

**Sardar Vallabhbhai Patel University of  
Agriculture & Technology,  
Meerut- 250110 (U.P.)**

# **College of Agriculture**



## **Course Curriculum**

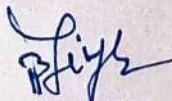
### **B.Sc. (Hons.) Agriculture**

*(As per V<sup>th</sup> Dean's Committee Recommendation of ICAR)*

**2016 – 2017**

  
Registrar

S.V.P. Uni. of Agri. & Tech.  
Meerut-250110 (U.P.)



REGISTRAR  
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SAC-311	Manures, Fertilizers and Soil Fertility Management		3(2+1)
<b>Entomology</b>			
ENT-121	Fundamentals of Entomology		4(3+1)
ENT-311	Pests of Crops and Stored Grain and their Management		3(2+1)
ENT-321	Management of Beneficial Insects		2(1+1)
<b>Agricultural Economics</b>			
AAE-121	Fundamentals of Agricultural Economics		2(2+0)
AAE-221	Agricultural Marketing Trade & Prices		3(2+1)
AAE-311	Agricultural Finance and Co-Operation		3(2+1)
AAE-312	Entrepreneurship Development and Business Communication		2(1+1)
AAE-321	Farm Management, Production & Resource Economics		2(1+1)
<b>Plant Pathology</b>			
PPA-121	Fundamentals of Plant Pathology		4(3+1)
PPA-211	Diseases of Field and Horticultural Crops and their Management-I		3(2+1)
PPA-312	Principles of Integrated Pest and Disease Management		3(2+1)
PPA-321	Diseases of Field and Horticultural Crops and their Management-II		3(2+1)
<b>Horticulture</b>			
HOR-111	Fundamentals of Horticulture		2(1+1)
HOR-211	Production Technology for Vegetables and Spices		2(1+1)
HOR-221	Production Technology for Ornamental Crops, MAP and Landscaping		2(1+1)
HOR-222	Production Technology for Fruit and Plantation Crops		2(1+1)
HOR-321	Protected Cultivation and Secondary Agriculture		2(1+1)
<b>Agricultural Extension and Communication</b>			
AEC-112	Rural Sociology & Educational Psychology		2(2+0)
AEC-121	Fundamentals of Agricultural Extension Education		3(2+1)
AEC-211	Communication Skills and Personality Development		2(1+1)
AEC-312	Entrepreneurship Development and Business Communication		2(1+1)
<b>Agricultural Biotechnology</b>			
AGB-111	Fundamentals of Plant Biochemistry and Biotechnology		3(2+1)
<b>Animal Production</b>			
AAP-211	Livestock and poultry Management		2(1+1)
AAP-212	Principles of Animal Nutrition		2(1+1)
AAP-221	Breeding and Improvement of Farm Animals		2(1+1)
<b>Remedial Courses</b>			
UGR-111	Agricultural Heritage	Department of Agronomy	1(1+0)
UGR-112	Introductory Biology	Department of Basic Science	2(1+1)
UGR-113	Elementary Mathematics	Department of Basic Science	2(2+0)
<b>Non-Gradual Courses</b>			
NCC-111	National Cadet Corps		2(0+2)
NSS-111	National Service Scheme		2(0+2)
PEY-111	Physical Education & Yoga Practices		2(0+2)
BAS - 113 /	Human Values & Ethics		1(1+0)
AEC-113			
NGC - 321	Educational Tour		2(0+2)

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Semester-wise distribution of courses		I Semester
Course code		
HOR-111	Fundamentals of Horticulture	2 (1+1)
AGB-111	Fundamentals of Plant Biochemistry and Biotechnology	3 (2+1)
SAC-111	Fundamentals of Soil Science	3 (2+1)
AGR-112	Introduction to Forestry	2 (1+1)
BAS-111	Comprehension & Communication Skills in English	2 (1+1)
AGR-111	Fundamentals of Agronomy	4 (3+1)
UGR-112	Introductory Biology*/	2 (1+1)
UGR-113	Elementary Mathematics*	2 (2+0)*
UGR-111	Agricultural Heritage*	1(1+0)*
AEC-112	Rural Sociology & Educational Psychology	2 (2+0)
BAS - 113 / AEC-113	Human Values & Ethics (non gradial)	1(1+0)**
NCC-111/ NSS-111/PEY-111	NSS/NCC/Physical Education & Yoga Practices**	1 (0+1)**
<b>TOTAL *R: Remedial course; **NC: Non-gradial courses</b>		<b>18 (12 + 6) 03*+02**</b>

