oilseeds – groundnut,Sesamum and soybean
Fiber crops – cotton

Unit-III: Fodder and Forage Crops

Different Kharif crops mentioned below will be taught under the following heads:
1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry,
seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect pest and moisture
12. Suitable crop rotation and crop mixtures.Forage crops – sorghum, maize, cowpea, and cluster bean and Napier grass.

Course Learning Outcome

1. In the course study the students will be able to know about origin, geographical distribution, and economic importance of Kharif crops.

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2. In the course study the students will be able to know about Soil and climatic requirements, varieties, cultural practices and yield of Kharif crops.
3. Analysis of comparative benefits of the different kharif crops. Constraints in production of oilseeds and pulses maybe identified through course content.
4. Production technology of kharif cereals and millets fulfill the need of human consumption and milch cattle.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	3	2	3	3	2	-	3
CO2	3	2	2	2	2	3	2	3	3	2	-	3
CO3	3	2	2	3	2	2	2	3	2	3	-	3
CO4	3	2	1	1	2	3	2	2	2	3	-	3
Avg	3	2	1.75	1.75	2	2.75	2	2.75	2.5	2.5	-	3

Recommended Text Books-

1. Scientific crop production (1&2) – C. Thakur
2. Hand Book of Agriculture (IV edition 2006) – ICAR Publication
3. Field Crops – Y.M. Iyyer
4. High Yielding Varieties of Crops – Mahabal Ram
5. Principal of Cereal Crop Production - Mahendra Pal, Deka and R.K. Rai
6. Cereal Crop – W.H. Leonard and J.H. Martin

Recommended Reference Books-

1. Crop Production – B.M. Paugh
2. Text Book of Field Crops – Rajendra Prasad, ICAR Publication
3. KrishiVishwa (Hindi) – JNKVV, Jabalpur

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BSA-359 Field Crops I (Kharif) Lab

List of Experiments:

1. Identification of different Kharif crops and their associated weeds
2. Nursery bed preparation for rice and transplanting/seed bed preparation and sowing of Kharif crops
3. Calculation of seed rate, plant population, fertilizer requirement and herbicide requirement for the crop
4. Sowing of soybean, pigeon pea, mung bean, maize, ground nut and cotton
5. Study the effect of sowing depth and seed size on germination of soybean
6. Top dressing of nitrogen in rice and maize
7. Study of yield attributing characters, yield calculations and yield estimation of rice, maize, ground nut, cotton and jute
8. Study of crop varieties and visit of important agronomic experiments and forage experiments.

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2nd Year, SEMESTER-III

BSA-318 Insect Morphology and Systematic

L	T	P	CR
2	0	1	3

Course objective:

To introduce the concepts of entomology, insect morphology and taxonomy.

Course content:

Unit 1:	**30%**
Unit 2:	**40%**
Unit 3:	**30%**

Unit-I: Entomology and Classification of insects

History of Entomology in India and factors of insect abundance.Classification of Phylum Arthropoda up to classes.Characters of Phylum Arthropoda and their classes.Relationship of class Insecta with other classes.

Unit-II: Morphology of Insects

Structure of insect body segmentation, Head, thorax and abdomen Structure and functions of insect cuticle and its moulting.Structure and modifications of antennae of insects Structure and modification of mouth parts of insects.Structure and modifications of legs of insects.Wing venation, modifications and wing coupling apparatus of insects.Structure of male and female external genetalia of insects.Types of sensory organs and their functions in insects.Structure and functions of digestive system in insects.Structure and functions of circulatory system in insects.Structure and functions of excretory system in insects.Structure and functions of Respiratory system in insects.Structure and functions of Nervous system in insects.Structure and functions of reproductive system (male and female) of insects.Types of reproductions in insects.Types of endocrine glands in insects.Metamorphosis and their types and diapauses in insects.Types of larvae and pupae.

Unit-III: Taxonomy

Taxonomy-importance, history, development and binomial nomenclature.Definition of bio-types, genus, species, sub species, family and orders. Classification of class insectaupto orders. Order-orthroptera – Acrididae, Dictypotera-Manidae, Odonata-Petaluridae, Isoptera-Termitidae, Neuroptera-Chrysopidae, Thysanoptera-Thripidae, Hemiptera-PentatomidaeCorideae, pyrrhocoridae, Lygacidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae. Lepidoptera-Noctuidae, Sphingidae, Pyralidae, Gelechiidae and Arctidae, Coleoptera-Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae and Scharabaidae. Order Hymenoptera – Tenthridinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae. Diptera-Cecidomyiidae, Trypetidae, Techinidae, Agromyziidae.

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Course Learning Outcome:

1. To be able to categorize insects based on basic ecological, behavioral, morphological, physiological, or developmental attributes.
2. To be able to examine insects deeply within a biological level of analysis and make strategies for successful pest management strategy.
3. To be able to understand about different families and orders of class Insecta which cause economic losses for human beings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
CO3	3	2	2	2	2	-	2	-			3	3
Avg.	3	2	2.3	2.3	2	2	2			2	3	3

Recommended Text Books

1. Imms general text book of Entomology - Richards, O.W. and Davies, E.C.
2. Text Book of Entomology - Pruthi, H.S.
3. Agricultural Entomology for Indian - Khanna, S.S.Students
4. General and Applied Entomology - Nayar, K.K., Ananthakrishnan, T.N. and David, B.V.
5. The Insect Structure and function - Chapman, R.F.

Recommended Reference Books-

1. The science of Entomology - Romoser, W.S. (1981),II& III edition Macmillan Publishing Company, New York
2. An introduction to Entomology (1997) - Shrivastava, P.D. and Singh, R.P., Concept Publishing Company, New Delhi 1

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BSA-360 Insect Morphology and Systematic Lab

List of Experiments:

1. Distinguishing characteristics of insects, External features of cockroach, sutures, sclerites of head
capsule and types of head
2. Structure of antennae and its modifications
3. Biting and chewing type of mouthparts of cockroach
4. Sucking type of mouth parts of Mosquito and bug
5. Structure of typical wing and its modifications
6. Structure of typical leg and its modifications
7. Dissection of cockroach to study internal organs – Salivary glands, Alimentary canal and Nervous
System (central)
8. Study of main types of larvae and pupae
9. Distinguishing characters, collection and preservation of the following orders– Isoptera, Orthoptera, Thysanoptera, Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera.

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER-III
BSA-319 Principles of Agriculture Economics

L	T	P	CR
2	0	0	2

Course objectives:
To enable students to understand the meaning, definition, subject matter, division of economics, importance of economics, basic concept of agricultural economics.

Course content:

Unit 1:	**30%**
Unit 2:	**40%**
Unit 3:	**30%**

Unit-I: Economics Introduction
Meaning, Definition, Subject Matter, Division of Economics, Importance of Economics, Basic concept-Goods, Service,Utility, Value, Price, Wealth, Welfare. Wants: Classification and Characteristics.Theory of Consumption.Law of diminishing marginal utility-meaning, definition, assumption, limitation and importance.Consumer surplus-Meaning, definition, importance.

Unit-II: Demand
Demand –meaning, definition, kinds of demand, demand schedule. Demand Curve, Law of demand. Extension and Contraction v/s increase and decrease in demand. Elasticity of demand, type of elasticity of demand.Degrees of price elasticity of demand, methods of measuring elasticity.Factors influencing elasticity of demand, Importance of elasticity of demand.

Unit-III: Welfare Economics
Welfare Economics-Meaning, Pareto's optimality.National income-concept, measurement.Public finance- Meaning, Principles. Public resource – Meaning. Service tax – Meaning. Classification of Taxes – Cannons of Taxation Public expenditure – Meaning, principles. Inflation – Meaning, definition, kinds of inflation.

Course Learning Outcome:
1. Identify elements of business success in agriculture and food-processing as well as elements that determine economic role of agriculture in national economy.
2. Propose methods of micro- and macroeconomic decision making in agriculture in different agro-ecological and agro-economic circumstances. Describe and explain models of production, supply and demand of agricultural and food products on national and international markets.
3. Understand the concepts of consumer choice and how it affects the farm / ranch level agriculture firm. Understand the macroeconomics aspects of the economy as they affect the agricultural sector.
4. Apply economics principles to understand the conduct and performance of the agricultural industry.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	2	3	3	2	3	2	-	-	2	-	3
CO2	2	2	2	2	2	3	2	-	-	2	-	3
CO3	2	2	2	2	2	3	2	-		2	-	3
CO4	2	2	-	3		3	2	-		2	-	3
CO5	2	2	-	3	-	3	3	-	-	2	-	3
Avg.	2	2	2.3	2.6	2	2	2.2			2		3

Recommended Text Book-

1. Elements of Economic Theory - K.K. Dewett and J.P. Verma
2. Indian Economy - S.K. Mishra and V.K. Puri, Himalayan Publication Pvt. Ltd.
3. Indian Economy - S.K. Mishra and V.K. Puri, Himalayan Publication Pvt. Ltd., New Delhi

Recommended Reference Book-

1. Fundamentals of Agricultural Economics - K.N. Sandhu &Amarjeet Singh, Himalayan Publication Pvt.Ltd, New Delhi
2. Agricultural Economics - S. Subsa Reddy and P.Raghuram, Oxford and IBH Publication Co. Pvt. Ltd., New Delhi
3. An Introduction to Agricultural Economics - Bilgram

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Date: 11.06.2016

2nd Year, SEMESTER-III
BSA-320 Farm Power and Machinery

L	T	P	CR
1	0	1	2

Course objectives:
To introduce the principles of Farm Machinery working, engines and tractors.

Course content:

Unit 1:	**25%**
Unit 2:	**25%**
Unit 3:	**25%**
Unit 4:	**25%**

Unit-I: Farm Machinery working
Sources of Farm Power in India.Engine brief, classification of I.C, Engines, Difference between 2 stroke and 4 stroke cycle engines, Difference between diesel and petrol engines.I.C Engine components and system's components of an IC.Engine.Working of two stroke petrol engines.Working of four stroke cycle petrol engines and diesel engines.I.C. Engine terminologies.

Unit-II: Engines
Numerical on engine terminologies.Fuel supply system of petrol engine.Fuel supply system of diesel engine.Cooling systems of diesel engine.Lubrication system of diesel engine.Air intake and exhaust system, Valve operating system.

Unit-III: Tractors
Tractors Definition, Classification and systems.Selection of a tractor. Operating cost of a tractor. Tillage, objectives of tillage. Tillage implements - Primary and secondary tillage tools and implements (Bullock Drawn and Tractor Drawn)

Unit-IV: Farm Implements
Description of Indigenous plough, MB plough, Types of shares and M.B. Description of Disc Plough and other ploughs. Description of harrows (BD & TD).Description of Disc harrow. Description of intercultural operations implements (cultivators). Descriptions of Hand Hoes. Description of Seed and Seed cum fertilizer drills. Calibration of seed drill. Description of paddy transplanter. Description of sprayers.Description of dusters. Description of harvesting equipments-Mowers. Description of harvesting equipments – Combines. Bullock drawn implements for land development.

Course Learning Outcomes:
1. At the end of the course, a student will be able to understand: Various sources of farm power and their uses.
2. About working of IC Engines and their uses in modern equipment. About various parts of tractors and their mechanism. The financial aspects of using farm power.
3. The various implements used in agriculture farm for various purposes

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
CO3	3	2	2	2	2	-	2	-			3	3
Avg	3	2	2.3	2.3	2	2	2			2	3	3

Recommended Text Books-

1. Elements of Agricultural Engineering - Dr. Jagdishwar Sahay
2. Principle of Agricultural Engineering Vol. I - T.P. Ojha, A.M. Michael
3. Elements of Agricultural Engineering - Dr. O.P. Singhal

Recommended Reference Books-

1. Tractors and Their Power Units - Liljedahl J B, Paul K Turnquist
2. Farm Power & Machinery Agricultural Engineering -Muzamil M., JillaniAsima, Kalyani Publishers,

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-361 Farm Power and Machinery Lab

List of Experiments:

1. Study of different components of an I.C. engine.
2. Study of working of 2 stroke petrol engine.
3. Study of working of 4 stroke diesel engine.
4. Study of working of 4 stroke petrol engine.
5. Study of working of a farm tractor.
6. Study of working of power tiller.
7. Learning of Tractor driving – Forward.
8. Learning of Tractor driving – Reverse.
9. Hitching of implements to a tractor.
10. Study of M.B. plough and its adjustments.
11. Study of Disc plough and its adjustments.
12. Study of Disc harrows and its adjustments.
13. Study of seed cum fertilizers and calibration of seed drill
14. Study of mowers and its adjustments.
15. Study of sprayers and Dusters and its adjustment.
16. Study of paddy transplanter.

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Date: 11.06.2016

2nd Year, SEMESTER- III
BSA-321 Agriculture Microbiology

L	T	P	CR
1	0	1	2

Course objectives:
To study about the microorganisms, soil microorganisms and beneficial microorganisms in agriculture.

Course Learning Outcome:

Unit 1:	**10%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**25%**
Unit 5:	**25%**

Unit-I: History of Microbiology
Spontaneous generation theory and germ theory.Protection against infection.Applied areas of microbiologyand fermentation.

Unit-II: Applied areas of microbial metabolism
Microbial ATP generation through different metabolical pathways - glycolysis.Embden-Meyerhop pathway,pentose cycle, Entner-Doudoroff pathway, and phosphodeloase pathway.Microbial fermentation - some majorpathways of fermentation viz., ethanol and lactic acid fermentation. Microbial respiration - aerobiosisand anaerobiosis.

Unit-III: Bacteriophages
Structure and properties of bacterial viruses (bacteriophages), existence of bacteriophages-lytic and lysogenicphages/cycles.Some specific forms of viruses - viriods and prions.Bacterial genetics – a.)Genetic expression 1.Genetic control of metabolism 2.Protein synthesis b.)Genetic recombination (recombination in bacteria) 1.Transformation, transduction and conjugation c.) Genetic engineering 1. Basic principles and techniques in genetic engineering 2. Genetic transposable elements in bacteria – plasmids, episomes, IS and Tn elements 3. Genetic manipulation and genetically modified organism

Unit-IV: Soil microbiology
Microbial groups in soil-bacteria, actinomycetes, fungi, algae, and protozoa - their characteristic morphology, significance and environmental influences. Microbial transformations of nutrients in soil - cycles of carbon, nitrogen, phosphorus and sulfur. Biological nitrogen fixation - symbiotic and non-symbiotic, microorganisms involved and their biochemistry. Microbiology of water (drinking water).Microbiology of food-Microbes important in foods.Principles of food preservation - heat treatment, low temperature preservation, drying, preservation by additives.Microbial spoilage of foods-thermophilic and mesophilic organisms.

Unit-V: Beneficial microorganisms in Agriculture

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Biofertilizers - classification, physiological relationships, principles of isolation, purification and maintenance of strains. Production, application, precautions in handling and benefits from their uses.Biopesticide-classification, Basic modes of action.Production (small and large scale), application, and precautions in handling.Microbiology of waste disposal and recycling - Sewage disposal, Solid waste recycling (composting), Biogas production, Biodegradation of decomposable plastic.

Course Learning Outcome

1. Student will understand the basic microbial structure, function and study the comparative characteristics of prokaryotes and eukaryotes.
2. To know the various Physical and Chemical growth requirements of bacteria. Impart knowledge about production of beneficial bacteria.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
Avg	3	2	2.5	2.5	2	2	2			2	3	3

Recommended Text Books-

1. Agricultural Microbiology - Rangaswami and Bhagyaraj
2. Soil Microbiology - N.S. Subbarao
3. Agricultural Microbiology - N. Mukherjee and T. Ghosh
4. Biofertilizers - L.L. Somani, S.C. Bhandari, S.N. Saxena
5. Introduction to Soil Microbiology - M. Alexender
6. An Introduction to Microbiology - P. Tauro, K.K. Kapoor and K.S. Yadav

Recommended Reference Books-

1. Dhaliwal, GS &Koul O. 2007. Biopesticides and pest management.Kalyani Publ., New Delhi
2. Sylvia D.N. 2005; Principles and application of Soil Microbiology.Peason Publisher.

