



Republic of the Philippines  
OFFICE OF THE PRESIDENT  
COMMISSION ON HIGHER EDUCATION

**CHED MEMORANDUM ORDER (CMO)**

No. 14  
Series 2008

**SUBJECT: POLICIES AND STANDARDS FOR BACHELOR OF SCIENCE IN AGRICULTURE (BSA) PROGRAM**

In accordance with the pertinent provision of Republic Act (RA) No. 7722, otherwise known as the "Higher Education Act of 1994," and by virtue of Resolution number 38-2008 of the Commission En Banc dated February 11, 2008 for the purpose of rationalizing the undergraduate agriculture education in the country with the end view of keeping abreast with the demands of global competitiveness. This set of Policies and Standards (PS) is a revision of CMO No. 34, series of 1998 "Guiding Principles and Minimum Standards for BS Agriculture Program" and is hereby adopted and promulgated by this Commission for implementation.

**ARTICLE I  
INTRODUCTION**

Section 1 - Rationale

In order to meet the challenges of development, there is a need to modernize the Philippine educational system making it more responsive to current and future needs. In the field of Agriculture, it is sad to note that there is a decreasing trend in enrolment for the Bachelor of Science in Agriculture (BSA) program for the past five (5) years. Students prefer to take up health science and technological courses. To address the country's problem on food security and sustainability, the present state should not be taken for granted.

The old curriculum is highly specialized which covers several areas of interest such as agronomy, animal science, horticulture and soil science among others. With dearth of expertise on many Higher Education Institution (HEIs) offering this program, graduates are not well equipped with the needed knowledge and skills. Furthermore, It has been observed that BSA graduates with specializations have limited chances for employment. It should also be noted that for the past years the national passing rate in Licensure Examination for Agriculture was very low. This could be partly attributed with the current limitations of BSA curriculum.

This PS is just a minimum standard for a general BSA curriculum. HEIs have the flexibility to substitute four (4) major courses equivalent to 12 units to pursue specialization depending on the availability of technical expertise, technologies and resources. This PS also addresses the concept of ladderization

as specified in Executive Order No. 358 "To Institutionalize a Ladderized Interface Between Technical-Vocational Education and Training (TVET) and Higher Education (HE)"

This PS aims to address the problem of employability of BSA graduates by developing them to become self-reliant and technically competent agriculturist. This PS also focuses on entrepreneurship leading toward agriculture enterprise so that instead of being job seekers, the BSA graduates will become self-employed or even possibly employment generators themselves. The PS shall enable graduates to have entry level competencies after finishing the prescribed number of units.

## **ARTICLE II AUTHORITY TO OPERATE**

The BSA program shall be operated only by HEIs with proper authority granted by the Commission on Higher Education (CHED) or by the respective Boards in case of chartered State Universities and Colleges (SUCs) and Local Colleges and Universities (LCUs)

## **ARTICLE III PROGRAM SPECIFICATIONS**

### Section 2 - Degree

The degree program herein shall be called Bachelor of Science in Agriculture (BSA)

### Section 3 - Program Description

#### a. Objectives

The BSA program aims to educate students in the scientific habit of thought, entrepreneurial skills and prepare them to become professionals with entry-level competencies in technical agriculture. It emphasizes the processes and techniques of identifying, diagnosing and analyzing problems and in designing, packaging and applying technologies needed in the development and conservation of the agriculture and food system resources.

#### b. Specific professions / careers / occupations or trades that BSA graduates may go into:

Students completing the BSA program will be prepared for careers in a variety of profession namely:

1. Research
2. Farm Management
3. Agriculture and food technology
4. Entrepreneurship and business in agriculture
5. Teaching

## Section 4 - Allied Programs

BSA is closely related to the fields of agricultural engineering, agribusiness, agroforestry, animal science and animal husbandry.