Course code	II Semester	
GPB-121	Fundamentals of Genetics	3(2+1)
SAC-121	Agricultural Microbiology	2(1+1)
AGE-121	Soil and Water Conservation Engineering	2(1+1)
AGR-121	Fundamentals of Crop Physiology	2(1+1)
AAE-121	Fundamentals of Agricultural Economics	2(2+0)
PPA-121	Fundamentals of Plant Pathology	4(3+1)
ENT-121	Fundamentals of Entomology	4(3+1)
AEC-121	Fundamentals of Agricultural Extension Education	3(2+1)
AGE-122	Farm Machinery and Power	2 (1+1)
<b>Total</b>		<b>24(16+8)</b>

Course code	III Semester	
AGR-212	Crop Production Technology – I (Kharif Crops)	3 (2+1)
GPB-211	Fundamentals of Plant Breeding	3 (2+1)
PPA-211	Diseases of Field and Horticultural Crops and their Management -I	3 (2+1)
AEC-211	Communication Skills and Personality Development	2(1+1)
BAS-212	Agri- Informatics	2(1+1)
HOR-211	Production Technology for Vegetables and Spices	2 (1+1)
AGE-211 / SAC -211 / AGR- 211	Environmental Studies and Disaster Management	3(2+1)
BAS-213	Statistical Methods	2(1+1)
AAP-211	Livestock and Poultry Management	2 (1+1)
AAP- 212	Principles of Animal Nutrition	2(1+1)
NCC-111/ NSS-111/PEY- 111	NSS/NCC/Physical Education & Yoga Practices**	1 (0+1) **
<b>TOTAL **NC: Non-gradial courses Total</b>		<b>24(14+10)</b>



GPB-321	Crop Improvement-II ( <i>Rabi crops</i> )	2 (1+1)
AGR-322	Practical Crop Production –II ( <i>Rabi crops</i> )	2 (0+2)
AGR-323	Principles of Organic Farming	2 (1+1)
AAE-321	Farm Management, Production & Resource Economics	3(2+1)
UGE-321	Hi-tech. Horticulture*	3(2+1)
UGE-322	Weed Management*	3(2+1)
UGE-323	System Simulation and Agro-advisory*	3(2+1)
UGE-324	Agricultural Journalism*	2(0+2)
NGC - 321	Educational Tour**	19(9 + 10)+ 3*+2**
	<b>TOTAL *Elective Course, **NC: Non-gradual courses</b>	

VII Semester		
Activities	No. of weeks	Credit Hours
<b>Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &amp; AIA)</b>		14
<b>READY-Component-I</b>		
<b>RAWE- 411 (Rural Agricultural Work Experience)</b>		
1. General orientation & On campus training by different faculties	1	
2. (a) Village attachment training programme	8	
i. Orientation and Survey of Village		
ii. Agronomical Interventions		
iii. Plant Protection Interventions		
iv. Soil Improvement Interventions (Soil sampling and testing)		
v. Fruit and Vegetable production interventions		
vi. Food Processing and Storage interventions		
vii. Animal Production Interventions		
viii. Extension and Transfer of Technology activities		
(b) Attachment in University/College/KVK/research Station	5	
<b>READY- Component –II</b>		
<b>AIA- 412 (Agro Industrial Attachment)</b>		
• Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks.	3	4
• Industries include Seed/Sapling production, Pesticides-insecticides, Post harvest-processing-value addition, Agri-finance institutions, etc.		
<b>Plant Clinic</b>	2	2
• Seed/Sampling production, Pesticide/insecticide, post harvest industries, processing- value addition, Agri -finance institutions etc.		
<b>Activities and Tasks during Agro-Industrial Attachment Programme</b>		
i. Acquaintance with industry and staff		
ii. Study of structure, functioning, objective and mandates of the industry		
iii. Study of various processing units and hands-on trainings under supervision of industry staff		



iv.	Ethics of industry		
v.	Employment generated by the industry		
vi.	Contribution of the industry promoting environment		
vii.	Learning business network including outlets of the industry		
viii.	Skill development in all crucial tasks of the industry		
ix.	Documentation of the activities and task performed by the students		
x.	Performance evaluation, appraisal and ranking of students		
		<b>Total</b>	<b>20</b>