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Date: 11.06.2016

BSA-362 Agriculture Microbiology Lab

List of Experiments:

1. General instructions: Familiarization with laboratory microbiological instruments materials, glassware
etc.
2. Practice of aseptic methods: Evaluation of aseptic technique with nutrient agar plate.
3. Evaluation of aseptic technique with nutrient broth tubes.
4. Methods of sterilization and preparation of media:
a.) Preparation of nutrient broth, nutrient agar plate's, nutrient agar and slant and nutrient agar stabling II
b.) Sterilization of glassware by dry heating
c.) Sterilization of nutrient broth by filtration planting method for isolation and purification of bacteria
5. Isolation of bacteria by streak plate method
6. Isolation of aerobic spores forming bacteria by enrichment using streak plate method
7. Checking of purity of a bacterial culture by streak planting method
8. Identification of bacteria by staining method and biochemical test
9. Morphological examination of bacteria by simple and differential staining
10. Different biochemical tests for identification of bacterial culture; Enumeration of bacteria by stain slide method.
11. Enumeration of bacteria by most probable number methods
12. Enumeration of bacteria stains slide method by pour plate method and spread plate method.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER-III
BSA- 322 Statistics

L	T	P	CR
1	0	1	2

Course objective:
To enable the students to understand the definition of statistics and its use, probability and hypothesis, correlation, regression and designs.

Course content:

Unit 1:	**30%**
Unit 2:	**40%**
Unit 3:	**30%**

Unit-I: Central Tendency
Introduction: Definition of Statistics and its use and limitations; Frequency. Distribution and Frequency Curves. Measures of Central Tendency: Characteristics of ideal Average, Arithmetic mean, Median, Mode, Merits and Demerits of Arithmetic Mean. Measures of Dispersion: Variance Standard deviation, and Coefficient of Variation.

Unit-II: Probability and Hypothesis
Probability: Concept of probability definition and; Normal Distribution and its properties. Introduction to Sampling: Random Sampling; the concept of Standard Error. Tests of Significance – Types of Errors, Null Hypothesis, Level of Significance and Degrees of Freedom, Steps involved in testing of hypothesis; Large sample Test: SND test for means, Single Sample and Two. Samples (all types); Small Sample Test for means; Students t-test for Single. Sample, Two Samples and Paired t test. F test: Chi-Square Test in 2X2Contingency Table, Yate's Correction for continuity.

Unit-III: Correlation, Regression and designs
Correlation: Types of Correlation and identification through Scatter Diagram, Computation of Correlation Coefficient 'r' and its testing. Linear Regression: Of Y on X and X on Y, Inter-relation between 'r' and the regression coefficients, fitting of regression equations. Experimental Designs: Basic Designs, Completely Randomized Design.(CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design(LSD), Layout and analysis.

Course Learning Outcomes:
1. At the end of the course student will be able to know: Acquaintance with some basic concepts in statistics.
2. Making familiar with some elementary statistical methods of analysis of data viz. Measures of Central Tendency, Dispersion, Moments, Skewness, and Kurtosis and to interpret them.
3. Analysis of data pertaining to attributes and to interpret the results.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3		3	3	2	2	2	-	-	2	3	3
CO2	3		2	3	2	2	2	-	-	2	3	3
CO3	3		2	3	2	-	2	-			3	3
Avg	3		2.3	3	2	2	2			2	3	3

Recommended Text Books-

1. Fundamentals of Mathematical Statistics - S.C. Gupta and V.K.Kapoor
2. Basic Statistics - B.L. Aggrawal
3. Design and Analysis of Experiments for Agriculture workers - B.L. Mishra
4. Theory of Sample Surveys and Statistical Decisions - K.S.Kushwaha and Decisions Rajesh Kumar

Recommended Reference Books-

1. Sahu P.K. Agriculture And Applied Statistics- I. Kalyani Publishers
2. Sahu P.K. Agriculture and Applied Statistics- II. Kalyani Publishers

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Date: 11.06.2016

BSA- 363 Statistics Lab

List of Experiments:

1. Construction of Frequency Distribution Tables and Frequency Curves
2. Computation of Arithmetic Mean for Un-Grouped and Grouped data
3. Computation of Median for Un-Grouped and Grouped data
4. Computation of Mode for Un-Grouped and Grouped data
5. Computation of Variance Standard Deviation and coefficient of variation for Un-Grouped and Grouped data
6. (SNI) test for means, single sample; SND test for mean, two samples
7. Student's t-test for single sample; student's t-test for two samples; Paired Ttest and F test
8. Chi-Square Test in 2x2 Contingency Table, Yate's Correction for continuity
9. Computation of Correlation Coefficient 'r' and its testing
10. Fitting of regression equations-Y on X and X on Y
11. Analysis of Completely Randomized Design (CRD)
12. Analysis of Randomized Block Design (RBD)
13. Analysis of Latin Square Design (LSD)

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER-III

BSA-323 Production Technology of Vegetable and Flowers

L	T	P	CR
2	0	1	3

Course objectives:

To make students to understand the production technology of fruits and flowers.

Course content:

Unit 1:	**20%**
Unit 2:	**50%**
Unit 3:	**30%**

Unit-I: Vegetable Classification

Importance and scope of olericulture.Types of vegetable gardens. Classifications of vegetable

Unit-II: Package of practices for vegetable production

Origin, area, production, varieties, package of practices for fruit vegetables

(a) Tomato, brinjal, chilli, okra

(b) Cucurbitaceous vegetables - cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd, watermelon, musk melon

(c) Cole crops - cauliflower, cabbage, knol-khol

(d) Bulb crops - onion and garlic

(e) Beans - French bean, cluster bean, dolichos bean and cowpea

(f) Peas

(g) Tuber crops - potato, sweet potato, colocasia, tapioca, yams

(h) Root crops - carrot, radish, turnip, beet root

(i) Leafy vegetable - palak, amaranthus

(j) Perennial vegetables - drumstick, curry leaf

Package of practices (cultivation) of knol-khol, cluster bean, tapioca, yams,beet root, curry leaf, to be taught in brief.

Unit-III: Gardens and ornaments of garden

Importance and planning of ornamental gardens.Types and styles of ornamental gardens.Different uses of trees, shrubs, climbers, palms, houseplants and seasonal flowers in gardens8.Package of practices for Rose, Marigold, Tuberose, Jasmine, Chrysanthemum.

Course Learning Outcome:

1. Students will understand practical knowledge on specialized production techniques of vegetables and spices.
2. Students understand will Importance of vegetables & spices in human nutrition improvedand national economy.
3. Students will knowledge about quality requirement and production and techniques.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
CO3	3	2	2	2	2	-	2	-			3	3
CO4	2	2	-	3		-	2	-			3	3
Avg	2.7	2	2.3	2.5	2	2	2			2	3	3

Recommended Text Books

1. Vegetable crops in India - T.K. Bose and M.G. Som
2. Production Technology - S.P. Singh of Vegetable crops
3. Production Technology of Vegetable crops - K.G. Shanumughavelu
4. Complete Gardening in India - K.S. Gopal Swamiyanger

Recommended Reference Books

1. Floriculture in India - G.S. Randhawa and A.Mukhopadhyay
2. Commercial Flowers - T.K. Bose
3. Progressive Floriculture - I.S. Yadav and M.L. Choudhary

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BSA-364 Production Technology of Vegetables and Flowers Lab

List of Experiments:

1. Layout planning of kitchen garden
2. Identification of important vegetable seeds and plants
3. Raising of vegetable nurseries
4. Identification of ornamental plants - Trees, shrubs, climbers, seasonal, palm etc.
5. Development of garden features
6. Transplanting of seedlings
7. Layout planning of lawns and maintenance
8. Seed extraction of tomato and brinjal.
9. Depotting, repotting and maintenance of house plants
10. Visit to different vegetable farms
11. Training and pruning of roses, pinching and disbudding of Chrysanthemum
12. Layout planning of gardens and garden design for public and private areas
13. Intercultural operations and seed production in vegetables
14. Harvesting indices of different vegetable crops, grading and packaging of vegetables.
15. Prolonging the shelf life of cut flowers

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Date: 11.06.2016

2nd Year, SEMESTER-III
BSA-365 Livestock Production and Management

L	T	P	CR
2	0	1	3

Course objective:
To introduce the principles of livestock and poultry management practices.

Course content:

Unit 1:	**20%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**30%**

Unit-I: Livestock in India
Role of Livestock in National economy. Different Livestock development programmes of Govt. of India. Important Indian breeds of cattle, buffalo, sheep, goat and swine. Important exotic breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in Livestock.Reproductive behavior like oestrus parturition and furrowing etc.

Unit-II: Milk and its components
Mechanism of milk secretion.Clean and hygienic milking of animals. Factors affecting milk yield and their composition. Selection and breeding of livestock for higher milk production.Selection and breeding of livestock for meat production.

Unit-III: Livestock Management
Feeding and management of calves, growing heifers and milch animals another types of animals. Hosing principles space requirements for different species of livestock. Disease control measures, sanitation and care. Breeding, feeding and production records.

Unit-IV: Poultry
Breed characteristics of poultry, Methods of rearing of poultry. Breeding of poultry, Feeding and Managementof poultry.Structure and keeping quality of eggs.Incubation and hatching management Brooding. Vaccinationschedules for prevention of poultry disease. Preservation of eggs.Marketing of eggs Economics of layer production. Cost of milk production. Economical unit of dairy.Economical unit of Goatery.Economical unit of Piggery.

Course Learning Outcome:

1. Develop and evaluate animal production and management systems by integrating knowledge of animal genetics, nutrition, reproduction, and other relevant disciplines and applying scientific and quantitative reasoning to solve real-world challenges.
2. Locate, critically evaluate, and apply information from scholarly animal science literatureand other sources to expand personal understanding and knowledge of animal sciences, providing a foundation for lifelong learning.

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3. Create and interpret graphs, tables and diagrams illustrating scientific data and concepts, and understand basic concepts relating to the design and analysis of research in the animal sciences.
4. Communicate effectively about animal sciences to a range of audiences, both orally and in writing, using appropriate traditional and emerging media.
5. Engage actively and effectively in discussion of complex issues relevant to the animal sciences by understanding and appreciating: a. the importance of animals to the health and well-being of society; b. economic, environmental, animal welfare, and societal impacts of animal production and management systems at the global and local level;

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	3	-	2	3	3
CO2	3	2	2	2	2	2	2	3	-	2	3	3
CO3	3	2	2	2	2	-	2	3	-	-	3	3
CO4	2	2	-	3	-	-	2	3	-	-	3	3
CO5	2	-	-	-	-	-	-	3	-	-	-	3
Avg	2.6	2	2.3	2.75	2	2	2	3		2	3	3

Recommended Text Books-

1. Livestock Production Management - Dr. N.S.R. Shastry, Dr. R.A.Singh and Dr. Thomas
2. A Text Book of Animal Husbandry - Dr. G.C. Banerjee
3. Poultry Production - Dr. R.A. Singh and others

Recommended Reference Books-

1. Animal Husbandry and Draining - Dr. Jagdish Prasad
2. Animal Husbandry - Dr. Harbansh Singh & Dr. Moor

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BSA-365 Livestock Production and Management Lab

List of Experiments:

1. Visit to Livestock farms.
2. Study of external body parts of Livestock species.
3. Identification methods for different livestock species.
4. Handling and restraining of animals.
5. Judging and culling of dairy animals.
6. Feeding and ration formulation.
7. Incubation and hatchery maintenance and their management.
8. Housing of animals.
9. Management of poultry.
10. Economics of livestock production

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Date: 11.06.2016

2nd Year, SEMESTER-IV
BSA-425 Field Crops II (Rabi)

L	T	P	CR
2	0	1	3

Course objective:
To enable students to grow different Rabi season crops.

Curse content:

Unit 1: **100%**

Unit-I: Field Crops

1. Cereals – Wheat and barley
2. Pulses – Chickpea, lentil, peas and French bean
3. Oilseeds – Rapeseed and mustard, sunflower, safflower and linseed
4. Sugar crops – Sugarcane and sugar beet
5. Commercial crops – Potato and tobacco
6. Forage crops – Berseem, Lucerne and Oats

Different Rabi crops mentioned above will be taught under the following heads:

1. Origin, history, distribution and economic importance
2. Soil and climatic requirement
3. Agronomic characteristics of the important varieties suitable for the various farming situations of the state.
4. Land preparation and sowing management: selection of seeds, seed rate, plant population, planting geometry, seed treatment and seed inoculation, sowing depth, suitable sowing methods, gap filling and thinning, watching of sown seeds and germinating seedlings
5. Application of manures and fertilizers: time and method of application
6. Interculture and weeding: earthing, hoeing, control of weeds by agronomical and chemical means, critical period of weed control
7. Irrigation: methods of irrigation and critical growth stages of crops for irrigation
8. Plant protection measures: insect pests and diseases causing damage to the crops and remedial measures to control them
9. Judging of maturity stage of crop and method of harvesting
10. Efficient and suitable method of winnowing, cleaning, grading and measurement of yield
11. Proper storage of produce at suitable moisture content in grains, protection against insect-pest and moisture
12. Suitable crop-rotation and crop mixtures.

Course Learning Outcomes

1. To know the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops.

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2. Identify weeds in rabi season crops, Pulses-chickpea, lentil, peas; oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane, Medicinal and aromatic crops-mentha, lemongrass and citronella, Forage crops-berseem, lucerne and oat.
3. Through proper knowledge of irrigation scheduling in rabi crops, additional area can be increased of low water requiring crops.
4. Students will be able to know about the economic importance of medicinal and Aromatic crops in present sphere. It will be helpful to know about basic morphological characteristics of rabi crops.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	2	-	2	3	3
CO2	3	2	2	2	2	2	2	2	-	2	3	3
CO3	3	2	2	2	2	-	2	2		3	3	3
CO4	2	2	-	3		-	2	2		3	3	3
Avg	2.75	2	2.3	2.5	2	2	2	2		2.5	3	3

Recommended Text Books-

1. Scientific crop production (1&2) – C. Thakur
2. Handbook of Agriculture (IV edition 2006)– ICAR Publication
3. Field Crops – Y.M. Iyyer
4. High Yielding Varieties of Crops – Mahabal Ram
5. Principal of Cereal Crop Production – Mahendra Pall, Deka& R.K. Rai
6. Cereal Crop – W.H. Leonard and J.H. Martin

Recommended Text Books-

1. Crop Production – B.M. Paugh
2. Text Book of Field Crops – Rajendra Prasad, ICAR Publication
3. Cultivation of Medicinal and Aromatic – A.A.Faruqui&B.S.CropsShreeramu
4. KrishiVishwa (Hindi) – JNKVV, Jabalpur

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BSA-466 Field Crops II (Rabi)Lab

List of Experiments:

1. Identification of different Rabi crops and their associated weeds
2. Calculation of seed rate, plant population, fertilizer requirement and herbicide requirement for
   The crop
3. Top dressing of nitrogen in wheat and study of fertilizer experiment on wheat and mustard
4. Application of herbicide in wheat and grain legumes
5. Study of morphological characters of wheat, sugarcane chickpea and mustard
6. Yield attributing characters of wheat, gram. Calculation of yield estimation of sugarcane, potato
and wheat etc.
7. Yield and quality analysis of sugarcane
8. Visit to important agronomic experiments and research station related to Rabi crops

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Date: 11.06.2016

2nd Year, SEMESTER-IV
BSA-426 Manures, Fertilizers and Agro-Chemicals

L	T	P	CR
3	0	0	3

Course objective:
To enable students to understand the manures and fertilizers, nutrients and insecticides. To understand essentiality of plant nutrients and mechanism of nutrient transport to plant and factor affecting nutrient availability.

Course content:

Unit 1:	**40%**
Unit 2:	**30%**
Unit 3:	**30%**

Unit- I: Manures and Fertilizers
Manures: Introduction, Raw materials, Bulky and concentrated composition. FYM: Composts, Different methods of composting mechanical compost plants, vermicomposting, green manures, oil cakes, sewage and sludge. Biogas plant slurry, plant and animal refuges. Fertilizers: Classification of fertilizers, process of manufacturing major nitrogenous, (Ammonium Sulphate, Urea, Calcium Ammonium Nitrate. Ammonium Nitrate and Ammonium Sulphate Nitrate) fertilizers and properties, manufacturing of phosphatic fertilizers (Single Super Phosphate, Enriched Super Phosphate, Diammonium Phosphate and Ammonium Polyphosphate) Manufacturing of potassic and complex fertilizers their fate and reactions in the soil.