### **ARTICLE IV COMPETENCY STANDARDS** (See Attachment A)

### **ARTICLE V CURRICULUM**

## Section 5 - Curriculum Description

The BSA curriculum is based on competency standards for agriculture. It emphasizes carrying out the science, art, ethics, management and entrepreneurial business in the production, processing and marketing of plants, animals and other organisms utilized for food, fiber, recreation, biomedicine, industrial and other purposes within the context of integrated and sustainable agriculture resource systems.

## Section 6 - Curriculum Outline

### a) General Education Courses - 74 Units

General Education Courses - General Education and legislated courses shall follow the existing requirements of CHED in accordance with CHED Memorandum Order No. 59, series 1996 (GEC-B; 51 units).

#### 1. Language and Humanities - 21 Units

##### a. English

- |   |   |
|---|---|
| 1. English 1 – Study and Thinking Skills in English | 3 |
| 2. English 2 – Writing in the Discipline            | 3 |

##### b. Filipino

- |  |   |
|--|---|
| 1. Filipino 1 – Sining Pakikipagtalastasan                   | 3 |
| 2. Filipino 2 – Pagbasa at Pagsulat sa Iba't-Ibang Disiplina | 3 |

##### c. Humanities

- |   |   |
|---|---|
| 1. Hum 1 - Introduction to Humanities         | 3 |
| 2. Hum 2 - The Literatures of the Philippines | 3 |
| 3. Hum 3 - Philosophy and Ethics              | 3 |

#### 2. Mathematics and Natural Science - 24 Units

##### a. Mathematics

- |                                |   |
|--------------------------------|---|
| 1. Math 1 - College Algebra    | 3 |
| 2. Math 2 - Plane Trigonometry | 3 |

##### b. Statistics I

3

c. Natural Sciences	
1. Nat. Sci. 1 – General Biology	4
2. Nat. Sci. 2 - General Chemistry	5
3. Nat. Sci. 3 - Physics I	3
d. Basic Computer Concept and Application	3
3. Social Sciences - 12 Units	
a. Soc. Sci. 1 - General Economics and Taxation	3
b. Soc. Sci. 2 - Philippine History, Gov't and Politics	3
c. Soc. Sci. 3 - Society and Culture with Family Planning	3
d. Soc. Sci.4 – Psychology and Anthropology	3
4. Life and Works of Rizal - 3 Units	
5. Physical Education (PE) - (8)	
6. National Service and Training Program (NSTP) - (6)	
b) Fundamental Agriculture courses - 49 Units	
1. Crop Science	
a. Crop Science 1 – Principles of Crop Production	3
b. Crop Science 2 – Practices of Crop Production	3
2. Crop Protection	
a. Crop Protection 1 – Principles of Crop Protection	3
b. Crop Protection 2 – Approaches and Practices in Pest Management	3
3. Animal Science	
a. Animal Science 1 – Introduction to Animal Science	3
b. Animal Science 2 – introduction to Livestock and Poultry Production	3
4. Soil Science	
a. Soil Science 1 – Principles of Soil Science	3
b. Soil Science 2 – Soil Fertility Conservation and Management	3
5. Agricultural Extension and Communication	3
6. Agricultural Economics and Marketing	3
7. Introduction to Enterprise and Entrepreneurship	3
8. Introduction to Agriculture	1
9. Fundamentals of Agricultural Engineering	3
10. Genetics	3
11. Biotechnology and Society	3
12. Introduction to Ecological Agriculture	3
13. Methods of Agricultural Research	3

- c) Core Courses - 39 Units
- |   |   |
|---|---|
| 1. Post Harvest Handling and Seed Technology                                      | 3 |
| 2. Principles and Practices of Plant Breeding, Propagation And Nursery Management | 3 |
| 3. Beneficial Arthropods and Micro Organism                                       | 3 |
| 4. General Physiology and Toxicology  | 3 |
| 5. Animal Nutrition And Feeding   | 3 |
| 6. Slaughter of Animals and Processing of Their Products                          | 3 |
| 7. Soil Survey, Classification and Land Use                                       | 3 |
| 8. Management of Extension Programs   | 3 |
| 9. Basics of Project Study and Development  | 3 |
| 10. Agricultural Policy and Development   | 3 |
| 11. Agribusiness Commodity Systems  | 3 |
| 12. Financial Management for Agri-based Enterprise                                | 3 |
| 13. Seminar A   | 1 |
| 14. Seminar B   | 1 |
| 15. Colloquium  | 1 |

d) Institutions which may opt for specialization – HEIs may have the flexibility to pursue specialization. In each identified specialization, 12 units of major courses relevant to the specialization may be substituted from the 12 units of core courses. However, schools which will opt for specialization should make sure there is sufficient technical expertise, technologies and resources available.