### VIII Semester

#### READY- Component -III (Experiential Learning Programme) Modules for Skill Development and Entrepreneurship

A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VIII Semester

Course code	Title of module	Department	Credits
ELP-421	Production Technology for Bio-agents and Biofertilizer	Soil Science & Agricultural Chemistry	0+10
ELP-422	Seed Production Technology	Genetics & Plant Breeding	0+10
ELP-423	Mushroom Cultivation Technology	Plant Pathology	0+10
ELP-424	Soil, Plant, Water and Seed Testing	Soil Science & Agricultural Chemistry	0+10
ELP-425	Commercial Beekeeping	Entomology	0+10
ELP-426	Poultry Production Technology	Animal Production	0+10
ELP-427	Commercial Horticulture	Horticulture	0+10
ELP-428	Floriculture and Landscaping	Horticulture	0+10
ELP-429	Food Processing	Agricultural Engineering	0+10
ELP-430	Agriculture Waste Management	Agricultural Engineering	0+10
ELP-431	Organic Production Technology	Agronomy	0+10
ELP-432	Commercial Sericulture	Entomology	0+10

**Grand Total (Credit Hours) = 185**

**Elective Courses:** A student can select three elective courses out of the following and offer during 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> semesters.

S.N.	Course Code	Courses	Department	Credit Hours
<b>IV Semester</b>				
1.	UGE-221	Agribusiness Management	Agricultural Economics	3(2+1)
2.	UGE-222	Agrochemicals	Soil Science & Agricultural Chemistry	3(2+1)
3.	UGE-223	Commercial Plant Breeding	Genetics & Plant Breeding	3(1+2)
4.	UGE-224	Landscaping	Horticulture	3(2+1)
<b>V Semester</b>				
1.	UGE-311	Food Safety and Standards	Agricultural Engineering	3(2+1)
2.	UGE-312	Bio-pesticides & Bio-fertilizers	Soil Science & Agricultural Chemistry	3(2+1)
3.	UGE-313	Protected Cultivation	Horticulture	3(2+1)
4.	UGE-314	Micro propagation Technologies	Horticulture	3(1+2)
<b>VI Semester</b>				
1.	UGE-321	Hi-tech. Horticulture	Horticulture	3(2+1)
2.	UGE-322	Weed Management	Agronomy	3(2+1)
3.	UGE-323	System Simulation and Agro-advisory	Soil Science & Agricultural Chemistry	3(2+1)
4.	UGE-324	Agricultural Journalism	Agriculture Extension & Communication	3(2+1)



problems on limit, Simple problems on continuity, Differentiation of  $x^n$ ,  $e^x$ ,  $\sin x$  &  $\cos x$  from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form  $y=f(x)$  (Simple problems based on it).

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

## NON-GRADIAL COURSES

**NSS 111/NCC 111/ PEY 111 Physical Education & Yoga Practices**

**2 (0+2)**

### Theory

Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

Following activities are to be taken up under the NSS course:

- Introduction and basic components of NSS: Orientation
- NSS programmes and activities
- Understanding youth
- Community mobilisation
- Social harmony and national integration
- Volunteerism and shramdan
- Citizenship, constitution and human rights
- Family and society
- Importance and role of youth leadership
- Life competencies
- Youth development programmes
- Health, hygiene and sanitation
- Youth health, lifestyle, HIV AIDS and first aid
- Youth and yoga
- Vocational skill development
- Issues related environment
- Disaster management
- Entrepreneurship development
- Formulation of production oriented project
- Documentation and data reporting
- Resource mobilization
- Additional life skills
- Activities directed by the Central and State Government

All the activities related to the National Service Scheme course is distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme III and National Service Scheme IV each having one credit load. The entire four courses should be offered continuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than five regular one day camp in a year and one special camp for duration of 7 days at any semester break period in the two year. Different activities will include orientation



lectures and practical works. Activities directed by the Central and State Government have to be performed by all the volunteers of NSS as per direction.