Unit-II: Nutrients
Nutrients, secondary and micronutrients fertilizer, Amendments, Fertilizer control order and fertilizer storage. Biofertilizers, types of biofertilizers, advantages of biofertilizers. Organic chemistry as a prelude to agro-chemicals, diverse types of agrochemicals.

Unit-III: Insecticides
Bioinsecticides (botanical) neem, pyrethrum and Synthetic pyrethroids. Synthetic organic insecticides, major classes, properties and use of some important insecticides under each class Classification of insecticides, herbicides-major classes, properties and uses of 2,4-D, atrazine, glyphosate, butachlor and benthiocarb. Fungicides – major classes of fungicides, properties and uses of Carbendazim, Carboxin, Captan, tridemorph and copper oxychloride. Insecticide Act. Plant growth regulators.

Course Learning Outcome:
1. Knowledge of different manure and fertilizers used in different crops according to soil condition. To understand essentiality of plant nutrients and mechanism of nutrient transport to plant and factor affecting nutrient availability.

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2. To be able about procedure of soil testing and establish soil testing laboratory in future as an entrepreneur.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
Avg	3	2	2.5	2.5	2	2	2			2	3	3

Recommended Text Books

1. The Nature Properties of Soil – Brady, N.C. & Weil R.R.
2. Fundamentals of Soil Science
3. Soil Fertility and Fertilizers – Nelson Tisdale

Recommended Reference Books

1. Methods of Soil Fertilization – A.J. Peters
2. Organic Farming Theory and Biofertilizers in agriculture – N.S. Subbarao

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Date: 11.06.2016

2nd Year, SEMESTER-IV
BSA-427 Insect Ecology & Integrated Pest Management
Including Beneficial Insects

L	T	P	CR
3	0	0	3

Course objective:
To provide the knowledge about the effects of biotic and abiotic factors on insect development, population growth, species interactions, physiological requirements and insect behaviour. To make studentsskilled in determining pest levels and impact on plant and animal hosts and the management of these pests by Integrated Pest Management approach.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit-I: Ecology of Insects
Insect ecology: Introduction, environment and its components. Effect of abiotic factors-temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.Concepts of balance of life in nature.Biotic potential and environmental resistance.Causes for outbreak of pests in agro-ecosystem.Pest surveillance and pest forecasting.Categories of pests.IPM, Introduction, importance, concepts.Principles and tools of IPM-Host plant resistance, Cultural method, Mechanical and physical control methods.Legislative control.

Unit-II: Methods of control
Biological (parasites, predators and transgenic plant pathogens such as bacteria, fungi and viruses) methods of control.Chemical control – importance, hazards and limitation.Classification of insecticides.Toxicity of insecticides and formulations of insecticides.Study of important insecticides. Botanical insecticides –neem based product. Cyclodine organophosphates.Carbamates, synthetic pyrethroids Novel insecticides, Pheromones, Nicotinyl insecticides.Chitin synthesis inhibitors, Phenyl pyrazoles, Avermectins.Macrocyclic lactones, Oxadiazimes, Thioureaderivatives.Pyridineazomethines, pyrroles etc.Nematicides.

Unit-III: Pest Control
Rodenticides, acaricides.Fumigants.Recent methods of pest control, repellents, antifeedants, Hormones.Attractants, gamma radiation and genetic control.Practices, scope and limitations of IPM.Insecticides Act 1968 – Important provisions.Application techniques of spray fluids.Phytotoxicity of insecticides.Symptoms of poisoning, first aid and antidotes. Beneficial insects: parasites and predators used in pest Control. Mass multiplication techniques.

Unit-IV: Microorganism

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Important groups of micro-organisms, bacteria, viruses and fungi used in pest control and their mass multiplication techniques. Important species of pollinators, weed killers and scavengers, their importance Non insect pests – mites, Nematology.Rodents and birds, Vermiculture.

Course Learning Outcome:

1. Students knowledgeable about the effects of biotic and abiotic factors on insect development, population growth, species interactions, physiological requirements and insect behavior.
2. Students are skilled in determining pest levels and impact on plant and animal hosts and the management of these pests by Integrated Pest Management approach.
3. To be able to address complex problems facing entomology or toxicology professionals taking into account related ethical, social, legal, economic, and environmental issues.
4. To be able to surveillance and forecasting of insect pests and assessment of insect pest population and recent pest outbreaks and manage them by using different tools and recent methods pest management.
5. To Understands about different classes of insecticides, their formulation, toxicity, poisoning, first aid and antidotes and their effect on plants, animals and environment.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3		3	3	2	2	2	-	-	3	-	3
CO2	3		2	3	2	2	2	-	-	3	-	3
CO3	3	3	2	2	2	2	2	-		3	2	3
CO4	2		-	3	2	2	2	-		3	2	3
CO5	2			3	2	2	2			3	2	3
Avg	2.6	1	2.3	2.8	2	2	2			3	2	3

Recommended Text Book-

1. Plant Protection Techniques – P.B. Chatterjee
2. Text Book of Agricultural Entomology – H.S. Pruthi
3. General and Applied Entomology – K.K. Nayar, T.N. Ananthakrishnan and B.V. David

Recommended Text Book-

1. Insect Pests of Field Crops – S. Pradhan
2. Introduction of Plant Quarantine – AbhishekShukla and O.P. Veda

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Date: 11.06.2016

2nd Year, SEMESTER-IV

BSA-428 Agricultural Finance and Cooperation

L	T	P	CR
1	0	1	2

Course objective:

To explain the broad feature of Indian financial institutions with instruments to control credit in the country.To effectively narrate the kinds and components of money with its regulatory system.

Course content:

Unit 1:	**35%**
Unit 2:	**30%**
Unit 3:	**35%**

Unit- I: Agricultural Finance

Agricultural Finance – nature and scope. Time value of money. Compounding and discounting Agricultural Credit: meaning, definition, needs. Classification of credit. Credit analysis – 4 R's of credit. 5 C's of credit.7 P's of credit. Repayment plans of credit. History of financing agriculture in India

Unit-II: Banks in India

Commercial banks, nationalization of commercial banks. Lead bank scheme, Regional Rural Banks, Scale of finance. Higher financing agencies – RBI, NABARD and AFC. Asian Development Bank, World Bank. Insurance and Credit Guarantee Corporation of India.Assessment of crop losses.Determination of compensation. Crop insurance, advantages and limitations in application, estimation of crop yields.

Unit-III: Cooperation in agriculture

Agricultural Cooperation – Philosophy and Principles.History of Cooperative movement – Pre independence and post-independence periods, cooperation in different plan periods.Cooperative Credit structure – PACS, FSCS.Reorganization of cooperative credit structure in Andhra Pradesh and single window system.Successful cooperative system in Gujarat, Maharashtra, Punjab etc.

Course Learning Outcome:

1. Explain the broad feature of Indian financial institutions with instruments to control credit in the country. Effectively narrate the kinds and components of money with its regulatory system.
2. Be aware of the functions, objectives and limitations of commercial bank. Identify the existence and development of non- banking financial institutions; know the important role of mutual fund. LIC investment companies etc.
3. Utilize and effectively participate in the development process. Understand the conditions of financial markets and its impact in the economy.

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4. Understand the macroeconomics aspects of the economy as they affect the agricultural sector. Apply economics principles to understand the conduct and performance of the agricultural industry.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	2	3	3	2	2	3	1	-	-	3	3
CO2	-	2	2	2	2	2	3	1	-	-	3	3
CO3	-	2	2	2	2	3	3	1	-	-	3	3
CO4	-	2	-	3		3	3	1	-	-	3	3
Avg.	-	2	2.3	2.5	2	2.5	3	1			3	3

Recommended Text Book-

1. An Introduction to Agricultural Finance – U.K. Pandey, Himalayan Publication Ltd., New Delhi.
2. Agricultural Finance - Theory and Practical – J.P. Singh
3. Agricultural Finance - Theory and Practical – Kahlon and Tyagi

Recommended Reference Book-

1. Agricultural Finance and Management – S. Subsa Reddy and P.Raghuram

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-467 Agricultural Finance and Cooperation Lab

List of Experiments:

1. Factors governing use of capital and identification of credit needs
2. Time value of money, compounding and discounting
3. Tools of financial management, balance sheet, income statement and cash flow analysis
4. Estimations of credit needs and determining unit costs
5. Preparations and analysis of loan proposals
6. Types of repayment loans
7. Study of financial institutions: PACS, DCCB, Apex Banks, RRBs, CBs, NABARD

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER- IV

BSA-429 Diseases of Field Crops and their Management

L	T	P	CR
2	0	1	3

Course objective:

To enable the students to understand the diseases of field crops with reference to their economic importance, symptoms, causal organism, etiology, epidemiology, diseases cycle and integrated management.

Course content:

Unit 1:	**35%**
Unit 2:	**30%**
Unit 3:	**35%**

Unit-I: Study of diseases

Study of following diseases with reference to their economic importance, symptoms, causal organism, etiology,Epidemiology, diseases cycle and integrated management.

1. Rust diseases of wheat, groundnut, sunflower, soybean, tea.
2. Smuts of paddy, sorghum, bajra
3. Whip smut of sugarcane
4. Loose smut of wheat
5. Wilt of sugarcane, cotton, red gram, black gram, green gram and Bengal gram
6. Leaf blights of wheat and maize
7. Bacterial blight and streak of rice
8. Blast of paddy
9. Brown spot of paddy

Unit-II: Plant Diseases

10. Sheath blight of paddy
11. Leaf spot of sorghum (*Gloeocercospora, Colletotrichum, Helminthosporium, Ascochyta*)
12. Downy mildew of Bajra
13. Ergot of sorghum and Bajra
14. Ear cockle and yellow ear rot of wheat
15. Karnal bunt of wheat
16. Grassy shoot of sugarcane, Leaf spot of turmeric

Unit-III: Plant Diseases

17. Tikka disease of groundnut (early and late leaf spot)
18. Collar rot of groundnut
19. Root rots (dry, wet, black) of gram, cotton
20. Phyllody of Sesamum
21. Bacterial leaf spot of Sesamum, Cercospora leaf spot of Sesamum
22. Phytophthora blight of arhar, Alternaria leaf spot of sunflower

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23. Angular leaf spot of cotton, Ramularia leaf spot of cotton
24. Bacterial pustule of soybean
25. Myrothecium leaf spot of soybean, Anthracnose of soybean
26. Mosaic of soybean, Sterility mosaic of arhar

Course Learning Outcome

1. Student will know the common pathogens of different diseases. Student acquires the knowledge about etiology, and symptoms of these diseases which helps in diagnosis of the diseases of field and horticultural crops.
2. By knowing means of dispersal of these diseases suitable management methods can be applied. Eco-friendly and economically suitable management practices may be adopted.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	3	-	-	2	2	3
CO2	3	2	2	3	3	2	3	-	-	2	2	3
Avg.	3	2	1.5	3	3	2	3			2	2	3

Recommended Text Books-

1. Plant Pathology - G.N. Agrios
2. Plant Diseases - R.S. Singh
3. Plant Pathology - P.D. Sharma

Recommended Reference Books

4. Diseases of crop plants in India - G. Rangaswami
5. Practical manual of Plant Pathology - V.N. Pathak
6. Essentials of Plant Pathology - V.N. Pathak

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BSA-468 Diseases of Field Crops and Their Management Lab

List of Experiments:

1. Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases. Presentation of disease samples survey and collection:
2. Diseases of rice, sorghum.
3. Diseases of wheat, Bajra and maize.
4. Diseases of sugarcane, turmeric and tobacco.
5. Diseases of groundnut, castor and sunflower.
6. Diseases of Sesamum and cotton.
7. Diseases of red gram, green gram, black gram, Bengal gram and beans.
8. Field visits at appropriate time during the semester.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

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Date: 11.06.2016

2nd Year, SEMESTER- IV

BSA-430 Production Technology of Spices, Aromatics, Medicinal and Plantation crops

L	T	P	CR
2	0	1	3

Course objective:

To understand the practical knowledge on specialized production techniques of medicinal and spices.To enable Students to understand the importance of spices in human nutrition improved and national economy.

Course content:

Unit 1:	**20%**
Unit 2:	**20%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit-I: Spices Crops

Importance, scope and definitions of spices, aromatic, medicinal and plantation crops.Production technology of spices – Ginger, turmeric, Black Pepper, Cardamom, Coriander, Cumin, Fenugreek.

Unit-II: Aromatic plants

Production Technology of Aromatic Plants-Lemon grass, Citronella, Palmarosa, Geranium, Dawana, Vetiver.

Unit-III: Plantation Crops

Production Technology of plantation crops-Coconut, Arecanut, Betelvine, Cashew nut, Cocoa, Coffee, Oil Palm

Unit-IV: Medicinal Plants

Production Technology of Medicinal plants –Dioscoria, Rauvulfia, Opium, Aloe, Guggul, Ocimum, Perwinkle, Belladonna, Nuxvomica, *Solanu mkhasiamum*, Aonla, Senna, Plantago, Stevia, Coleus,

Course Learning Outcome-

1. Students will understand practical knowledge on specialized production techniques of medicinaland spices. Students understand will Importance of spices in human nutrition improved and national economy.
2. Students will knowledge about quality requirement and production and techniques. Managing skill for solving field problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2	3	3
CO2	3	2	2	2	2	2	2	-	-	2	3	3
Avg	3	2	2.5	2.5	2	2	2			2	3	3

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Recommended Text Books

1. Fruit in India, Tropical and Subtropical – T.K. Bose
2. Medicinal, Aromatic, Plantation and Spices – N. Kumar
3. A hand book of medicinal plants – N.D. Prajapati

Recommended Reference Books

1. Medicinal plant cultivation – S.S. Purohit
2. Minor spices – J.S. Purthi
3. Spices – V.B. Singh and K. Singh

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BSA-469 Production Technology of Spices, Aromatics, Medicinal and Plantation Crops Lab

List of Experiments:

1. Botanical description and identification of aromatic plants
2. Identification of spices, medicinal, plantation crops with their varieties
3. Propagation techniques in aromatic and spices
4. Selection of mother palm, seed nuts in coconut and oil palms
5. Identification and distillation procedures for aromatic crops
6. Propagation techniques in plantation crops
7. Propagation and planting methods of Turmeric, Ginger
8. Harvesting methods of aromatic plants
9. Processing and curing of Ginger, Turmeric and Black pepper
10. Training methods on betelvine
11. Rejuvenation practices in cashew nut
12. Products, byproducts of spices and plantation crops
13. Procedures for oleoresin extraction
14. Visit of local commercial seed spices, plantation, medicinal and aromatic plant nurseries and fields

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Date: 11.06.2016

2nd Year, SEMESTER-IV
BSA- 431 Breeding of Field/Horticultural Crops

L	T	P	CR
2	0	1	3

Course objective:
To introduce the concept and methods ofbreeding self-pollinated cross pollinated and vegetative propagated crops. To familiarize students with breeding procedures used for development of hybrids/varieties of various crops. To learn the plant genetic resources and their conservation and utilization in crop improvement.

Course content:

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

Unit-I: Breeding Objectives
Breeding objectives and important concepts of breeding self-pollinated cross pollinated and vegetative propagated crops. Hardy-Weinberg Law
Study in respect of origin, distribution of species, wild relatives and forms
a) Cereals (rice, wheat, maize, millets, sorghum Bajra, ragi)
b) Pulses (red gram, green gram, black gram, soybean)
c) Oilseed (groundnut, sesame, sunflower, safflower, castor, mustard etc.)
d) Fibers (cotton, kenaf, Roselle, jute) etc.
e) Vegetables (tomato, bhindi, chilli, cucumbers)
f) Flowers crops (chrysanthemum, rose, galardia, gerbera, marigold)
g) Fruits crops (aonla, guava, mango, custard apple, banana, papaya)

Unit-II: Breeding Procedures
Major breeding procedures for development of hybrids/varieties of various crops. Plant genetic resources their conservation and utilization in crop improvement. Ideotype concept in crop improvement.Breeding for resistance to biotic and abiotic stresses variability in pathogens and pests.Mechanisms of resistance in plant to pathogens and pest. Genetic basis of adaptability to unfavorable environments

Unit-III: Variability
Definition of biometrics, assessment of variability i.e. additive, dominance and epistasis and their differentiationGenotype x environment interaction and influence on yield/performance, IPR and its related issues.