- e) Thesis or Practicum/Field Practice - 6 Units
- |   |   |
|---|---|
| 1. Special Topics Related to Thesis or Practicum/Field Practice | 3 |
| 2. Thesis or Practicum/Field Practice                           | 3 |

f) Sum total of units of the Curriculum

General Education	74 units
Fundamental Agriculture	49 units
Core Courses	39 units
Thesis or Practicum/Field Practice	6 units
Total Number of Units	<u>168 units</u>

## Section 7 – Sample/Model Program of Study

The institution may enrich the sample/model program of study depending on the needs of the industry, provided that all prescribed courses/competencies required in the curriculum outline are offered and prerequisites and co requisites are observed.

### First Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Introduction to Agriculture	1	1	0	Soil Science 1 – Principles of Soil Science	3	2	3
English 1 – Study and Thinking Skills in English	3	3	0	Soc. Sci. 1 - Society and Culture with Family Planning	3	3	0
Nat. Sci. 1 – General Biology	4	2	6	Animal Science 1 – Introduction to Animal Science	3	2	3
Math 1 - College Algebra	3	3	0	Crop Science 1 – Principles of Crop Production	3	2	3
Agricultural Extension and Communication	3	3	0	Math 2 - Plane Trigonometry	3	3	0
Nat. Sci. 2 - General Chemistry	5	3	6	English 2 – Writing in the Discipline	3	3	0
PE 1	(2)			PE 2	(2)		
NSTP	(3)			NSTP	(3)		
Total	24	15	12	Total	23	15	9

### Summer

Practicum (Skills Development) 6 units or equivalent to 240 hrs

### Second Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.	Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Soc. Sci. 2 - Philippine History, Government and Politics	3	3	0	Nat. Sci. 3 – Physics I	3	2	3
Hum 1 - Introduction to Humanities	3	3	0	Soc. Sci. 3 - General Economics and Taxation	3	3	0
Crop Protection 1 – Principles of Crop Protection	3	2	3	Crop Protection 2 – Approaches and Practices in Pest management	3	2	3
Animal Science 2 - Introduction to Livestock and Poultry Production	3	2	3	Agricultural Economics and Marketing	3	3	0
Crop Science 2 – Practices of Crop Production	3	2	3	Slaughter of Animals and Processing of Their Products	3	1	6
Basic Computer Concept and Application	3	2	3	Introduction to Ecological Agriculture	3	2	3
Post Harvest Handling and Seed Technology	3	2	3	Introduction to Enterprise and Entrepreneurship	3	2	3
PE 3	(2)			PE 4	(2)		
Total	23	16	15	Total	23	15	18

All students who satisfactorily completed the first two (2) years shall be awarded the Certificate of Agriculture Science (CAS) which the students may use for immediate employment or application for TESDA Skills Certification subject to the requirement of the specific TESDA Training Regulation being applied for (See Attachment B for matrix of equivalencies).