### **NSS 111 National Service Scheme (Semester I)**

1(0+1)\*\*

#### **Introduction and basic components of NSS:**

**Orientation:** history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

#### **NSS programmes and activities**

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary

#### **Understanding youth**

Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

#### **Community mobilisation**

Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

#### **Social harmony and national integration**

Indian history and culture, role of youth in nation building, conflict resolution and peace-building

#### **Volunteerism and shramdan**

Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

#### **Citizenship, constitution and human rights**

Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

#### **Family and society**

Concept of family, community (PRIs and other community based organisations) and society

### **NSS 111 National Service Scheme (II)**

#### **Importance and role of youth leadership**

Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership

#### **Life competencies**

Definition and importance of life competencies, problem-solving and decision-making, inter personal communication

#### **Youth development programmes**

Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led organisations

#### **Health, hygiene and sanitation**

Definition needs and scope of health education: role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health.

#### **Youth health, lifestyle, HIV AIDS and first aid**

Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid

#### **Youth and yoga**

History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

### **NSS 111 National Service Scheme (Semester III)**

1(0+1)\*\*

#### **Vocational skill development**

To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list

#### **Issues related environment**

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Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management

#### **Disaster management**

Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management.

#### **Entrepreneurship development**

Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution.

#### **Formulation of production oriented project**

Planning, implementation, management and impact assessment of project

#### **Documentation and data reporting**

Collection and analysis of data, documentation and dissemination of project reports

### **NSS 111 National Service Scheme (IV)**

#### **Youth and crime**

Sociological and psychological factors influencing youth crime, cyber crime, peer mentoring in preventing crime and awareness for juvenile justice

#### **Civil/self defence**

Civil defence services, aims and objectives of civil defence; needs and training of self defence

#### **Resource mobilisation**

Writing a project proposal of self fund units (SFUs) and its establishment

#### **Additional life skills**

Positive thinking, self confidence and esteem, setting life goals and working to achieve them, management of stress including time management.

### **NCC 111 National Cadet Corps (Semester I)**

1 (0+1)\*\*

1. Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
2. Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
3. Sizing, numbering, forming in three ranks, open and close order march and dressing.
4. Saluting at the halt, getting on parade, dismissing and falling out.
5. Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
6. Turning on the march and wheeling. Saluting on the march.
7. Marking time, forward march and halt.
8. Changing step, formation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards
10. Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
11. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
12. Leadership traits, types of leadership. Character/personality development.
13. Civil defense organization, types of emergencies, fire fighting, protection,
14. Maintenance of essential services, disaster management, aid during development projects. 15. Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
16. Structure and function of human body, diet and exercise, hygiene and sanitation.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
19. Basic principles of ecology, environmental conservation, pollution and its control.
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense.



**NCC 111 National Cadet Corps (Semester III)**

1(0+1)\*\*

1. Arms Drill- Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms.
2. Shoulder from the order and vice-versa, present from the order and vice-versa.
3. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa.
4. Guard mounting, guard of honour, Platoon/Coy Drill.
5. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning and sight setting.
6. Loading, cocking and unloading. The lying position and holding.
7. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight.
8. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing.
9. Characteristics of Carbine and LMG.
10. Introduction to map, scales and conventional signs. Topographical forms and technical terms.
11. The grid system. Relief, contours and gradients. Cardinal points and finding north. Types of bearings and use of service protractor.
12. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map.
13. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
14. Field defenses obstacles, mines and mine lying. Bridging, watermanship
15. Field water supplies, tracks and their construction.
16. Nuclear, Chemical and Biological Warfare (NCBW)
17. Judging distance. Description of ground and indication of landmarks.
18. Recognition and description of target. Observation and concealment. Field signals. Section formations.
19. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill.
20. Types of communication, media, latest trends and developments.

**PEY111 Physical Education and Yoga Practices(Semester I)**

1(0+1)\*\*

1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
2. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
3. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
4. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
6. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
7. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
8. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of some of Asanas – demonstration, practice, correction and practice
11. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
12. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
13. Teaching – Meaning, Scope and importance of Physical Education
14. Teaching – Definition, Type of Tournaments
15. Teaching – Physical Fitness and Health Education
16. Construction and laying out of the track and field (\*The girls will have Tennikoit and Throw Bail).