Course Learning Outcome:
1. In this course Students learn importance of wild relative to produce new varieties ofkharif crop. Learner learns Gene preservation method for further use to improve kharif crops.
2. Learner learns to applies breeding method to improve kharif crops.

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3. Learner learns identification of resistance gene relate to kharif crop with high yield potential against Pest and pathogen and utilization genes.
4. Learner learns new genetic approaches to achieve a definite ideotype of khaif crop.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	2	2	-	-	2		3
CO2	3	2	2	2	2	2	2	-	-	2		3
CO3	3	2	2	2	2	-	2	-		2		3
CO4	2	2	-	3		-	2	-		2		3
Avg	2.5	2	2.3	2.5	2	2	2	-	-	2		3

Recommended Text Books-

1. Plant Breeding – B.D. Singh
2. Principles and Practices of Plant Breeding – J.R. Sharma
3. Breeding of field crops – J.M. Poehlman and D. A. Sleper
4. Principles of Plant Breeding – R.C. Choudhary

Recommended Text Books-

1. Elementary Principle of Plant Breeding – H.K. Choudhary
2. Breeding Technologies of Crop Production – A.K. Sharma
3. Plant Breeding Theory and Practical – Stoskopt

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Date: 11.06.2016

BSA- 470 Breeding of Field/Horticultural Crops Lab

List of Experiments:

1. Emasculation and Hybridization techniques
2. Handling of segregating generations, pedigree methods
3. Handling of segregating generation bulk methods
4. Handling of segregating generation, back cross methods
5. Field layout of experiments
6. Field trials, maintenance of records and registers
7. Estimation of Heterosis and inbreeding depression
8. Estimation of Heritability, GCA and SCA
9. Estimation of variability parameters
10. Parentage of released varieties/hybrids
11. Problems on Hardy, Weinberg Law
12. Study of quality characters
13. Sources of donors for different characters
14. Visit to seed production and certification plots
15. Visit to AICRP trials and programmes
16. Visit to grow out test plots
17. Visit to various research stations
18. Visit to other institutions.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

2nd Year, SEMESTER-IV
BSA- 432 Processing of Milk and Milk Products

L	T	P	CR
1	0	1	2

Course objective:
To introduce the methods used for clean milk production, microbiology of milk, filtration and pasteurization process of milk.

Course content:

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**30%**

Unit-I: Milk Composition
Composition of milk and its characteristics, Clean milk production, Microbiology of milk, Filtration clarification, Bactofugation, Pasteurization, UHT treatment, Homogenization and sterilization. Common adulterants and preservatives used in milk and its detection.

Unit-II: Milk Products
Composition and method of manufacturing of cream, butter, dahi, ghee, khoa, chenna, paneer, Ice cream andcondensed milk.

Unit-III: Dairy Equipments
Cleaning and sanitization of dairy equipments, Storage of milk and milk products, nutritive value of milk products.

Course Learning Outcome:
1. Explain the formation of milk and its components. Explains the formation of milk. Lists the components of milk.
2. Explains the sensory and physical properties of milk. Explain the production of milk and pre-treatment of milk. Lists the pre-treatments of milk.
3. Explains the importance of UHT and pasteurization processes. Explain the dairy processing technologies. Defines the pasteurized milk and sterilized milk.
4. Explains the production of yogurt. Lists of fermented milk products. Explains the production of butter. Explains the production of cheese, milk powder, and ice cream.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	-	-	-		2	2	-			3
CO2	3	2	-	-	-		2	2	-			3
CO3	3	2	-	2	2	1	2	2		2		3
CO4	2	2	-	3	2	1	2	2		2		3
Avg	2.75	2	-	1.7	2	1	2	2	-	2	2	3

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Recommended Text Books-

1. Trevor Britz& Richard K. Robinson; Advanced Dairy Science and Technology, Blackwell Publication.
2. Adnan Tamime; Dairy Fats and Related Products, Wiley-Blackwell Publication.
3. Ramesh C. Chandan, ArunKilara; Dairy Ingredients for Food Processing, Wiley-Blackwell Publication.

Recommended Reference Books-

1. Dairy Engineering: Milk Processing and Milk Products Rupesh S. Chavan, Anit Kumar, RachnaSherawat, and TanmayNalawade
2. Aseptic Food Processing and Packaging Md. I. A. Ansari, Rupesh S. Chavan, Tanmaynalawade, Anit Kumar, and Shraddha Bhatt
3. High Pressure Processing of Dairy Products Rupesh S. Chavan, RachnaSherawat, Prabhat K. Nema, and Kumar Sandeep
4. Introspection on Mechanization of Traditional Indian Dairy Products A. K. Agrawal, K. K. Sandey, and K. Dewangan

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Date: 11.06.2016

BSA- 471 Processing of Milk and Milk Products Lab

List of Experiments:

1. Sampling of milk
2. Determination of specific gravity
3. Fat in milk, S.N.F. and TS
4. Acidity in milk
5. Common milk adulterants in milk and milk products
6. Demonstration of cream separation
7. Preparation of Chennna, Paneer, Ice-Cream and Dahi.
8. Calculation on Ice Cream mix standardization of milk and cream and over run in butter.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-V

BSA- 533 Farming Systems and Sustainable Agriculture

L	T	P	CR
1	0	1	2

Course objective:

To help the student to understand the concept of sustainable agriculture and principles and componentsof farming systems.

Course content:

Unit 1: 50%

Unit 2: 50%

Unit-I: Sustainable agriculture

Introduction and definition, Sustainable agriculture: Goal and current concepts.Factor affecting ecological balance.Ameliorative measures for ecological balance.Land degradation.Conservators of natural resources LEIA & HELA.Irrigation problems. Wastelands and their development

Unit-II: Organic Farming and Farming Systems

Definition, principles and components. Farming systems: definition, principles and components.Integrated Farming System models for wetland situation. Integrated Farming System models for irrigated dryland situation. Integrated Farming System models for dryland situation.

Course Learning Outcomes:-

1. The student will be able to explain the major aspects of agricultural practices and traditions through time and throughout the world.
2. The student will be able to explain in general the relationships among culture, economics, politics, science, and agricultural development.
3. A solid understanding of the cross-cultural interactions and exchange that linked the world's people and facilitated agricultural development is also expected.
4. The student will study and analyze the refereed-journal articles, texts, and practices that represent the perspectives of different societies and agricultural traditions.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	1	-	2	3	1	-	-	1	-	2
CO2	1	-	1	-	-	2	3	1	-	-	1	2
CO3	-	1	2	2	-	-	-	-	1`	-	-	1
CO4	-	1	-	-	1	-	1	-	1	-	-	1
Avg.	1.5	1	1.33	2	1.5	2.5	2.5	1	1	1	1	1.5

Recommended Text Books

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1. Cropping and Farming system – S.C. Panda, Agrobios Publication
2. Proceeding of Symposium on Efficient Cropping System Agronomy–Indian Society of Cropping System, New Delhi
3. Principles and Practices of Agronomy – S.S. Singh, Kalyani Publication
4. Farm Management – S.K. Tondon and S.P. Dondhyal

Recommended Reference Books

1. Farming System and Sustainable Agriculture- SR Reddy, Kalyani Publication
2. Farming System And Sustainable Agriculture- A. Zaman and Md. Hedayetullah

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA- 572 Farming Systems and Sustainable Agriculture Lab

List of Experiments:

1. Preparation of cropping scheme for irrigated situations
2. Preparation of cropping scheme for dryland situations
3. Study of existing farming systems in nearby villages
4. Preparation of integrated farming system models for wetlands
5. Preparation of integrated farming system models for drylands
6. Preparation of enriched Farm Yard Manure
7. Preparation of vermicompost
8. Visit to urban waste recycling unit
9. Study of profitable utilization of agricultural wastes
10. Visit to poultry units to study resource allocation, utilization and economics
11. Visit to dairy units to study resource allocation, utilization and economics
12. Visit to an organic farm to study various components and utilization
13. Study of degraded lands

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-V
BSA-534 Biochemistry

L	T	P	CR
2	0	1	3

Course objective:
To introduce the students with importance of Biochemistry and structure of Plant cell, cell wall and its role in plant and animal food and paper industries.To enable the students to understand the biosynthesis of carbohydrates, lipids, proteins and nucleic acids.

Course content

Unit 1: **40%**
Unit 2: **30%**
Unit 3: **30%**

Unit- I: Biochemistry of Plants
Introduction and importance of Biochemistry.Plant cell, cell wall and its role in plant and animal food and paper industries.Bio molecules - structure, properties and applications.Amino acids, peptides and proteins - plant proteins and their quality. Enzymes - factors affecting the activity, classification, immobilization andother industrial application. Lipids - acyl lipids, their industrial application in soaps, detergents, paints,varnishes, lubricants, adhesives, plastics, nylon, bio-diesel, biodegradable plastics. Carbohydrates.Nucleotides and nucleic acids.

Unit-II: Metabolism and Glycolysis
Metabolic energy and its generation - Metabolism, basic concepts.Glycolysis, citric acid cycle, pentose phosphate pathway, oxidative phosphorylation.Fatty acid oxidation.General reaction of amino acid degradation.

Unit-III: Biosynthesis
Biosynthesis - carbohydrates, lipids, proteins and nucleic acids. Metabolic regulation.Secondary metabolites, terpenoids, alkaloids, phenolics and their applications in food and pharmaceutical industries.

Course Learning Outcome

1. In the end of the course students will know the role of cell organelles and their functions.
2. Functions of biomolecules and their utility in cell.
3. Identify the deficiency symptoms of biomolecules.
4. Synthesis pathways of biomolecules and regulations.Identification of biomolecules in given sample.

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Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	1	-	1	2	1	-	-	1	-	2
CO2	1	-	1	-	-	1	3	1	-	-	1	1
CO3	-	1	-	2	-	-	-	-	-	-	1	2
CO4	1	1	-	-	1	-	1	-	1	-	-	1
Avg.	1	1.5	1	2	1	1.5	1.33	1	1	1	1	1.5

Recommended Text Books

1. Outlines of Biochemistry - Conn and Stumpt
2. Essentials of Biochemistry - M.C. Pant
3. Biochemistry - U. Satyanarayana
4. Biochemistry –Dasgupta

Recommended Reference Books

1. Chemistry of natural products - O.P. Aggrawal
2. Text book of Biochemistry - AVSS Rama Rao

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Date: 11.06.2016

BSA-573 Biochemistry Lab

List of Experiments:

1. Amino acid models (atomic)
2. Paper electrophoresis for the separation of plant pigments.
3. Protein denaturation - heat, pH, precipitation of proteins with heavy metals.
4. Protein estimation by Lowry's method
5. Enzyme kinetics - competitive inhibition, enzyme immobilization
6. Extraction of nucleic acids
7. Column chromatography of RNA hydrolysate
8. Characterization of lipids by TLC
9. Extraction of oil from oil seeds
10. Estimation of fatty acids by GLC
11. Models of sugars, sucrose and starch
12. Quantitative determination of sugars
13. Paper chromatography for the separation of sugars
14. Determination of phenols

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3rd Year, SEMESTER-V

BSA-535 Crop and Stored Grain Pests and Their Management

L	T	P	CR
2	0	1	3

Course objective:

To study the stored grains and their pest of fields crops, vegetable crops, fruit crops and medicinalaromatic and plantation crops.

Course content:

Unit 1:	**35%**
Unit 2:	**35%**
Unit 3:	**10%**
Unit 4:	**10%**
Unit 5:	**10%**

Unit- I: Stored Grains and their Pest

Study of stored grain pests of order coleopteran their biology and damage pulse beetle, red flour beetle, khapra beetle and rice weevil. Study of stored grain pests of order Lepidoptera their biology and damage – rice moth Study of preventive and curative methods against stored grain pest.

Unit-II: Pests in Grain crops

Distribution, biology, nature and symptoms of damage of insect pests of

Rice, Hipsa, grass hopper, rice leaf roller, brown plant hopper, green leaf hopper, white backed plant hopper rice gundhi bug

Sorghum and maize, Sorghum shoot fly, maize stem **Pests** borer, cob borers-ear head caterpillar, army worm green sting bug

Ragi, Stem borer, web worm

Wheat, Termite

Sugarcane, Early shoot borer, top shoot borer; Pyrilla, white fly, mealy bug and scale insect

Cotton, Cotton aphid, white fly, red cotton bug, Jassid and Thrips pink boll worm, spotted boll worm, American boll worm and tobacco caterpillar, leaf roller and mealy bug. Non Pests-Mites

Mesta and Sunhemp– Red hairy caterpillar, capsule borer and Bihar hairy caterpillar

Pulses – Tobacco caterpillar, jassid, aphid green stink bug. Green gram, black gram lentil, Rajmas and Lytherie

Pigeon pea – Aphid, Thirps, and Pod fly and Pod bug, Plume moth

Chickpea – Cut worm, gram pod borer

Pea – Pea leaf miner and pea pod borer

Soybean – Girdle beetle, stem fly and tobacco caterpillar

Groundnut – White grub and red hairy caterpillar

Castor – Castor semilooper

Gingerly/Sesame – Leaf roller and capsule borer, Til hawk moth

Safflower – Aphid, capsule fly

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Mustard – Aphid, sawfly, flea beetle, painted bug
Sunflower – Head capsule borer (Helicoverpa)

Unit-III: Pests in Vegetable Crops

Brinjal– Shoot and fruit borer
Bhindi– Shoot and fruit borer, jassid
Tomato – Gram pod borer
Cruciferous – Diamond back moth, tobacco caterpillar
Cucurbitace– Red pumpkin beetle, fruit fly, spotted leaf beetle, blister beetle
Potato – Potato tuber moth, Cut worm
Colacasia– Tobacco cater pillar
Sweet potato – Sweet potato weevil
Moringa (Drumstick) – Bark eating caterpillar
Amaranthus– Leaf caterpillar
Chilli– Thrips, chillibudfly
Non pest – Chilli mite

Unit-IV: Pests in Fruit crops

Mango – Leaf hopper, mealy bug, fruit fly, nut weevil (stone weevil)
Citrus – Lemon butter fly, citrus cilla, leaf miner, white fly, fruit sucking moth
Grapevine – Termite, vine borer, vine girdler, fruit sucking moth
Banana – Rizome borer, Psedostem borer, aphid
Guava – Bark eating caterpillar, white grub, fruit borer, fruit fly, fruit sucking moth
Sapota– Leaf webber, fruit borer, anar butterfly
Ber– Ber fruit fly, leaf webber, mealy bug

Unit-V: Pests in Medicinal, Aromatic and Plantation Crops

Tobacco – Tobacco caterpillar, cut worm, gram pod borer
Turmeric – Banana lacewing bug, Bihar hairy caterpillar
Betelvine– White fly, betelvine scale
Onion/Garlic – Thrips
Coriander – Aphid
Curry leaf – Citrus butterfly, leaf roller
Pepper – Pollu beetle
Ginger – Fly maggot
Cashew nut – Shoot borer, stem borer, shoot tip and inflorescence caterpillar
Pomegranate – Anar butter fly, bark eating caterpillar, anar fruit borer
Apple – Apple wooly aphid, san jose scale, flower thrips
Coconut – Termite, aphid, scale insect, nut borer
Coffee – White fly, mealy bug, green plant bug, leaf miner
Tea – Jassid / Aphid
Ornamental plants
Rose – Scale insects, bark caterpillar
Chrysanthemum – Aphid, gram pod borer
Marigold – Leaf miner, gram pod borer

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Course Learning Outcome:

1. Familiarized with identification of different insect pest of field, horticulture, ornamentals, vegetables and stored grains at the field level.
2. Understand how insects affect animal and Plant health and agricultural production, and be able to safely manipulate populations of beneficial and destructive species in habitats and in production agro-ecosystems with minimal environmental impact.
3. To be able about the biology, diversity, distribution of insects, and their relationships to crop and the environment condition of a particular area.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	1	-	2	1	2	-	-	1	-	2
CO2	1	-	1	-	-	2	1	1	-		1	1
CO3	1	1	-	1	-	-	-	-	1`	-	-	2
Avg.	1	1	1.5	1	2	1.5	1.5	1	1	1	1	1.66

Recommended Text Books

1. Storage Pest Management – Sharma, S. and Choudhary, A.
2. Management of Insect Pests of Horticultural Crops– Gupta, H.C.L.
4. Text book of Entomology – Pruthi, H.S.
5. Cotton pests and Bio control agents – Sathe, T.V.