### Third Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.
Hum 2 - The Literatures of the Philippines	3	3	0
Statistics I	3	2	3
Filipino 1 – Sining Pakikipagtalastasan	3	3	0
Hum 3 - Philosophy and Ethics	3	3	0
Methods of Agricultural Research	3	2	3
Soil Science 2 – Soil Fertility Conservation and Management	3	2	3
Beneficial Arthropods and Micro Organism	3	2	3
<b>Total</b>	<b>21</b>	<b>17</b>	<b>12</b>

Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Soc. Sci.4 – Psychology and Anthropology	3	3	0
Filipino 2 – Pagbasa at Pagsulat sa Iba't-Ibang Disiplina	3	3	0
Genetics	3	2	3
Principles and Practices of Plant Breeding, Propagation And Nursery Management	3	2	3
General Physiology and Toxicology	3	2	3
Animal Nutrition And Feeding	3	2	3
Soil Survey, Classification and Land Use	3	2	3
<b>Total</b>	<b>21</b>	<b>16</b>	<b>15</b>

### Fourth Year

First Semester	Units	Lect. Hrs.	Lab. Hrs.
Special Topics Related to Thesis or Practicum/Field Practice	3		
Seminar A	1	1	0
Seminar B	1	1	0
Colloquium	1	1	0
Agricultural Engineering - Fundamentals of Ag. Eng. - 1	3	2	3
Biotechnology and Society	3	3	0
Management of Extension Programs	3	2	3
Basics of Project Study and Development	3	3	0
Agricultural Policy and Development	3	3	0
<b>Total</b>	<b>21</b>	<b>16</b>	<b>0</b>

Second Semester	Units	Lect. Hrs.	Lab. Hrs.
Life and Works of Rizal	3	3	0
Thesis or Practicum/Field Practice	3		
Agribusiness Commodity Systems	3	3	0
Financial management for Agri-based Enterprise	3	3	0
<b>Total</b>	<b>12</b>	<b>9</b>	<b>0</b>

For Practicum Guidelines see Attachment C

## ARTICLE VI COURSE SPECIFICATIONS OF COURSES (See Attachment D)

## ARTICLE VII GENERAL REQUIREMENT

### Section 8 - Program Administration.

The minimum qualifications of the head of the unit that implements the degree program are the following:

- a. Dean of the unit/college. The dean of a unit/college must be at least a doctorate degree holder in any of the disciplines for which the unit/college offers a program; and a holder of a valid certificate of registration and professional license, where applicable.
- b. Chair of the unit/department. The chair of the department must be at least master's degree holder in the discipline for which the unit/department offers a program or a master's degree holder in an allied program identified in the policies and standards; and a holder of a valid certificate of registration and professional license, where applicable.

### Section 9 - Faculty

#### a. General Requirements

1. As a rule, a master's degree in the discipline or its equivalent is required for teaching in the tertiary level. Further, he/she should be a holder of a valid certificate of registration and professional license, where applicable.
2. A college offering a BSA program should have at least sixteen (16) full-time permanent faculty members. It should have a minimum of two (2) instructors in each of the following fields: crop science, crop protection, soil science, animal science, agricultural engineering, agricultural economics, agricultural extension and communication and food science.
3. For HEIs which will opt for specialization, a minimum of 75% of the faculty must have at least a Masters degree in the discipline or its equivalent. All other HEIs without specialization must have a minimum of 50% of the faculty with at least a Masters degree in the discipline or its equivalent.

#### b. Qualification of faculty

Faculty teaching in a BSA program must have an appropriate master's degree in agriculture or any of the allied fields mentioned in Section 4.



c. Full-time faculty members

The institution shall maintain 50% of the faculty members teaching in the BSA program as full time.

d. Teaching Load

Teaching load requirements for the BSA program shall be as follows:

1. A faculty should not be assigned more than four (4) different courses/subjects within a semester.
2. A faculty may be assigned an overload.
3. In no instance should the teaching load of the faculty exceed 18 units per semester
4. Teaching hours per day should not exceed 6 hours.

e. Faculty Development.

The institution must have a system of staff development. It should encourage the faculty to:

1. Pursue graduate studies
2. Attend seminars, symposia and conferences for continuing education
3. Undertake research activities and to publish their research output
4. Give lectures and present papers in national/international conferences, symposia and seminars.