**PEY111 Physical Education and Yoga Practices(Semester III)**

1(0+1)\*\*

1. Teaching of skills of Hockey – demonstration practice of the skills and correction.
2. Teaching of advance skills of Hockey – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
3. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
4. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
5. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
6. Teaching of different field events – demonstration practice of the skills and correction.
7. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
8. Teaching of different asanas – demonstration practice and correction.
9. Teaching of weight training – demonstration practice and correction.
10. Teaching of circuit training – demonstration practice and correction.
11. Teaching of calisthenics – demonstration practice and correction.

**Note:**

- 1) Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants)
- 2) The games mentioned in the practical may be inter changed depending on the season and facilities.

**BAS- 113/ AEC -113 Human Values and Ethics**

1 (1+0)

**Theory**

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Expiration

NGC- 321 Educational Tour

2 (0 + 2)

**ELECTIVE COURSES**

UGE- 221 Agri-Business Management

3(2+1)

**Theory**

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain; Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, policies procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation; Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behavior analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle. Identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.



# COLLEGE OF BIOTECHNOLOGY

## SYLLABUS-III

### *B. TECH. (BIOTECHNOLOGY)*

(As per V- Dean Committee Recommendations)



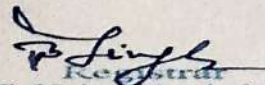
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## Semester wise Distribution of Courses

Semester	Course No.	Name of Course	Credits	Page No.	
Sem. I	BAS 112	Human Ethics	1 (1-0-0)	13	
	BAS 116	Basic Mathematics-I	3 (3-0-0)	13	
	BAS 114	Basic Botany	3 (2-0-1)	14	
	BAS 115	Communication Skills & Personality Development	2 (1-0-1)	15	
	AGE/ SAC/ AGR 114	Environmental Studies and Disaster Management	3 (2-0-1)	15	
	AGE 113	Food Science and Processing	2 (1-0-1)	17	
	AGR 113	Crop Production Technology	3 (2-0-1)	18	
	BTM 111	Basic Genetics	3 (2-0-1)	19	
	BTO 111	Introduction to Biotechnology	3 (2-0-1)	20	
	BTC 111	Cell Biology	2 (2-0-0)	20	
	NCC/NSS/ PEY- 111	NCC/NSS/PEY (NG)	1 (0-1-0)		
		(R: BAS 116 or BAS 114)	<b>Total</b>	<b>23 (18-0-8)</b>	
	Sem. II	BAS 121	Basic Zoology	3 (2-0-1)	21
		BAS 122	Basic Mathematics- II	3 (3-0-0)	21
BAS 123		Basic Statistics	2 (1-0-1)	22	
HOR 121		Production Technologies for Horticultural Crops	3 (2-0-1)	23	
VAN/VPB 123		Anatomy and Physiology of Livestock	3 (3-0-0)	24	
GPB 122		Basics of Plant Breeding	3 (2-0-1)	24	
AAP 121		Introduction to Animal Breeding	3 (2-0-1)	25	
BTO 121		Plant Tissue Culture	3 (2-0-1)	26	
BTM 121		Molecular Biology	3 (2-0-1)	26	
BTC 121		Biodiversity and its conservation	2 (2-0-0)	27	
BTP 121		Microbiology	3 (2-0-1)	28	
	(R: BAS 121 or BAS 122, OP: HOR 121 or VPB 123, GPB 122 or AAP 121)	<b>Total</b>	<b>22 (23-0-9)</b>		