Recommended Text Books

1. Economic and Applied Entomology – Ashok Kumar and Prem Mohan Nigam
2. A Test book of Applied Entomology (Vol. II) – K.P. Shrivastava

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Date: 11.06.2016

BSA-574 Crop Pests and Stored Grain Pests and Their Management Lab

List of Experiments:

Identification of pests, their damage symptoms and management

1. Rice
2. Sorghum
3. Maize
4. Wheat
5. Sugarcane
6. Cotton
7. Pulses
8. Cruciferous vegetables
9. Malvaceous vegetables
10. Cucurbitaceous vegetables
11. Chilli
12. Solanaceous vegetables
13. Citrus
14. Sapota
15. Mango
16. Banana

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Date: 11.06.2016

3rd Year, SEMESTER-V
BSA-536 Agricultural Marketing, Trade and Prices

L	T	P	CR
1	0	1	2

Course objectives:
To provide the knowledge aboutagricultural marketing, concepts and definition, scope and subject matter, market and marketing.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit- I: Agricultural Marketing
Agricultural Marketing- Concepts and Definition, Scope and subject matter, Market and Marketing: meaning, definition, components of a market.Classification of market.Market structure, conduct and performance, marketing structure. Market functionaries or agencies

Unit-II: Market Strategy
Producer's surplus: Meaning, types of producers surplus, marketable surplus, marketed surplus, importance, factors affecting marketable surplus. Marketing channels: Meaning, definition, channels for different products. Market integration, meaning, definition, types of market integration. Marketing efficiency- Meaning, definition, marketing costs, margins and price spread, factors affecting the cost of marketing, reasons for higher marketing costs of farm commodities, ways of reducing marketing costs.

Unit-III: International Trade
Theories of International Trade: Domestic trade, Free trade, International trade. GATT, WTO, implications of AOA, Market access, domestic support, export subsidies.EXIM policy and ministerial conferences Cooperative marketing. State Trading, Ware Housing Corporation; Central and State, objectives, functions, advantages.

Unit-IV: Food corporations
Food Corporation of India: Objectives and functions, Quality control, Agricultural products, AGMARK.Price characteristics of agricultural products process, Meaning, Need for Agricultural Price Polity. Risk in marketing: Meaning and importance, types of risk in marketing, speculations and hedging, futures trading, contract farming.

Course Learning Outcomes:
1. Optimization of Resource use and Output Management: An efficient agricultural marketing system leads to the optimization of resource use and output management. An efficient marketing system

can also contribute to an increase in the marketable surplus by scaling down the losses arising out of inefficient processing, storage and transportation.

2. A well designed system of marketing can effectively distribute the available stock of modern inputs, and thereby sustain a faster rate of growth in the agricultural sector.
3. **Increase in Farm Income:** An efficient marketing system ensures higher levels of income for the farmers by reducing the number of middlemen or by restricting the commission on marketing services and the malpractices adopted by them in the marketing of farm products.
4. **Growth of Agro-based Industries:** An improved and efficient system of agricultural marketing helps in the growth of agro-based industries and stimulates the overall development process of the economy. Many industries depend on agriculture for the supply of raw materials.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	1	2	-	-	1	-	1
CO2	1	-	1	-	-	1	2	1	-	-	1	2
CO3	-	-	1	-	-	-	-	-	1`	-	-	1
CO4	-	1	-	-	1	-	3	-	1	-	-	3
Avg.	1.5	1.5	1	-	1	1.5	2.3	1	1	1	1	2.3

Recommended Text Books-

1.Agricultural Marketing in India – S.S. Acharya and N.L. Aggrawal, Oxford and IBH Publication Co. Pvt. Ltd., New Delhi
2.An introduction to Marketing – Amarchand, D. and B. Vardhrajan,Vikash Publication House Pvt. Ltd., New Delhi
3. Export Marketing – Balagopal
4. Agricultural Marketing and – L.K. Wader and C. Murty, ICAR, New Delhi

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IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-575 Agricultural Marketing, Trade and Prices Lab

List of Experiments:

1. Identification of marketing channels
2. Study of Rythu Bazars, Regulated markets
3. Study of unregulated markets
4. Study of livestock markets
5. Price spread analysis
6. Visit to market institutions, NAFED
7. Study of SWS, CWC and STC
8. Analysis of information of daily prices
9. Marketed and marketable surplus of different commodities

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-V

BSA-537 Fundamentals of Farm Business Management (including Project Development, Appraisal and Monitoring)

L	T	P	CR
1	0	1	2

Course objective:

To provide the knowledge about thestructure of agribusiness, management, agro-based industries and itsimportance and needs.

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit-I: Agribusiness

Meaning, definition, structure of agribusiness (input, farm product sectors), importance of agribusiness in theIndian economy.Agricultural Policy. Agribusiness Management-Distinctive features, importance of goodmanagement, definitions of management. Management functions.

Unit-II: Planning

Planning, meaning, definition, types of plans (Purpose or mission, goals or objectives, strategies, policiesprocedures, rules, programmes, budget), characteristics of sound plan, steps in planning. Organization staffing,directing, motivation, ordering, leading, supervision, communications, control. Capital Management. Financialmanagement of Agribusiness: Importance of Financial statements, Balance sheet, Profit and loss statement,Analysis of financial statements

Unit-III: Agro-based industries

Agro-based industries: Importance and needs, classification of industries, Types of agro based industries.Institutional arrangement, procedure to set up agro based industries. Constraints in establishing agro-basedIndustries.Marketing Management: Meaning, definitions, marketing mix, 4Ps of marketing, Mix, marketsegmentation, Methods of market, Product life cycle.

Unit-IV: Price Policy and Project

Pricing policy, meaning, pricing method.Prices at various stages of marketing. Project: Definitions, projectcycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Appraisal and evaluation techniques, NPW, BCR, IRR, N/K ratio, Sensitivity analysis. Characteristics of agricultural projects preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries,agro-industries etc.

Course Learning Outcome:

1. The course contains a comprehensive treatment of the traditional agricultural production economics topics employing both detailed graphics and differential calculus.
2. Focus on the neoclassical factor-product, factor-factor and product- product models and is suitable for an advanced undergraduate or a beginning graduate –level course in static production

economics. Understand limited resources available in the economy. Realize the need to exploit and utilize through development and improvement of production techniques.

3. Make them aware of the availability of rich natural endowments to achieve sustainable agricultural development with this knowledge they can challenge the problems of unemployment inequality shortage of food productions, poverty and be useful to compete advanced agricultural economies.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	1	1	-	1	-	3	-	2	1	-	1
CO2	-	1	-	-	-	3	2	-	-	-	-	2
CO3	2	-	1	-	-	1	1	-	`-	-	-	2
Avg.	2	1	1	-	1	2	2	-	2	1	-	1.6

Recommended Text Books-

1. Agribusiness Management – W. David Downey and Steven P.Erickson
2. Introduction of Agricultural Business Management – Davis, J. and Gold Berg
3. Project Management and Control – Rao
4. Project Management – S. Choudhary, Hill Publication Company, New Delhi

Recommended Text Books-

1. Project Management – Nagaraja
2. Agri. Business Management – Broadway, Himalaya Publication House, New Delhi
3. Project Planning, Analysis, Selection, Implementation and Review – Chandra

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-577 Fundamentals of Farm Business Management (including Project Development, Appraisal and Monitoring) Lab

List of Experiments:

1. Study of input markets: seed, fertilizers, pesticides
2. Study of output markets: grains, fruits, vegetables, flowers
3. Study of product markets, retails trade commodity trading, and value added products
4. Study of financing institutions-Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD
5. Preparations of projects, Feasibility reports; Projects appraisal techniques; Case study of agro-based industries

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-V
BSA-538 Fundamentals of Rural Sociology and Educational Psychology

L	T	P	CR
2	0	0	2

Course objective:
To make student understand the concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society. To make student able to understand social groups, social stratification, culture, social values, social control and attitudes, leadership and training.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit-I: Extension Education
Introductory lecture, Meaning and definition of extension education and agriculture extension.Scope and importance of sociology in agriculture extension and interrelationship between rural sociology and agriculture extension, Meaning of rural sociology and its important characteristics.Difference and relationship between rural and urban societies.Meaning and Definition of social group and its classification, Factors considered in formation and organization of a group, Motivation in group formation and role of social group in agricultural extension.Social Process: concepts, definition and forms, Meaning, definition and functions of social stratification, Basis of stratification, forms of social stratification, characteristics and differences between class and caste system. Concept of culture.

Unit-II: Sociality
Meaning and definition of custom, folkways, mores and taboos, rituals and traditions.Role of social norms in agricultural extension.Meaning and definition of social values and attitudes, Types and role of social values and attitudes in agriculture extension.Meaning and definition of social institution and major institutions in rural society, Function and role of major institutions in agriculture extension.Meaning and definition of social organization and types of organizations, Role of social organization in agriculture extension.Meaning and definition of social control, Need and means of social control.Meaning, definition and nature of social change, Dimension and factors responsible for social change.

Unit-III: Leadership and Training
Meaning, definition and classification of leadership, Roles of leader in agriculture extension, Different methods of selection of professional and lay leaders, advantages and limitations in use of local leaders in agriculture extension. Meaning and definition of training, Training of leaders, Methods of training.

Unit-IV: Psychology and personality

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Meaning and definition of psychology and educational psychology, Scope and importance of educational psychology in agriculture extension.Meaning and definition of intelligence and its types, Factors affecting intelligence and its importance in agriculture extension.Meaning and definition of personality and its types, Factors influencing the personality and its role in agriculture extension.Meaning and definition of teaching and learning process, Learning experience and learning situation.Elements of learning situation and its characteristics, Principles of learning, Implications of learning principles for teaching.

Course Learning Outcomes:

1. Understand concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society.
2. Understand social groups, social stratification, culture, social values, social control and attitudes, leadership and training. Understand concept of educational psychology, intelligence, personality, perceptions, emotions, frustration, motivation, teaching and learning.
3. Acquaint with characteristics of rural society, village institutions and social organizations. Select lay leaders and train them.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	-	-	2	1	1	-	-	1	-	2
CO2	1	-	1	-	-	2	2	1	-	-	-	2
CO3	-	2	1	-	1	-	1	-	-	-	-	2
Avg.	1.5	1.5	1	-	1.5	1.5	1.3	1	-	1	-	2

Recommended Text Books-

1. Introductory Rural Sociology – Chitambar, J.B., Wiley Eastern Private Limited, New Delhi
2. Education and communication for development – Dahama O.P. and Bhatnagar, O.P., Oxford and IBH Publishing Co. New Delhi
3. Rural Sociology in India – Desai, A.R., Popular Prakashan, Bombay

Recommended Text Books-

1. Educational Psychology – Jitendra Mohan, Wiley Eastern Limited, New Delhi
2. Educational Psychology – Rai, B.C., Prakashan Kendra, Lucknow

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-V
BSA-539 Post Harvest Management and Value Addition of Fruits and Vegetables

L	T	P	CR
1	0	1	2

Course objective:
To introduce the post-harvest technology of horticultural crops to the students.To make them able to understand the value addition of horticulture crops.

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**40%**

Unit-I: Post-harvest technology
Importance of post-harvest technology in horticultural crops. Maturity indices, harvesting, post-harvest handling of fruits and vegetables. Maturity and ripening process, factors affecting ripening in fruits and vegetables. Pre harvest factors affecting quality on post-harvest shelf life of fruits and vegetables. Chemicals used for harvesting, delaying in ripening of fruits and vegetables.

Unit-II: Storage of fruits and Vegetables
Methods of storage – precooling, pre storage treatments, and low temperature storage controlled atmospheric storage, irradiation, low cost storage structures. Various methods of packing, packaging materials and transport, packing techniques for export. Fabrication of types of containers, cushioning materials, vacuum packing, poly shrink packing, specific packing for export of mango, banana, grapes, kinnow, mandarin and sweet orange.

Unit-III: Fruits and Vegetable preservation
Importance and scope of fruits and vegetable preservation. Principles of preservation by heat, low temperature, chemicals and fermentation.Unit layout-selection of site, precautions for hygienic conditions of unit.Preservation through, canning, bottling, freezing, drying, dehydration, ultraviolet and ionizing radiations. Preparation of jams, jellies, marmalades, candies, crystallized, glazed fruits, preserves, chutney, pickle, ketchup, sauce, puree, syrups, juices, squashes and cordials. Spoilage of canned products, biochemical, enzymatic and microbial spoilage. Preservatives, colours permitted and prohibited in India.

Course Learning Outcome-

1. Understand the post harvest technology of horticultural crops. Understand the value addition of horticulture crops.
2. Understand the work space, tool and equipment design for PHT and value addition. Study the various certification and accreditation i.e. FPO, ISO and other labelling.

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Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	1	-	-	1	2	-	-	-	3	2
CO2	1	-	2	-	-	-	1	-	1	-	-	2
Avg.	1	-	1.5	-	-	1	1.5	-	1	-	3	2

Recommended Text Books-

1. Principles and Practices of Post-Harvest Technology – P.H. Pandey
2. Post-Harvest Technology of Fruits and Vegetables – L.R. Verma and V.K. Joshi
3. Post-Harvest Technology of Horticultural Crops – K.P. Sudheer

Recommended Reference Books-

1. Post-Harvest Management of Horticultural Crops – M.A. Mir
2. Marketing of Processed, Fruits and Vegetables – M. Choudhary
3. Fruits and Vegetable preservation – Girdharilal, G.S. Sidhappa and G.L. Tondan

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Date: 11.06.2016

BSA-576 Post Harvest Management and Value Addition of Fruits and Vegetables Lab

List of Experiments:

1. Practice in judging the maturity of fruits and vegetables
2. Conservation of zero energy cool chambers for on farm storage
3. Determination of physiological loss in weight, total soluble solids, total sugars, acidity, ascorbic
acids contents in fruits and vegetables
4. Types, methods of packing and importance of ventilation, pre-cooling packing methods for export
5. Methods of prolonging storage life
6. Effect of ethylene on ripening of Banana, Sapota, Mango
7. Identification of equipment and machinery used in preservation of fruits and vegetables
8. Preservation by drying and dehydration
9. Preparation of jam, jelly, marmalades, squash, cordials, syrups, chutney, pickles, sauces, ketchup
10. Visit to local processing unit, markets, cold storage units and packing industry

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Date: 11.06.2016

3rd Year, SEMESTER-V

BSA- 540 Diseases of Horticultural Crops and Their Management

L	T	P	CR
2	0	1	3

Course objective:

To provide students the knowledge about the common pathogens of different plant diseases. To help them to acquire the knowledge about etiology and symptoms of these diseases which helps in diagnosis of the diseases of field and horticultural crops?

Course content:

Unit 1:	**30%**
Unit 2:	**30%**
Unit 3:	**20%**
Unit 4:	**20%**

Unit-I: Study of diseases I

Study of following diseases with reference to their economic importance, symptoms, causal organism, etiology, epidemiology, diseases cycle and integrated management.