The institution must provide opportunities and incentives such as:

1. Tuition subsidy for graduate studies
2. Study leave with pay
3. Deloading to finish a thesis or carry out research activities
4. Travel grants for academic development activities such as special skills training and attendance in national/ international conferences, symposia and seminars.
5. Awards and recognition

## Section 10 - Library

a. Policy

Libraries service the instructional and research needs of the staff and students making it one of the most important service units within an HEI. It is for this reason that libraries should be given special attention by HEI administrators by maintaining it with a wide and up-to-date collection, qualified staff, and communications and connectivity portals.

b. Library Staff

The Head Librarian should: 1) have an appropriate professional training; 2) be a registered librarian; and 3) have a Master's degree.

The library should be: 1) staffed with one full time professional librarian for every 1,000 students; and 2) a ratio of 1 librarian to 2 staff/clerks should be observed.

c. Library Holdings

Library holdings should conform to existing requirements for libraries. For the BSA program, the libraries must provide 5 book titles per professional course found in the curriculum at a ratio of 1 volume per 15 students enrolled in the program. These titles must have been published within the last 10 years.

The HEI is likewise encouraged to maintain periodicals and other non-print materials relevant to agriculture, business and economics to aid the faculty and students in their academic work. CD-ROMs should complement a library's book collection but should otherwise not be considered as replacement for the same.

d. Internet Access.

Internet access is encouraged but should not be made a substitute for book holdings.

e. Space Requirements

At least 126 m<sup>2</sup>. or a space that can accommodate at least 10% of the combined total number of students and staff whichever is applicable.

f. Finance.

All library fees should be used exclusively for library operations and development for collections, furniture and fixtures, equipment and facilities, maintenance and staff development.

g. Networking

Libraries shall participate in inter-institutional activities and cooperative programs whereby resource sharing is encouraged.

h. Accessibility

The library should be readily accessible to all.

i. Office Hours

The library should be open to serve the needs of the users.

Section 11 - Facilities and Equipment

a. Laboratory requirements (See Attachment E)

Laboratories should conform to existing requirements as specified by law (RA 6541, "The National Building Code of the Philippines" and Presidential Decree 856, "Code of Sanitation of the Philippines").

b. Class Size

1. For lecture classes, ideal size is 35 students per class, maximum is 50.
2. For laboratory and research classes, class size shall be specific to the discipline to be stated in the policies and standards.
3. Special lectures with class size more than 50 may be allowed as long as the attendant facilities are provided.

c. Educational Technology Centers

The institution should provide facilities to allow preparation, presentation and viewing of multi-media materials to support instruction.

Section 12 - Land

There should be a minimum area of 50 hectares specifically used by the agriculture program for instruction, production, research and extension (farm demonstration).

Section 13 - Admission and Retention

The basic requirement for eligibility for admission of a student to any tertiary level degree program shall be graduation from the secondary level recognized by the Department of Education. HEIs must specify admission, retention and residency requirements. They should ensure that all students are aware of these policies.

**ARTICLE VIII  
TRANSITORY PROVISION**

All HEIs with existing permit or recognition to offer a re hereby given a non-extendible period of three (3) years from the date of effectivity hereof, within which to fully comply with this PS.

**ARTICLE IX  
SANCTION**

For violation of this Order, the Commission may impose such administrative sanction, as it may deem appropriate pursuant to the pertinent provisions of RA 7722, in relation to Section 69 of BP 232 otherwise known as Education Act of 1982, and sections 24 and 101 of the Manual of Regulations for Private Schools (MRPS), and other related laws.

**ARTICLE X  
SEPARABILITY AND REPEALING CLAUSES**

Any provision of this Order, which may thereafter be held invalid, shall not affect the remaining provisions.

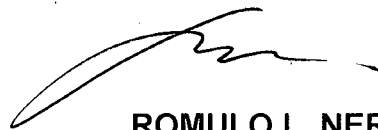
All CHED issuances or part thereof inconsistent with the provision in this CMO shall be deemed modified or repealed.

**ARTICLE XI  
EFFETIVITY**

This order shall take effect after its publication in the official Gazette or Newspaper of General Circulation.

Pasig City, Philippines. April 14, 2008 .