  
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<b>Sem. III</b>	BAS 211	- Biomathematics	3 (2-0-1)	29
	BAS 214	Information and Communication Technology	2 (1-0-1)	29
	AAE 212	Economics and Marketing	3 (2-0-1)	30
	ENT/ PPA 212	Fundamentals of Crop Protection	3 (2-0-1)	31
	LPT 211	Livestock Product Technology	3 (2-0-1)	32
	GPB 212	Breeding of Field Crops	3 (2-0-1)	33
	VMD/VMC 212	Animal Health Care	3 (2-0-1)	34
	LPM 212	Livestock Production and Management	3 (2-0-1)	34
	BTR 211	Recombinant DNA Technology	3 (2-0-1)	35
	BTB 211	Plant Physiology	3 (2-0-1)	36
	NCC/NSS/ PEY- 111	NCC/NSS/PEY (NG)	1 (0-1-0)	
	(OP: ENT 212 or LPT 211, GPB 212 or VMD 211)	<b>Total</b>	<b>24 (15-0-9)</b>	
<b>Sem. IV</b>	BAS 221	- Biophysics	3 (2-0-1)	36
	AEC/ AAE 222	Entrepreneurship Development and Business Management	2 (1-0-1)	37
	BTB/ AGE 221	Electronics and Instrumentation in Biotechnology	2 (1-0-1)	38
	BTB 222	General Biochemistry	4 (3-0-1)	39
	BTI/ BTR 221	Introductory Bioinformatics	3 (2-0-1)	40
	BTM 221	Plant Genetic Transformation	3 (2-0-1)	41
	BTC 221	Classical and Molecular Cytogenetics	3 (2-0-1)	41
	BTP 221	Microbial Genetics	3 (2-0-1)	42
		<b>Total</b>	<b>23 (15-0-8)</b>	
<b>Sem. V</b>	BAS 311	Agricultural Informatics	3 (2-0-1)	43
	BTI/ VPB/ VMC 312	Animal Biotechnology	4 (3-0-1)	44
	BTI 311	- Immunology	3 (2-0-1)	45
	BTM 311	Molecular Genetics	2 (2-0-0)	45
	BTM 312	Nanobiotechnology	2 (2-0-0)	46
	BTF 311	Molecular Marker Technology	2 (2-0-0)	46
	BTF 312	IPR, Biosafety and Bioethics	2 (2-0-0)	47
	BTR 311	Genomics and Proteomics	3 (3-0-0)	47



	BTB 311	Enzymology & Enzyme Technologies	3 (2-0-1)	48
		<b>Total</b>	<b>24 (20-0-4)</b>	
<b>Sem. VI</b>	BAS 321	Biostatistics	3 (2-0-1)	49
	BTI/BTR 321	Computational Biology	3 (2-0-1)	49
	Optional/ Elective Course (04 no.)			
	1.	Plant Biotechnology	18 (12-0-6)	50
	2.	Animal Biotechnology	18 (13-0-5)	55
	3.	Microbial and Environmental Biotechnology	18 (14-0-4)	59
	4.	Bioinformatics	18 (11-0-7)	63
		<b>Total</b>	<b>24 (15/18 -0- 6/9)</b>	
<b>Sem. VII</b>	BTS 411	Educational Tour (NG)	1 (0-1-0)	67
	BTS 412	Student READY – (04 Optional topics)		
		In-house Skill Development Modules	20 (0-0-20)	67
	BTO/AGE 411	Bioprocess Engineering, Bioseparation and Downstream processing	3 (3-1-0)	68
		<b>Total</b>	<b>24</b>	
<b>Sem. VIII</b>	BTS 421	Student READY - Project Formulation, Execution and Presentation	10	69
	BTS 422	Student READY - Entrepreneurial Development in Biotechnology	10	69
		<b>Total</b>	<b>20</b>	
		<b>Grand Total</b>	<b>184 (59 Courses)</b>	

S.	Semester								Total Credits
	I	II	III	IV	V	VI	VII	VIII	
Credit	23	22	24	23	24	24	24	20	184 (59 Courses)

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<b>Entomology</b>				
ENT/ PPA 212	Fundamentals of Crop Protection	3 (2-0-1)	31	
<b>Plant Pathology</b>				
ENT/ PPA 212	Fundamentals of Crop Protection	3 (2-0-1)	31	
<b>Horticulture</b>				
HOR 121	Production Technologies for Horticultural Crops	3 (2-0-1)	23	
HOR 322	Molecular Breeding of Horticultural Crops and Forest Trees	3 (2-0-1)	54	
<b>Agricultural Economics</b>				
AAE 212	Economics and Marketing	3 (2-0-1)	30	
AEC/ AAE 222	Entrepreneurship Development and Business Management	2 (1-0-1)	37	
<b>Agriculture Extension</b>				
AEC/ AAE 222	Entrepreneurship Development and Business Management	2 (1-0-1)	37	
<b>Animal Production</b>				
AAP 121	Introduction to Animal Breeding	3 (2-0-1)C	25	