1. Rust diseases of Rose, Beans, Coffee, Tea, Mulberry and Jasmine.
2. White rust of crucifers
3. Leaf blight of Mango (twig die back), Brinjal (phomopsis), Potato (early and late), Tomato (early)
4. Bacterial blight of Betelvine, Mulberry, Mango
5. Bacterial leaf spot of pomegranate
6. Leaf spot of Banana (sigatoka diseases), Sapota (*Phaeophleosporaindica*), Grapevine (*Cercosporaviticola*), Crucifers (*Alternariabrassicicola*), Mulberry (*Cercosporamoricola*), Jasmine (*Alternariajasmini*)

Unit-II: Study of diseases II

7. Powdery mildew of Mango, Grapevine, Apple, Cucurbits, Rose, Mulberry, Chrysanthemum
8. Downy mildew of Grapevine, Crucifers, Cucurbits, Onion
9. Anthracnose of Papaya, Mango, Citrus, Grapevine, Guava, Chilli, Cucurbits, Beans
10. Bacterial wilt of Banana, Guava, Brinjal
11. Fungal wilt of Bhindi, Chrysanthemum, Banana (panama disease)
12. Fruit rot of Pomegranate (*Phomopsis*sp.), Banana (*Macrophominamusae*), Citrus (Gummosis), Tomato, Oil palm (*Mafasmiumpalmivora*) Rotting of grape berries
13. Damping off of Papaya, Tomato
14. Collar rot of Papaya, Apple, Brinjal, Chrysanthemum (Stem rot)
15. Root rot of Apple, Chrysanthemum
16. Onion smut
17. Foot and leaf rot of Betelvine

Unit-III: Study of diseases III

18. Citrus canker, Stem canker of Mango
19. Bud rot of Coconut, Oil palm, stem bleeding of coconut
20. Purple blotch and blast of onion
21. Blister blight of Tea
22. Mango malformation and black tip
23. Citrus gummosis and greening
24. Black rot of Crucifers
25. Little leaf of brinjal
26. Leaf curl of Chilli, Potato, Tomato

Unit-IV: Study of Diseases IV

27. Mosaic of Papaya, Beans
28. Bunchy top of banana, little leaf of brinjal
29. Flat limb of Sapota
30. Black mold of onion, Sooty mould of Sapota
31. Root knot of Bhindi, Citrus nematode
32. Brown rot of Apple, Pink disease of Apple - Apple Scab

Course Learning Outcome

1. Student will know the common pathogens of different diseases.
2. Students acquire the knowledge about etiology and symptoms of these diseases which helps in diagnosis of the diseases of field and horticultural crops.
3. By knowing means of dispersal of these diseases suitable management methods can be applied.
4. Eco-friendly and economically suitable management practices may be adopted.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	2	-	-	-	1	1	2	1	-	2
CO2	1	-	1	-	1	-	1	-	3	-	1	2
CO3	1	1	-	1	-	-	2	-	-	-	-	1
CO4	2	-	1	-	-	-	1	-	-	-	-	1
Avg.	1.25	1	1.33	1	1	-	1.25	1	2.5	1	1	1.5

Recommended Text Books-

1. Diseases of Vegetable crops - R.S. Singh
2. Diseases of Plantation crops and their management - Kulkarni
3. Diseases of Fruits and Plantation crops and their management, A modern perspective- Jahagirdar
   Shamora

Recommended Reference Books

1. Diseases of Plantation Crops - V.K. Gupta
2. Diseases of Vegetable Crops - J.C. Walker
3. Diseases of Fruit Crops - V.K. Gupta

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Date: 11.06.2016

BSA- 578 Diseases of Horticultural Crops and their Management Lab

List of Experiments:

1. Diseases of beans, citrus, guava and Sapota
2. Diseases of papaya, banana, pomegranate and Ber
3. Diseases of mango, grapes and apple; Diseases of chilli, brinjal and bhindi
4. Diseases of potato, tomato and crucifers;
5. Diseases of cucurbits, onion and betelvine;
6. Diseases of oil palm, coconut, tea, coffee and mulberry,
7. Diseases of rose, chrysanthemum and jasmine.

Note: Field visit at appropriate time during the semester.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-579 Practical Crop Production I (Cereals, Pulses and Fodder Crops) Lab

L	T	P	CR
0	0	1	1

Course objective:

To make students acquainted with the knowledge of profitable crop production technology.Tohelp the students/farmers about ruminative crop production techniques.

Course content:

Practice of raising 8-10 prevailing *Kharif*crops of the agro-climatic zones will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m^2 area. Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No.	Exercise	No. of classes
1	Crop planning for raising*Kharif*-crops	2
2	Field preparation and preparation of nursery beds for crop	1
3	Seed treatment, seed inoculation and sowing of crop	2
4	Fertilizer application (basal, top dressing and foliar spray) in crop	2
5	Water management (irrigation & drainage) in crop	1
6	Weed management (cultural/mechanical/chemical) in crop	1
7	Management of insect pests and diseases in crop	1
8	Harvesting, drying, and tying bundles and transport to threshing floor of crop.	1
9	Threshing, winnowing and drying of produce	1
10	Storage and marketing	1
11	Preparation of balance sheet including cost of cultivation and value of produce.	2

Course Learning Outcome

1. In the course study students will be acquainted with the knowledge of profitable crop production technology.
2. Course content will help to students/farmers about ruminative crop production techniques.
3. It helps to adopt diversified farming system according to available farming situation.
4. It will assist to encourage the sustainable agriculture system. Profitable based farming system can we adopted with the help of course content

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Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	3	2	-	-	1	-	3
CO2	1	-	-	-	-	2	2	-	-	1	-	2
CO3	1	-	2	1	-	-	1	-	1	-	-	1
CO4	3	-	1	1	-	-	1	-	-	-	-	2
Avg.	1.66	1	1.5	1	1	2.5	1.5	-	1	1	-	2

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IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI
BSA-641 Production Economics and Farm Management

L	T	P	CR
1	0	1	2

Course objective:
To introduce a comprehensive treatment of the traditional agricultural production economics topics employing both detailed graphics and differential calculus.

Course outcome:

Unit 1:	**30%**
Unit 2:	**35%**
Unit 3:	**35%**

Unit- I: Production Economics
Production Economics: Meaning, definition, nature and scope of agricultural production economics. Basic concepts and terms.Concepts of production. Production Functions: Meaning, definition, types.

Unit-II: Law of Returns
Laws of returns: Increasing, constant and decreasing. Factor product relationship, determination of optimum input and output.Factor relationship.Product relationship.Types of enterprise relationships.Returns to scale: Meaning, definition, importance.

Unit-III: Farm Management
Farm Management. Economic principles applied to the organizations of farm business. Types and systems of farming.Farm planning and budgeting.Risk and uncertainty. Linear Programming: Assumptions, advantages and limitations of linear Programming.

Course Learning Outcome:

1. The course contains a comprehensive treatment of the traditional agricultural production economics topics employing both detailed graphics and differential calculus.
2. Focus on the neoclassical factor-product, factor-factor and product- product models, and is suitable for an advanced undergraduate or a beginning graduate –level course in static production economics. Understand limited resources available in the economy.
3. Realize the need to exploit and utilize through development and improvement of production techniques.
4. Make them aware of the availability of rich natural endowments to achieve sustainable agricultural development with this knowledge they can challenge the problems of unemployment inequality shortage of food productions, poverty and be useful to compete advanced agricultural economies.

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Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	-	1	2	-	-	2	-	-	1	-	2
CO2	1	-	-	-	1	2	3	-	-	1	-	2
CO3	-	1	-	2	-	1	1	-	-		-	1
CO4	2	1	-	1	-	-	1	1	-	2	-	2
Avg.	1.5	1	1	1.66	1	1.5	1.75	1	-	1.33	-	1.75

Recommended Text Books-

1. Elements of Farm Management – I.J. Singh and V.K. Puri
2. Economics of Farm Management – A.S. Kahlon and Karam Singh

Recommended Reference Books-

1. Farm Business Management – S.S. Johl and T.R. Kapoor
2. Farm Management – S.P. Dondyal.

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Date: 11.06.2016

BSA-680 Production Economics and Farm Management Lab

List of Experiments:

1. Computation of cost concepts
2. Methods of computation of depreciation
3. Analysis of net worth statement; Farm inventory analysis
4. Preparation of farm plans and budgets
5. Types of farm records and accounts
6. Preparation of profit and loss account
7. Break-Even analysis
8. Economic analysis of different crop and livestock enterprises
9. Application of farm management principles

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI

BSA-642 Extension Methodologies for Transfer of Agricultural Technology

L	T	P	CR
1	0	1	2

Course objective:

To introduce the new trends in agriculture extension, privatization extension.To make student meaning, definition and genesis of term communication. Different important models of communication understand the

Course content:

Unit 1:	**10%**
Unit 2:	**15%**
Unit 3:	**30%**
Unit 4:	**20%**
Unit 5:	**25%**

Unit-I: Communication skills

Meaning, definition and genesis of term communication. Different important models of communication Aristotle model, Shannon and Weaver model, Berlo model and Leagans model. Elements of communication and their characteristics, Types of communication and barriers of communication.

Unit-II: Planning in Extension

Extension Programme Planning – Meaning, concept and definition of programme planning, Project and its importance. Principles of programme planning and Steps of programme planning. Definition of evaluation, difference between evaluation and monitoring.Meaning and definition of extension teaching, Methods and their classifications, Functions of Extension Teaching Methods.

Unit-III: Contact Methods

Individual contact methods-Farm and home visit, result demonstration, Field trials – Meaning, objectives, steps, merits and demerits.Group contact methods, Group discussion, method demonstration, Field trips meaning, objectives, steps, merits and limitations. Small group discussion techniques-Lecture, Symposium, Panel, Discussion, Debate, Forum, Buzz group, Workshop, Brain storming, Seminar and Conference. Mass contact methods-Campaign, Exhibition, KisanMela, Radio and T.V. talk- Meaning, Importance, Steps, and merits and limitations. Factors influencing in selection and use of Extension teaching methods and combination (Media Mix) important Steps, merits and limitations.

Unit-IV: Information

Innovative information sources-concept and importance of innovative information sources like internet, cyber cafes, videos and tele conferences.Concept of Kisan call centers and consultancy clinics, scope and definition of Agricultural clinics. Agricultural Journalism-meaning, scope and importance. Different sources of news andtypes, Merits and limitations of agricultural journalism. Meaning, definition, Process of diffusion and elements of diffusion.

Unit-V: Adoption

Meaning, definition of adoption process, stages of adoption. Meaning, definition and characteristics ofInnovation.Adopters categories and their characteristics, important factors influencing adoption

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process.meaning of capacity building, Meaning and definition of training, Different types of training.Development and execution of training programmes to farmers, farm women and rural youth.Functions of Farmers Training Center and Krishi Vigyan Kendra.

Course Learning Outcome:

1. New trends in agriculture extension: privatization extension.
2. Monitoring and evaluation – concept and definition, monitoring, and evaluation of extension programmes, Transfer of Technology- Concept and models.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	1	1	-	-	1	-	3
CO2	1	-	1	-	-	-	2	2	-	-	1	2
Avg.	1	2	1	-	1	1	1.5	2	-	1	1	2.5

Recommended Text Book-

1. Education and Communication for Development – O.P. Dahama and O.P. Bhatnagar
2. Extension Communication and Management – G.L. Ray

Recommended Reference Books-

1. A Text Book of Agricultural Communication – A.S. Sandhu
2. Diffusion of Innovation – E.M. Rogers

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-681 Extension Methodologies for Transfer of Agricultural Technology Lab

List of Experiments:

1. Simulated exercises on communication. Identifying the problems, fixing the priorities and selecting
a most important problem for preparation of a project
2. Developing a project based on identified problems in a selected village
3. Organization of Group Discussion and Method demonstration
4. Visit to KVK/FTC
5. Planning and writing of scripts for radio and television
6. Audio-Visual aids-Meaning, Importance and Classification
7. Selection, Planning and Preparation. Evaluation and Presentation of visual aids
8. Planning and preparation of visual aids-Charts, Posters, Over Head Projector (OHP), Transparencies, Power Point Slides
9. Planning and preparation of Agricultural Information materials-Leaflet, Folders, Pamphlet, News Stories, Success Stories
10. Handling of Public Address Equipments (PAE) System, Still camera, Video Camera and Liquid Crystal Display (LCD) projector

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI

BSA- 643 Principles of Plant Biotechnology

L	T	P	CR
2	0	1	3

Course objective: To introduce the concepts of plant biotechnology to students. To make them understand the principles of tissue culture and plant genetic engineering.

Course content:

Unit 1: 25%

Unit 2: 25%

Unit 3: 25%

Unit 4: 25%

Unit-I: Plant Biotechnology Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering;scope and importance in crop improvement.(a) Totipotency and Morphogenesis,(b) Nutritional requirements of in-vitro cultures.

Unit-II:*In vitro* Cultures:Techniques of *In vitro* cultures; (a) Micro propagation(b) Anther culture(c) Pollen culture(d) Ovule culture(e) Embryo culture(f) Test tube fertilization(g) Endosperm culture(h) Factors affecting above in vitro culture(i) Applications and achievements.

Unit-III: Somaclonal Variation; Somaclonal variation, types, reasons, Somatic embryogenesis and synthetic seed production technology, Protoplast isolation(a) Culture, manipulation and fusion(b) Products of somatic hybrids and cybrids, applications in crop improvement.

Unit-IV: Genetic Engineering;Genetic engineering(a) Restriction enzymes(b) Vectors for gene transfer(c) Gene cloning(d) Direct and indirect method of gene transfer(e) Transgenic plants and their applicationsBlotting techniques-DNA finger printing, DNA based markers-RFLP, AFLP, RAPD, SSR and DNA probe Mapping QTL – future prospects, MAS, and its application in crop improvement.

Unit 1: 25%

Unit 2: 25%

Unit 3: 25%

Unit 4: 25%

Course Learning Outcome:

1. Application of plant tissue culture in crop improvement.
2. Tackled the problems in convention breeding Plant tissue culture is a area of entrepreneurship.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	-	2	1	1	-	-	2
CO2	1	-	1	-	-	2	1	-	-	-	-	2
Avg.	1	1	1	-	-	2	1.5	1	1	-	-	2

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Recommended Text Book-

1. Plant Biotechnology – H.S. Chawala
2. Biotechnology – B.D. Singh

Recommended Reference Books-

1. Element of Biotechnology – Prof. P.K. Gupta
2. Plant Biotechnology – Dr. S.S. Purohit

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Date: 11.06.2016

BSA- 682 Principles of Plant Biotechnology Lab

List of Experiments:

1. Requirements for Plant Tissue Culture Laboratory
2. Techniques in Plant Tissue Culture
3. Media components and preparations
4. Sterilization techniques and inoculation of various explants
5. Aseptic manipulation of various explants
6. Callus induction and Plant Regeneration
7. Micro propagation of important crops
8. Anther, Embryo and Endosperm culture
9. Hardening/Acclimatization of regenerated plants
10. Somatic embryogenesis and synthetic seed production
11. Isolation of protoplast
12. Demonstration of culturing of protoplast
13. Demonstration of Isolation of DNA
14. Demonstration of Gene transfer techniques, direct methods
15. Demonstration of Gene transfer techniques, indirect methods
16. Demonstration of Confirmation of Genetic transformation
17. Demonstration of gel-electrophoresis techniques

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI

BSA-644 Entrepreneurship Development and Communication Skills

L	T	P	CR
2	0	0	2

Course objectives:

To make students able to understand the concepts ofentrepreneurship and scope and prospects of entrepreneurship development.

Course content:

Unit 1:	25%
Unit 2:	25%
Unit 3:	25%
Unit 4:	25%

Unit-I: Entrepreneurship; development-Historical perspective, assessing overall business environment in the Indian Economy; Concept, need, scope and prospects of entrepreneurship development; Globalization and the emerging business/entrepreneurial environment; Entrepreneurial and managerial characteristics; Managing an enterprise, motivation and entrepreneurship development.

Unit-II: Entrepreneurship development programmes;Importance of planning, monitoring, evaluation and follow up. Managing competition and entrepreneurshipdevelopment programmes*viz* IRDP, JRY, TRYSEM, SGSY, SWOT analysis.

Unit-III: Commercialization and industrialization;Generation, incubation and commercialization of ideas and innovation. Government schemes and incentives forpromotion of entrepreneurship.Government policy on small and medium enterprises (SME's)/SSIs.Export andImport policies relevant to agriculture sector.Venture capital, contract farming and joint ventures, public- private partnership. Overview of agri inputs industry. Characteristics of Indian agricultural processing and export industry.Social responsibility of business.