FOR THE COMMISSION:



**ROMULO L. NERI**  
Acting Chairman

## A MATRIX OF DUTIES AND COMPETENCIES OF AN AGRICULTURE GRADUATE

DUTIES	COMPETENCIES			
<b>A. Perform the tasks in the technical and scientific fields with confidence and creativity</b>	1. Apply concepts, principles and methodologies	2. Enhance working knowledge through technical and scientific exposures	3. Conduct innovative research to generate good agricultural practices and desirable products	
<b>B. Diagnose and analyze strengths and limitations, opportunities, threats in the practice of agriculture profession</b>	1. Keep abreast with developments in agriculture.	2. Analyze, interpret and utilize technical and socio-economic data to evaluate opportunities and constraints.	3. Recommend appropriate actions and strategies.	
<b>C. Conceptualize and formulate systems-oriented strategic plans and programs for agricultural development</b>	1. Examine the inter and intra dependence of systems within the context of agricultural development.	2. Map out strategic plans using technical, scientific, market and other sources of information.	3. Prepare workable agricultural plans, programs and feasibility studies.	4. Formulate alternative measures to solve potential problems in implementing agricultural plans and programs.
<b>D. Manage resources effectively and efficiently</b>	1. Conduct resource inventory by employing recent qualitative and quantitative tools.	2. Assess & analyze the enterprise using techniques that will establish strengths, limitations, opportunities and threats.	3. Develop strategies and alternatives within the context of sustainability.	
	4. Formulate and implement resource management plan for improved and sustained productivity.	5. Assess the overall efficiency and sustainability of agricultural plans and programs	6. Recommend and disseminate best management practices (BMPs) developed from the enterprise.	
<b>E. Monitor and Evaluate Plans and Programs in Agriculture</b>	1. Conduct performance audit to assess the progress and accomplishments of the enterprise and recommend measures to ensure sustained use of the resources available in the enterprise.	2. Design benefit monitoring and evaluation system for plans and programs.	3. Formulate verifiable performance indicators of agricultural plans and programs.	4. Take corrective actions promptly.
<b>F. Advocate agricultural laws, rules, regulations and related policies</b>	1. Know and analyze existing agricultural laws, rules, regulations and related policies.	2. Identify policy impacts and gaps.	3. Formulate recommendations for policy reforms.	4. Design and implement strategies for advocacy.

DUTIES	COMPETENCIES			
<b>G. Practice and promote public safety in the use of agricultural technology</b>	1. Apply good management practices in the workplace for safety.		2. Promote consciousness in the application of agricultural technology among workers for public safety.	
<b>H. Implement agricultural development compatible with resource conservation</b>	1. Explain the interrelationship of agriculture and the environment	2. Identify best management practices and promote their applications in specific sectors of the agriculture industry.		3. Promote resource conservation and sustainable use of natural resources.
<b>I. Develop communication skills and strategies</b>	1. Convey ideas and information clearly and effectively	2. Apply the principles and use different forms and types of communication.		3. Develop the ability to access, retrieve, process and disseminate information.
	4. Prepare, review, analyze and evaluate technical & scientific reports, proposals, researches and concept papers and respond promptly		5. Update oneself of the recent trends on information and Communication technologies (ICTs)	
<b>J. Develop and cultivate collaborative and productive work attitude towards the agriculture profession</b>	1. Demonstrate the values of self-respect and integrity.	2. Innovate for improvement of the agriculture profession	3. Develop self-reliance and practice teamwork and networking with high performance and quality.	
<b>K. provide leadership and vision in identifying, creating and pursuing opportunities in agricultural development</b>	1. Identify, collect and integrate important data and information on specific agricultural situations	2. Evaluate data /information using appropriate statistical and decision making tools.		3. Identify rational alternatives to solve specific problem, close critical gaps or pursue opportunities.
	4. Synthesize relevant information to understand the emerging global agricultural scenario		5. Pursue program of action with enthusiasm and determination	6. Practice leadership qualities and display social concerns
<b>L. Practice ethical interpersonal relations with employers, subordinates, peers, clients and the general public.</b>	1. Observe professional ethics and standards.	2. Respect the rights of others and recognize their accomplishments	3. Demonstrate emotional intelligence/maturity	4. Motivate others to participate actively in PRC Accredited Professional Organization (APO) and other agriculture-related association activities and comply with their policies and obligations.