### College of Veterinary Sciences

#### Veterinary Physiology and Biochemistry

VAN/VPB 123	Anatomy and Physiology of Livestock	3 (3-0-0)	24	
BTI/VPB/VMC 312	Animal Biotechnology	4 (3-0-1)	44	
VPB 321	Animal Genomics	3 (2-0-1)	55	
VPB/VGO 322	Embryo Transfer Technologies	3 (2-0-1)	55	
BTI/VPB/VMC 323	Principles and Procedures of Animal Cell Culture	3 (2-0-1)	56	
BTI/VPB 324	Transgenic Animal Production	3 (3-0-0)	57	
BTI/VPB 325	Molecular Diagnostics	3 (2-0-1)	57	

#### Livestock Product Technology

LPT 211	Livestock Product Technology	3 (2-0-1)	35	
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#### Veterinary Microbiology

VMD/VMC 211	Animal Health Care	3 (2-0-1)C	34	
BTI/VPB/VMC 312	Animal Biotechnology	4 (3-0-1)	44	
BTI/VPB/VMC 323	Principles and Procedures of Animal Cell Culture	3 (2-0-1)	56	
BTI/VMC 326	Molecular Virology and Vaccine Production	3 (2-0-1)	58	

#### Livestock Production and Management

LPM 212	Livestock Production and Management	3 (2-0-1)	34	
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#### Veterinary Medicine

VMD/VMC 212	Animal Health Care	3 (2-0-1)C	34	
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<b>Veterinary Anatomy</b>				
VAN/VPB 123	Anatomy and Physiology of Livestock	3 (3-0-0)	24	
<b>Veterinary Gynecology &amp; Obstetrics</b>				
VPB/VGO 322	Embryo Transfer Technologies	3 (2-0-1)	55	
<b>Veterinary Pharmacology &amp; Toxicology</b>				
BTI/ VPT 330	Pharmacogenomics	3 (2-0-1)	65	
BTI/VPT 327	Molecular Pharming and Biopharmaceuticals	3 (2-0-1)	61	

### Description of Courses

#### SEMESTER-I

**Course Title** : **Human Ethics**

**Course No.** : **BAS 112**

**Credit Hours** : **1 (1-0-0)**

#### UNIT I

Universal human aspirations: Happiness and prosperity; Human values and ethics: Concept, definition, significance and sources; Fundamental values: Right conduct, peace, truth, love and non-violence; Ethics: professional, environmental, ICT; Sensitization towards others particularly senior citizens, developmentally challenged and gender.

#### UNIT II

Spirituality, positive attitude and scientific temper; Team work and volunteering; Rights and responsibilities; Road safety; Human relations and family harmony; Modern challenges and value conflict: Sensitization against drug abuse and other social evils; Developing personal code of conduct (SWOT Analysis); Management of anger and stress.

#### **Suggested Readings**

- Gaur RR, Sangal R & Bagaria GP. 2011. A Foundation Course in Human Values and Professional Ethics. Excel Books.
- Mathur SS. 2010. Education for Values, Environment and Human Rights. RSA International.
- Sharma RA. 2011. Human Values and Education -Axiology, Incultation and Research. R. Lall Book Depot.
- Sharma RP & Sharma M. 2011. Value Education and Professional Ethics. Kanishka Publishers.
- Srivastava S. 2011. Human Values and Professional Ethics. S K Kataria & Sons.
- Srivastava S. 2011. Environmental Science. S K Kataria & Sons.
- Tripathi A.N. 2009. Human Values. New Age International (P) Ltd Publishers.

**Course Title** : **Basic Mathematics-I**

**Course No.** : **BAS 116**

**Credit Hours** : **3 (3-0-0)**

#### UNIT I

  
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## Practical

Emasculation and hybridization techniques; Handling of segregating generations : pedigree method, bulk method; back cross methods; Field layout of experiments; Field trials, maintenance of records and registers; Estimation of heterosis and inbreeding depression; Estimation of heritability; Parentage of released varieties/hybrids; Study of quality characters; Sources of donors for different characters; seed sampling; seed quality; seed viability; seed vigour; seed health testing; Visit to seed production plots.