Unit-IV: Communication Skills; Communication skills-structural and functional grammar-meaning and process of communication. Verbal andnon-verbal communication.Listening and note taking, writing skills and oral presentation skills.Field diary and lab record, indexing, foot note and bibliographic procedures.Reading and comprehension of general and technical articles.Precise writing, summarizing, abstracting.Individual and group presentations.Importance (Extempore speech) of presentation, public speaking group discussion.Organizing seminars and conferences.

Course Learning Outcomes:

1. In the end of the course students will be able to define basic terms and analyse the business environment in order to identify business opportunities.
2. Identify the elements of success of entrepreneurial ventures.Consider the legal and financial conditions for starting a business venture, Evaluate the effectiveness of different entrepreneurial strategies.

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3. Specify the basic performance indicators of entrepreneurial activity.
4. Explain the importance of marketing and management in small businesses venture, interpret their own business plan.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	3	2	-	-	1	-	2
CO2	1	-	-	-	1	3	1	-	-	1	-	2
CO3	-	-	1	-	1	1	1	-	1	-	-	2
CO4	-	1	-	-	1	3	1	-	1	-	-	1
Avg.	1	1	1	-	1	2.5	1.25	-	1	1	-	1.75

Recommended Text Books-

1.Trainer's Manual on Developing Entrepreneurial Motivation – Akhori, M.M.P., Mishra, S.P. and Sengupta, Rita (1989), NIESBUD
2. Entrepreneurial Development – Khanka, S.S., S. Chand Co. Ltd. Ramnagar, New Delhi
3. Fundamental of Entrepreneurship – Aggrawal R.C., Laxmi Narayan Aggrawal, Agra (U.P.)
4. Dynamics of Entrepreneurial – Desai, Vasant, Himalayan Publication House, New Delhi

Recommended Reference Books-

1. Farm Communication through Mass – Samant, A.G., Associated Media in the New Millennium Publishing Company, Karol Bag, and New Delhi
2. Entrepreneurship Development Programme in India and its relevance – Patel, V.G.

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Date: 11.06.2016

BSA-662 Entrepreneurship Development and Communication Skills Lab

List of Experiments:

1. Listening and note taking, writing skills
2. Oral presentation skills
3. Field diary and lab record, indexing, footnote and bibliographic procedures
4. Reading and comprehension of general and technical articles
5. Precise writing, summarizing, abstracting
6. Individual and group presentations

IA UNIVERSITY UTTAR PRADESH KANPUR

Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI
BSA-645 Organic Farming

L	T	P	CR
3	0	0	3

Course objective:
To introduce the students to the concepts and importance of organic farming.To provide the knowledge about the nutrient management and disease and pest management inorganic farming.

Course content:

Unit 1:	25%
Unit 2:	25%
Unit 3:	20%
Unit 4:	20%
Unit 5:	10%

Unit-I: Organic farming introduction; Introduction of Organic Farming (OF); (a) Importance of requirement of foods and fodder in the nation (b) OF in relevance to quality foods and fodder(c) Meaning of OF and its basic toolsConcept of OF and objectives of OF; (a) OF in relevance to Indian and global agriculture in present context(b) OF in relevance to sustainable agriculture and farming systemsOrganic production requirements(a) What to do and what not to do in OF and conversion of land for organic agriculture(b) Organic soil with organic nutrition - organic matter and its role in plant nutrition(c) Organic sources of plant nutrition

Unit-II: Nutrient management; Biological intensive nutrient management; (a) Organic manures-Farmyard manure (preparation, composition and availability)(b) Composts and composting-aerobic and anaerobic composting, microbial cultures for hastening composting, preparation of composts from rural and urban wastes, phospho-composts, NADEP-composts(c) Vermicompost-role of earthworms in composting, method of vermicomposting, vermicuture, vermi-wash, qualities of vermicompost(d) Green manuring and its advantages, green manure crop (leguminous and non-leguminous), ideal green manuring crops and type of green manuring (e) Crop and weed residues and its recycling, farm residues, mulching of residues, use of press mud, biogas slurry and oilcakes(f) Biodynamic farming, *Amritpani*, Homa farming

Unit-III: Biofertilizers;(nitrogenous, phosphorus and compost), Azolla, blue green algae and mycorrhiza their applications.

Unit-IV: Disease and pest management in OF - Integrated disease and pest management and key steps foriological control of diseases and pests(a) Use of bio-control agents (parasitoids and predators), and biopesticides (bacterial, fungal and viral pesticides)(b) Use of pheromone traps, trap crops, bird-perches, botanic, cultural practices and ITKs (indigenous technical knowledge)

Unit-V: Weed management(a) Cultural and physical methods of weed control(b) Biological methods of weed control using natural enemies and pathogens.Quality considerations(a) Concepts of standards

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and various standards of OF(b) Accreditation and functions of accreditation agencies(c) Inspection and certification - accredited inspection and certification agencies, and procedures of inspection and certification(d) Labeling, logo, transport, storage, marketing and export.

Course Learning Outcomes

1. Initiative from Government for organic produce. Role of NGOs in producing organic products.
2. Selection of crops and varieties for organic produce.
3. Certification of organic produce.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	1	-	1	2	1	-	-	1	-	2
CO2	1	2	1	-	1	2	1	1	-	-	-	2
CO3	-	2	1	1	-	1	-	-	1	-	-	1
Avg.	1	2	1	1	1	1.66	1	1	1	1	-	1.66

Recommended Text Books-

1. Organic Food Production in India - Bhattacharya, P. 2003, Agribios- Status, Strategy and Scope (India)Jodhpur
2. Organic Farming-Theory and - Palanniappan, S.P. and Anandurai, Practices K 1999, Scientific Publisher, Jodhpur
3. Organic Farming - Lumpkin, N. 1990, Farming Press Books, IPSWITCH, U.K.
4. Hand Book of Organic Farming - Sharma, A.K. 2001, Agribios (India), Jodhpur

Recommended Reference Books-

1. Organic Farming - Gupta, M.K. 2002, Moraka Foundation, Jodhpur
2. Organic Farming for - Parvatha Reddy, P, Agribios (India), Sustainable Horticulture Jodhpur
3. Emerging Trends in Biological - Ananthakrishnan, T.N. 1992, Oxford Control of PhytophageousInsects & IBH, New Delhi

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BSA-663 Organic Farming (Lab)

List of Experiments:

1. Raising of vegetable crops through organic nutrients, diseases and pest management
2. Raising of nursery for vegetable crops and ornamentals
3. Macro quality analysis
4. Grading and packaging
5. Post-harvest management

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rdYear, SEMESTER- VI
BSA-646Environmental Science

L	T	P	CR
2	0	0	2

Course objective:
To introduce the multidisciplinary nature of environmental studies and need for public awareness.

Course content:

Unit 1:	25%
Unit 2:	20%
Unit 3:	20%
Unit 4:	15%
Unit 5:	10%
Unit 6:	10%

Unit-I: Environmental Science Scope and importance of environmental studies. Multidisciplinary nature of environmental studies and need for public awareness. Natural resources - Renewable and non-renewable resources: Natural resources and associated problems.(i) Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams andtheir effects on forests and tribal people.(ii) Water resources: Use and over utilization of surface and ground water, floods, drought, conflict over water, dams benefits and problems.(iii) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.(iv) Food resources: World food problem, changes caused by agriculture and over-grazing, effect of modern agriculture, fertilizer-pesticides problem, water logging, salinity, case studies.(v) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.(vi) Land resources: Land as resources, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources forsustainable life style.

Unit-II: Ecosystem: Concept of an ecosystem. Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession.Food chain, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem: Crop and ecosystem, Forest ecosystem, Grassland easy, Desert ecosystem, Aquatic ecosystem (Ponds, streams, lakes, rivers, oceans estuaries).

Unit-III: Bio-diversity and its conservation(i) Introduction - Definition, genetic, species and ecosystem diversity.(ii) Bio-geographical classification of India.(iii) Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values.(iv) Biodiversity: at global national and local level(v) India as a mega-diversity nation.(vi) Hot-spot of biodiversity(vii) Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.(viii) Endangered and endemic species of India(ix) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

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Unit-IV: Pollution Environmental pollution:Definitions cause effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and nuclear hazards.(ii) Solid waste managements: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.(iii) Disaster management: floods, earthquake, cyclone and landslides.

Unit-V: Environment and social issues Social issues and the Environments:(i) From unsustainable to sustainable development.(ii) Urban problems related to energy.(iii) Water conservation, rain water harvesting, watershed management.(iv) Resettlement and rehabilitation of people: its problems and concerns.(v) Environmental ethics: issues and possible solutions.(vi) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.(vii) Wasteland reclamation.(viii) Consumerism and waste products.

Unit-VI: Protection Acts for Environment and Human rights; The Environment Protection Act.The Air (Prevention and Control of Pollution) Act.The Water (Prevention and Control of Pollution) Act.The Wildlife Protection Act.The Forest Conservation Act.Issues involved in enforcement of environmental legislation Public awareness. Human population andEnvironment (a) Women and Child Welfare.(b) HIV/AIDS.(c) Role of Information Technology in Environment and human health(d) Population growth, variation among nations(e) Population explosion - Family Welfare Programme(f) Environment and human health. Human Rights, Value Education

Course Learning Outcome:

1. At the end of the course, the student will be able to: Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Interdisciplinary branches of environment and their scopes. Concepts of natural resources, Food resources, mineral resources, Concept of non-conventional energy resources, types and various applications of renewable resources and current potentials of energy resources.
3. Ecosystem Links between environmental components and their role and types of ecosystems. Types of biodiversity, their values, depletion and conservation methods.
4. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare.Role of Information Technology in environment and human health.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	1	1	-	1	2	2	-	-	1	1	3
CO2	1	-	1	-	1	2	2	1	-	1	1	2
CO3	1	-	2	2	1	-	1	-	1`	-	-	2
CO4	-	2	2	-	1	-	2	-	1	1	-	2
Avg.	1.33	1.5	1.5	2	1	2	1.75	1	1	1	1	2.25

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Faculty of Agricultural Sciences and Allied Industries

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Recommended Text Books-

1. Principles of Agricultural Ecology - G.S. Dhaliwal & G.S. Klear
2. Fundamentals of Environmental Biology - K.C. Aggrawal
3. Ecology and Environment - P.D. Sharma
4. A Test book of Environmental Science - V. Subramaniam
5. Ecology and Environmental Biology - Purohit, S.S. and Aggrawal, A.K.
6. Environmental Studies - S. Singhal and N. Singhal

Recommended Reference Books-

7. Essentials of Environmental Science - Dhaliwal, G.S. and Kukal, S.S.
8. Environmental Biology - P.D. Sharma
9. Environmental Studies - Rajesh Dharkar

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA-664Environmental Science Lab

List of Experiments:

1. Collection, processing and storage of effluents sample.
2. Determination of Bio-chemical Oxygen Demand (BOD) in effluents sample.
3. Determination of Chemical Oxygen Demand (COD) in effluents sample
4. Determination of Oxygen Demand (OD) in effluents sample.
5. Determination of sound level by using sound level meter.
6. Estimation of irrespirable and non irrespirable dust in the air by using portable dust samples.
7. Determination of Total Dissolved Solids (TDS) in effluents sample.
8. Estimation of species abundance of plants.
9. Estimation of nitrate contamination in ground water.
10. Analysis of temporary and total hardness of water sample by titration.
11. Estimation of pesticides contamination in Agro-Ecosystem.
12. Crop adaptation to environmental variable, soil conditions.
13. Study of transpiration and water balance in plants.
14. Assessment of chlorophyll content of fresh water ecosystem.
15. Visit to local polluted sites: Observation and remedial measures.
16. Visit to social service organization/Environmental Education Center.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI
BSA- 647 Weed Management

L	T	P	CR
1	0	1	2

Course objective:
To introduce students to the weeds and its classification, propagation and dissemination and concepts of weed prevention, eradication and control.

Course content:

Unit 1:	35%
Unit 2:	35%
Unit 3:	30%

Unit-I: Weeds
Weeds: Introduction, harmful and beneficial effect. Classification, propagation and dissemination. Weed biology and ecology. Crop-weed association.Crop-weed competition and allelopathy.

Unit-II: Weed Control and Herbicides
Concepts of weed prevention, eradication and control. Method of weed control: physical, cultural, chemical and biological. Integrated weed management. Herbicides: Advantages and limitation of herbicide usage in India; Herbicides classification and formulation. Methods of herbicide application.Introduction to adjuvant and their use in herbicides.Introduction to selectivity of herbicides.

Unit-III: Weed Management
Compatibility of herbicides with other agro-chemicals. Weed management in major field and horticultural crops; Shift of weed flora in cropping systems. Aquatic and problematic weeds and their control.

Course Learning Outcome

1. Students will be acquainted about why to undertake environmental weed control.
2. Students will be acquainted about different approaches of weed management.
3. Students will be acquainted about harmful and beneficial effects of weeds in Agriculture.
4. Students will be acquainted planning for weed management and weed management processes.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	1	-	1	1	-	2
CO2	1	-	1	-	1	1	2	-	-	-	1	2
CO3	-	1	-	-	1	1	-	-	1	-	-	1
CO4	-	1	-	-	1	-	1	-	-	-	-	1
Avg.	1	1	1	-	1.25	1.33	1.33	-	1	1	1	1.5

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Date: 11.06.2016

Recommended Text Books-

1. Principal of Weed Science – V.S. Rao (1994), Oxford & IBH Publication, New Delhi.
2. Weed Management – Walia, U.S. (2003), Kalyani Publication, New Delhi
3. Weed Management-Principles and – Gupta, O.P. (2000), Agrobios practices Publication, India
4. A Manual of Weed Control – Kewat, M.L. and Sharma, R.S. (2007), Department of Agronomy, College of Agriculture Jabalpur Publication

Recommended Text Books-

1. All about Weed Control – Subramaniam, S., Ali, A.M. and Kumar, R.J. (1977), Kalyani Publication,
   New Delhi
2. Weed Science: Basics and Applications – T.K. Das (2008), Jain Brother Publication

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

BSA- 683 Weed Management Lab

List of Experiments:

1. Identification of weeds
2. Survey of seeds on crop fields and other habitats
3. Preparation of herbarium of weeds
4. Calculations on weed control efficiency and weed index
5. Herbicide label information
6. Computation of herbicides doses
7. Demonstration of methods of herbicides application
8. Preparation of list of commonly available herbicides
9. Study of phytotoxicity symptoms of herbicides in different crops
10. Biology of nut sedge, Bermuda grass, parthenium, celosia
11. Economics of weed control practices
12. Visit of weed infested/problematic areas

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI
BSA-648 Renewable Energy

L	T	P	CR
2	0	0	2

Course objective:
To introduce the concepts and principles of energy resources, solar and wind energy.To make students able to understand the process of biomass conversion and biogas.

Course content:

Unit 1:	35%
Unit 2:	35%
Unit 3:	30%

Unit-I: Energy Resources
Introduction to energy sources. Biomass conversion processes. Biogas production and application.Types of biogas plants and constructional details.Agricultural wastes and their characteristics.Principles of combustion, pyrolysis and gasification.Process of biomass gasification and types of gasifiers.Producer gas and its applications. Bio-mass briquetting machines types, uses of briquettes, shredders.

Unit-II: Solar energy
Introduction to solar energy, solar flat plate and focusing plate collectors.Solar air heaters, solar space heating and cooling. Solar cookers, solar water heating systems, solar grain dryers. Solar refrigeration system, solar ponds, solar photo voltaic system.Solar street light, solar fencing, solar pumping system.

Unit-III: Wind Energy
Wind energy, types of wind mills, constructional details and application of windmills. Production process of Liquid Bio Fuels (Bio diesel and Ethanol).