Definition:

The Bachelor of Science in Agriculture is a degree program designed to prepare professionals with general competencies in carrying out the science, art, ethics, management and entrepreneurial business in the production, processing and marketing of plants, animals and other organisms utilized for food, fiber, recreation, biomedicine, industrial and other purposes within the context of integrated and sustainable agriculture resource systems.

An Agriculturist refers to a person who has the competence to scientifically diagnose and pursue opportunities; design and implement appropriate strategies; manage resources and information for gainful and sustainable development of the agricultural and food system resources. He/She should also be able to provide scientific, technical and policy advice in implementing programs that would promote agricultural development.

## Attachment B

The lists of Identified TVET Qualifications in BSA program are as follows:

### 1. Agricultural Crops Production NC I

Year/Sem.	Subject	Unit of Competency	Module Title
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	English 1 – Study and Thinking Skills in English	Receive and respond to workplace communication	Receiving and responding to workplace communication
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	Math 1 - College Algebra	Perform estimation and basic calculation	Performing estimation and basic calculation
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Use farm tools and equipment	Using farm tools and equipment
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Soc. Sci. 1 - Society and Culture with Family Planning	Work with others Demonstrate work values	Working with others Demonstrating work values
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Support irrigation work	Supporting irrigation work

### 2. Horticulture NC II

Year/Sem.	Subject	Unit of Competency	Module Title
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	English 2 – Writing in the Discipline	Participate in workplace communication	Participating in workplace communication
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	Math 1 - College Algebra	Perform estimation and basic calculation	Performing estimation and basic calculation
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Conduct pre-horticultural farm operations Produce vegetables Produce fruit-bearing trees	Conducting pre-horticultural farm operations Producing vegetables Producing fruit-bearing trees
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Use farm tools and equipment	Using farm tools and equipment
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Soc. Sci. 1 - Society and Culture with Family Planning	Work in a team environment Practice career professionalism	Working in a team environment Practicing career professionalism
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem	Post Harvest Handling and Seed Technology	Perform post harvest operations of major tropical fruits Perform post harvest operations of major lowland and semi-temperate vegetable crops	Performing post harvest operations of major tropical fruits Performing post harvest operations of major lowland and semi-temperate vegetable crops

### 3. Animal Production NC II

Year/Sem.	Subject	Unit of Competency	Module Title
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	English 2 – Writing in the Discipline	Participate in workplace communication	Participating in workplace communication
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	Math 1 - College Algebra	Perform estimation and basic calculation	Performing estimation and basic calculation
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Animal Science 2 - Introduction to Livestock and Poultry Production	Raise poultry	Raising poultry
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Animal Science 2 - Introduction to Livestock and Poultry Production	Raise swine	Raising swine
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Animal Science 2 - introduction to Livestock and Poultry Production	Use farm tools and equipment	Using farm tools and equipment
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Soc. Sci. 1 - Society and Culture with Family Planning	Work in a team environment Practice career professionalism	Working in a team environment Practicing career professionalism
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Animal Science 2 - Introduction to Livestock and Poultry Production	Raise small ruminants Raise large ruminants	Raising small ruminants Raising large ruminants

### 4. Slaughtering Operations NCII

Year/Sem.	Subject	Unit of Competency	Module Title
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Animal Science 2 - Introduction to Livestock and Poultry Production	Cattle / Ox / Hog / Pig / Swine Stun, shackle and lift animal Stick and bleed animal Perform cradle processes Flay cattle completely	Cattle / Ox / Hog / Pig / Swine Stun, shackle and lift animal Stick and bleed animal Perform cradle processes Flay cattle completely
2 <sup>nd</sup> Yr. 2 <sup>nd</sup> Sem	Slaughter of Animals and Processing of Their Products *	Eviscerate animal Split and quarter carcass Grade, label and stamp carcass Wash, trim and weigh carcass	Eviscerate animal Split and quarter carcass Grade, label and stamp carcass Wash, trim and weigh carcass