## Suggested Readings

- Chopra VL 2001. *Breeding Field Crops*. Oxford and IBH Publishing Co.  
Fehr WR. 1987. *Principles of Cultivar Development, Vol. II Crop Species*. MacMillan Publishing Co.  
Sleper DA & Poehlman JM. 2006. *Breeding Field Crops*. Wiley-Blackwell.

**Course Title** : **Animal Health Care**  
**Course No.** : **VMD/VMC 212**  
**Credit Hours** : **3 (2-0-1)**

## UNIT I

Introduction to animal health; Animal Vaccinations; history of disease diagnoses and medicine; classification of diseases; Introduction to fore stomach disorders in ruminants.

## UNIT II

Introduction to important diseases of respiratory, urinary, musculoskeletal and cardiovascular system of domestic animals. Introduction to common metabolic, bacterial, viral, parasitic and blood protozoan diseases of domestic animals. Importance of animal health in relation to public health.

## Practical

Introduction to veterinary hospital; methods of sample collection; introduction to common disease diagnostic tests in animals; vaccination schedule in domestic animals. Microscopic examination of parasites. Clinical diagnostics: urine, blood, milk, sputum, faeces examination.

## Suggested Readings

- Blood DC & Henderson JA. 1968. *Veterinary Medicine*. Bailliere Tindall publishers.  
Bradford P & Smith DVM. 2014. *Large Animal Internal Medicine*. 5<sup>th</sup> edition. Mosby Publishers.  
Chakrabarti Amalendu. 2007. *Textbook of Clinical Veterinary Medicine*. Kalyani Publishers.  
Stephen J, Ettinger DVM, Edward C & Feldman DVM. 2010. *Textbook of Veterinary Internal Medicine Expert Consult*. 7<sup>th</sup> edition. Saunders Publishers.

**Course Title** : **Livestock Production and Management**  
**Course No.** : **LPM 212**  
**Credit Hours** : **3 (2-0-1)**

  
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Course Title : **Biophysics**  
Course No. : **BAS 221**  
Credit Hours : **3 (2-0-1)**

UNIT I

Quantum mechanics; Electronic structure of atoms; The wave particle duality, wave length of de-Broglie waves; Phase and group velocity; Some basic concepts of quantum mechanics; Schrodinger's wave equations; Particle in a box; Quantum mechanical tunneling; Ist and IInd law of thermodynamics; Enthalpy; Entropy; Statistical and thermodynamic definition of entropy; Helmholtz free energy, Equilibrium thermodynamic; Near-equilibrium thermodynamic; Gibbs free energy; Chemical potential; Thermodynamic analysis of membrane transport.

UNIT II

Hydration of macromolecules; Role of friction; Diffusion; Sedimentation; The ultracentrifuge; Viscosity; Rotational diffusion; Light scattering, Small angle x-ray scattering; Ultraviolet and visible spectroscopy; Circular dichroism(CD) and optical rotatory dispersion(ORD); Fluorescence spectroscopy; Infrared spectroscopy; Raman spectroscopy; Electron spin resonance; NMR spectroscopy; Light microscopy.

UNIT III

Electron optics; Transmission electron microscope (TEM); Scanning electron microscope(SEM); Preparation of the specimen for electron microscopy; Image reconstruction; Electron diffraction; Tunnelling electron microscope; Atomic force microscope; Crystals and symmetries, crystal systems, point group and space groups; Growth of crystals of biological molecules; X-ray diffraction.

**Practical**

Refractive index and dispersive power of the prism using spectrometer; Calibration of prism spectrometer; Newton's rings; Polarimeter; Diffraction grating; Resolving power of telescope and grating; Ostwald viscometer; Planck's constant using photovoltaic cell; Photospectrometer; Photoelectric effect; Stefan's constant; Thermal diffusivity in metals.

**Suggested Readings**

- Chang R. 2005. *Physical Chemistry for the Biosciences*. University Science Books.  
Glaser. 2012. *Biophysics*. Springer.  
Pattabhi V & Gautam N. 2002. *Biophysics*. Narosa Publishing House.  
Rodney Cotterill. 2002. *Biophysics: An Introduction*. John Wiley & Sons.  
Srivastava PK. 2006. *Elementary Biophysics: An Introduction*. Narosa Publishing House.

**Course Title : Entrepreneurship Development and Business Management**  
**Course No. : AEC/AAF 222**  
**Credit Hours : 2 (1-0-1)**

  
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