Course Learning Outcome:
CO1- In the end of the course students will be able to understand the various energy sources, biomass conversion processes.
CO2-Biogas production and application.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	-	1	1	2	1	-	-	1	-	2
CO2	1	-	1	-	-	1	2	-	-	1	-	1
Avg.	1	-	1	1	1	1.5	1.5	-	-	1	-	1.5

Recommended Text Books-

1. New and Renewable Energy Sources – A.N. Mahur, N.S. Rathore

2. Bio-gas Technology – K.C. Khandelwal and S.S. Mandi
3. Renewable Energy Sources – J.N. Twivell and A. Weir
4. Bio-mass Combustion Technologies – FAO 1988

Recommended Text Books-

1. Advances in biogas technologies – O.P. Chawala
2. Solar Energy – S.P. Sukhatme
3. Non-conventional Sources of Energy – G.D. Rai

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Date: 11.06.2016

BSA-666 Renewable Energy Lab

List of Experiments:

1. Study of constructional details of KVIC and Janta type biogas plants.
2. Study of DeenBandhu type biogas plants.
3. Field visit to biogas plants
4. Study of different types of gasifiers.
5. Operation of gasifiers.
6. Briquette preparation from biomass
7. To study the efficiency of solar cooker
8. To study the construction and operation of solar still
9. To study the construction and operation of solar dryer.
10. To study the construction and operation of solar photovoltaic pumping system.
11. To study the construction and operation of domestic solar water heater.
12. To study the construction and operation of solar lantern.
13. To study the construction and operation of solar street light.
14. To study the construction and operation of different types of wind mills.
15. Field visit to windmills.
16. To study the processing of bio-diesel production from Jatropha.

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Faculty of Agricultural Sciences and Allied Industries

Date: 11.06.2016

3rd Year, SEMESTER-VI

BSA-684 Practical Crop Production II (Oil seeds and commercial crops) Lab

L	T	P	CR
0	0	1	1

Course objective:

To make students acquainted with the knowledge of profitable crop production technology for oil seeds and commercial crops.Tohelp the students/farmers about ruminative crop production techniques.

Course content:

Practice of raising 8-10 prevailing *Rabi* crops of the agro-climatic zone will be done by the student. One crop will be grown by a student or group of 2-4 students depending upon the strength of students in the class, on a minimum of 100 m^2 area. Following practices will be performed by the student(s) for raising the allotted crop to them separately, besides observing the practices performed by other students in their plots for raising the crops.

Practical

S.No.	Exercise	No. of classes
1	Crop planning for raising Rabi-crops	2
2	Field preparation and preparation of nursery beds for crop	1
3	Seed treatment, seed inoculation and sowing of crop	2
4	Fertilizer application (basal, top dressing and foliar spray) in crop	2
5	Water management (irrigation & drainage) in crop	1
6	Weed management (cultural/mechanical/chemical) in crop	1
7	Management of insect pests and diseases in crop	1
8	Harvesting, drying, and tying bundles and transport to threshing floor of crop.	1
9	Threshing, winnowing and drying of produce	1
10	Storage and marketing	1
11	Preparation of balance sheet including cost of cultivation and value of produce	2
12	Determination of net monetary returns per student or per group of students and benefit cost ratio	1

Total 16

Note: Final report of raising the crop will be submitted by the student or group of students for evaluation

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Date: 11.06.2016

Course Detail and Evaluation Scheme
(Effective from the Session 2018-19)
B. Sc. Agriculture (Honours)
4th Year, SEMESTER-VII
BSA 701- Rural Agricultural Work Experience Programme (RAWE)

Credit: 20

Rama University, Kanpur, has introduced Rural Agricultural Work Experience programme as an essential requirement for B.Sc. (Ag) degree. The committee in order to make higher agricultural education relevant to present day changing needs, and develop professionalism felt for reorienting agricultural education. In view of globalization and development of new technologies, it is essential that the students meet international quality standards. One of the pillars for quality assurance in agricultural education is the curriculum, which takes are of contemporary needs, provides for analytical skill, students will be placed in the villages for intensive training and field experience with farm families. During stay in the villages, they will get an opportunity to study the different the problems and suggest the appropriate measures to solve them for improvement in the existing practices. Students will also develop confidence in applying the knowledge gained during the course of the studies and fine-tune their skill with the experience and knowledge of host farmers. Under this programme, RAWE model first has been adopted in the University.

Objectives

1. To understand of rural community life and the current situation prevailing in villages with special reference to agriculture and allied enterprises.
2. To familiarize with the socio-economic conditions of farmers and their problems with reference to agricultural development.
3. To make students understand farm technologies as adopted by farmers and also to help farmers to prepare sound farm plans matching to available resources.
4. To facilitate development of communication skills in students through use of extension teaching methods for transfer of technology.
5. To acquaint the students with the on-going extension and rural development programmes and to understand the activities of Krishi Vigyan Kendra.
6. To develop confidence and competence in students for solving teaching problems related to agriculture and allied enterprises.
7. To develop understanding regarding high-tech agricultural technology and factors affecting in the adoption of modern methods of agriculture by the farmers.

Registration

The students shall register for RAWE programme during VII semester in B.Sc. (Agri.) degree programme.

Eligibility for registration and other requirements

1. Students who have completed all the prescribed courses up to VIth semester for B.Sc. (Agri.) degree will be eligible for registration.

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2. Students will be required to devote whole time to RAWE programme.
3. Eighty per cent attendance is compulsory for students registered for RAWE programme failing which they will have to repeat the programme at their own cost. The students shall maintain good conduct and discipline during RAWE activities. The students registered for RAWE are not allowed to leave the venue of their placement without written permission of the Coordinator RAWE/Dean, College of Agriculture, Permission will be granted only under emergency.

Monitoring and evaluation

1. The advisory committee for monitoring and evaluation of RAWE programme will comprise of the following members) Senior Scientist/Programme Coordinator of concerned station (Chairman)
b) Dean's nominee (Dean will be the overall in-charge of the programme).
c) Head/representative of the departments involved in the RAWE programme.
2. Students will be required to submit a final comprehensive report on or before the date specified in the academic calendar.
3. The students will be required to maintain a daily diary as per the prescribed proforma. They shall produce their diary to the visiting teachers for inspection and for recording their observations and suggestions. The visiting teachers shall verify the work and sign the diary.
4. The Chairman of the committee shall monitor daily activities of individual student.

Evaluation of Performance

The performance of a student will be evaluated component wise as shown below. The 50 marks allotted to each component marks will be awarded by considering the performance of student viz. work done respective subject with the host farmer, observation of the teacher recorded during the visits, punctuality,
Enthusiasm, report with the host farmer and any other significant achievement of the student. All the course teachers will evaluate the comprehensives report submitted by the student and conduct the via voce examination as per their course.

S.No.	Components	Credit	Maximum Marks
1.	Crop production	0+5	50 -20+15+10+5
2.	Crop protection	0+4	50 -20+15+10+5
3.	Rural Economics	0+3	50 -20+15+10+5
4.	Extension Programme	0+4	50 -20+15+10+5
5.	Attachment to the Research Station/KVK	0+4	50 -20+15+10+5
6.	Comprehensive report & Viva-voce		50 -50
	Total	**0+20**	**300 marks**

Thus, a student registered for RAWE will have to obtain at least 150 marks to pass RAWE; OGPA will be worked put following prescribed procedures. In case a student failed to secure the required marks will have to repeat the programme at his own cost.

Implementation of the Programme

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The students from each College will be divided into small groups; each group will be allotted to a Krishi Vigyan Kendra/Research Station under the jurisdiction of JNKVV.

Norms for Allotment of Villages

1. The students will be allotted to KVK or Research Station and they will be equally distributed in different villages depending on availability of enterprising and innovative host-farmers. The Senior Scientist/Training Organizer must satisfy themselves with regard to suitability of selected Farmers/villages for fulfilling the overall objectives of RAWE programme.
2. From among the students placed in a village, one student nominated by station in-charge will function as a student group leader and coordinate the activities in the assigned village.

Orientation

Students have to report to the in-charge RAWE programme in their respective colleges as per the prescribed schedule of work for orientation immediately after registration. They will undergo training on crop production, plant protection, rural economics, extension programme and attachments to KVK/Research Station. This will be of 2 weeks duration. The Heads of concerned departments will ensure that the students are well exposed to the latest practices/technologies available in their respective fields.

Programme of Work

The RAWE program consists of 20 credits and comprises of six components as under:

1. Crop Production 5 Credit

The students shall involve themselves in actual day-to-day agricultural operations along with their host farmers. He/she will also involve in production technology and management of various crops. The student shall maintain a record of work done in prescribed proforma. In fruits and vegetables crops, the students shall involve themselves in field operations viz., seedbed preparation, nursery management, propagation etc. along with their host farmers. The student shall maintain a record of work done and will submit it at the end of the semester.

2. Crop Protection 4 Credit

Under this the students are exposed to various plant and soil disorders and learn to diagnose major plant diseases, insect-pests, and nutrient deficiency, soil related constrains, physiological disorders and prescribe remedial measures.

3. Rural Economics 3 Credit

The students shall take-up tech-economic survey of the village as per the prescribed questionnaire. The students shall be required to collect the data on economic condition of village, resource endowment and its utilization, problems of labour and employment and other important economic aspects detailed in the
schedule. The student shall also conduct a farm survey and workout the cost of cultivation of principal crops grown on the farm allotted to them. He will also maintain a farm record book and

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analyze the data. On the basis of the results students will formulate a number of alternative plans in consultation with the farmers and the advisor for reorganization of the farm business for optimal net returns.

4. Extension Programme 4 Credit

The students shall involve themselves in the following extension education programmes –

I. Identification of agricultural problems of the village and training needs of the farmers.
II. Conducting method demonstrations of improved practices.
III. Organization of short duration farmers training, camps, field visits and agricultural exhibitions.
IV. Study of the on-going extension programmes in the villages.
V. Arrange farmers meeting the discuss agricultural aspects.
VI. Visit to village institutions and study their role in development programmes and other extension activities.
VII. Motivate farmers through different extension teaching methods.
VIII. Documentation of success stories.

Each student will prepare a report with respect to the activities indicated above and submit it to the Chairman of Advisory Committee for its evaluation. The students shall be given an opportunity to acquaint themselves with ongoing programmes and activities of research, development, marketing, extension agencies and organizations in the village. The students will submit report on the institutions he/she has visited.

5. Attachment to the Research Station/KVK 4 Credit

Student will conduct the bench mark survey & PRA of KVK villages. Assisting in conducting F.L.D., organizing farmers meeting Kisanmela, Exhibition, Monthly Workshop, Organizing field visits. Training programmes for farmers and farm women, study of crop cafeteria, visit of line departments viz., Agriculture, Horticulture Dairy, Poultry etc. to enquire about farmers welfare about respective department and visit of digontic team.

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Faculty of Agricultural Sciences and Allied Industries

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4th Year, SEMESTER-VIII
BSA-802 Courses for Experiential Learning

Credit: 20

Course Learning Outcome

1. The student will involve themselves in actual day-to-day agricultural and horticultural operations along with their adopted farmers. For this purpose, a calendar of operations for the entire semester will be prepared in consultation with the adopted farmer and the member of advisory committee. The advisory committee will provide the recommendations for major crops grown in the village and the turn the recommendations for major crops grown in the village and the turn the student compare these with farmer"s practice and get opinion about improved technology. The students will maintain a record of daily work done in the Proforma given to them by the department of Agronomy. Each student shall cover a minimum of three corps, preferable from among cereals, oilseeds and pulse crops. If such crop diversification is not available, the student shall collect information on any three crops either with the adopted farmer or other farmer in or nearby village. Biometrical observations shall be recorded as per Proforma. Each student shall crops a minimum of three corps, preferable from (1) Mango / Khirni / Cashew, (2) Papaya / Lime / Guava (3) Cabbage / Cauliflower / tomato / Chilli. The help of Advisory Committee will be taken in this.

2. The students get an opportunity to work with the farmers in the field and acquainted with various plant protection problems of the standing crops. They collect data on pest damage every week. They shall maintain record of plant protection work undertaken in the prescribed Performa given to them by the Department of Entomology and Plant Pathology for this purpose. The student will also conduct a survey on adoption of recommended plant protection measures and the incidence/occurrence of different diseases and insect pests on different crops in the village. The students will also demonstrate preparation of fungicidal / insecticide spray fluids for important plant protection measures

3. Each student will take up an agro-economic survey of separate village (including surrounding villages) as per questionnaire issued for this purpose by the Department of Agril. Economics. He shall collect data on economic conditions of the village, population, vital statistics, cropping, patterns, irrigation facilities, resources endowment and its utilization, labour problems and employment and other economic aspects covered in the schedule/questionnaire. The student will also conduct a farm holding survey as per proforma given to him by the department, and has to work out the cost of cultivation of principal crops grown by the adopted farmer and two other farmers. He has to develop alternate farm plans in consultation with farmers and extension staff for re-organization of the farm business for higher income. A student has to register 20 credits with major

load in one area of electives and rest from among one/two areas of electives in the eighth semester.

Mapping of course outcome with programme outcome and programme specific outcome-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	3	2	1	2	3	3	3
CO2	1	-	2	1	1	2	2	-	1	2	1	2
CO3	2	1	2	1	1	2	2	1	-	1	2	2
Avg.	1.66	1.5	1.66	1	1	2.33	2	1	1.5	2	2	2.33

Sr.	Title of the module	Credit
I Crop Production		
1	Seed production Technology	3(1+2)
2	Remote Sensing GIS and Land Use Planning	3(1+2)
3	Integrated Farming System	3(1+2)
4	Water Management (Watershed Micro-irrigation Problematic Water)	4(1+3)
5	Soil Management (conservation problematic soil, soil quality	4(1+3)
II Crop Protection		
1	IPM and IDM (Pest Disease Scouting)	4(2+2)
2	Management of Post Harvest insect-pests and diseases	3(1+2)
3	Non-insect pests and their management	3(1+2)
4	Apiculture	2(0+2)
5	Mushroom (cultivation)	2(0-2)
6	Bio-control agencies and bio-pesticide (mass multiplication and uses)	3(1+2)
7	Pesticides and Plant Protection equipment	3(1+2)
III Horticulture		
1	Commercial Vegetable Production	3(1+2)
2	Commercial Floriculture	3(1+2)
3	Commercial Fruit Production	3(1+2)
4	Nursery management of horticultural crops	4(1+3)
5	Protected cultivation of horticultural crops and Seed production of vegetables and flowers	4(1+3)
6	Processing and value addition of horticultural crops	3(1+2)
IV Post Harvest Technology and Value addition		
1	Post harvest technology of Horticultural crops	3(1+2)
2	Unit operation for quality value addition processing and development of new products	4(1+3)
3	Post harvest technology of spices, plantation crops,	

	medicinal and aromatic crops	4(1+3)
4	Integrated storage management of fruits, flowers and vegetables	3(1+2)
5	Post harvest handling of cut flowers and dry flowers	3(1+2)
6	Processing of cereals, pulses and oilseed crops including biodiesel	3(1+2)

V Agri-Business Management

1	Information and Communication Management	3(1+2)
2	Management of Agro-based industry	4(1+3)
3	Marketing Management (Agricultural Import-Export Policy of Govt. of India & Business Laws)	3(1+2)
4	Financial Management of Agri-Business	4(1+3)
5	Natural Resources Economics and Management	3(1+2)
6	Project formulation, Evaluation and Monitoring	3(1+2)

VI Social Sciences

1	Agricultural Journalism	3(1+2)
2	Visuals and Graphic Communications	3(1+2)
3	Cyber Extension	2(1+1)
4	Behavioral Skills	3(1+2)
5	Livestock, Poultry and Fish Marketing	3(1+2)
6	Farm Planning and Budgeting	3(1+2)
7	Government Policies and Programmes Related to Agriculture	3(1+2)

VII Basic Sciences

1	Molecular Breeding	3(1+2)
2	Plant tissue culture	4(1+3)
3	Recombinant DNA Technology	3(1+2)
4	Bio informatics	3(1+2)
5	Microbial and Environmental Technology	4(1+3)
6	Molecular Diagnostics	3(1+2)

VIII Commercial Agriculture

1	Commercial Floriculture	3(0+3)
2	Commercial fruit production	3(0-3)
3	Nursery management of horticultural crops	3(1+2)
4	Cultivation of commercially important medicinal and aromatic plants	2(1+1)
5	Commercial spices production	3(1+2)
6	Production technology of economic forest plants	3(1+2)
7	Commercial seed production technologies	3(1+2)