\*Should include slaughtering animal following Dhabiha Halal procedures



5. Horticulture NC III

Year/Sem.	Subject	Unit of Competency	Module Title
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Prepare land for agricultural crop production Implement plant nutrition programs Prepare and apply chemicals	Preparing land for agricultural crop production Implementing plant nutrition programs Preparing and apply chemicals
2 <sup>nd</sup> Yr. 2 <sup>nd</sup> Sem	Crop Protection 2 – Approaches and Practices in Pest management	Control weeds Establish horticultural crops Coordinate horticultural maintenance program Coordinate horticultural crop harvesting	Controlling weeds Establishing horticultural crops Coordinating horticultural maintenance program Coordinating horticultural crop harvesting
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	English 2 – Writing in the Discipline	Lead workplace communication	Leading workplace communication
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	Math 1 - College Algebra	Use mathematical concepts and techniques Perform estimation and calculations	Using mathematical concepts and techniques Performing estimation and calculations
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Soc. Sci. 1 - Society and Culture with Family Planning	Leads small teams Develop and practice negotiation skills Solve problems to related to work activities	Leading small teams Developing and practice negotiation skills Solving problems to related to work activities
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Basic Computer Concept and Application	Use relevant technologies	Using relevant technologies
3 <sup>rd</sup> Yr. 1 <sup>st</sup> sem.	Post Harvest handling of perishables	Implement a post-harvest program	Implementing a post-harvest program
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem	Post Harvest Handling and Seed Technology	Undertake field budding and grafting Undertake propagation activities	Undertaking field budding and grafting Undertaking propagation activities
2 <sup>nd</sup> Yr. 2 <sup>nd</sup> Sem	Crop Protection 2 – Approaches and Practices in Pest management		

### 6. Agricultural Crops Production NC III

Year/Sem.	Subject	Unit of Competency	Module Title
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Crop Science 2 – Practices of Crop Production	Prepare land for agricultural crop production Implement plant nutrition programs Prepare and apply chemicals	Preparing land for agricultural crop production Implementing plant nutrition programs Preparing and apply chemicals
2 <sup>nd</sup> Yr. 2 <sup>nd</sup> Sem	Crop Protection 2 – Approaches and Practices in Pest management	Control weeds Establish agronomic crops Undertake agronomic maintenance activities Undertake agronomic crop harvesting activities	Controlling weeds Establishing agronomic crops Undertaking agronomic maintenance activities Undertaking agronomic crop harvesting activities
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	English 2 – Writing in the Discipline	Lead workplace communication	Leading workplace communication
1 <sup>st</sup> Yr. 1 <sup>st</sup> Sem.	Math 1 - College Algebra	Use mathematical concepts and techniques Perform estimation and calculations	Using mathematical concepts and techniques Performing estimation and calculations
1 <sup>st</sup> Yr. 2 <sup>nd</sup> Sem	Soc. Sci. 1 - Society and Culture with Family Planning	Leads small teams Develop and practice negotiation skills Solve problems to related to work activities	Leading small teams Developing and practice negotiation skills Solving problems to related to work activities
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem.	Basic Computer Concept and Application	Use relevant technologies	relevant technologies
2 <sup>nd</sup> Yr. 2 <sup>nd</sup> Sem	Crop Protection 2 – Approaches and Practices in Pest management	Implement a post-harvest program Implement vertebrate pest control programs	Implementing a post-harvest program Implementing vertebrate pest control programs
2 <sup>nd</sup> Yr. 1 <sup>st</sup> Sem	Post Harvest Handling and Seed Technology	Save, prepare and store agricultural seed	Saving, preparing and storing agricultural seed

## **GUIDELINE FOR MAJOR PRACTICE OR PRACTICUM**

The major practice or practicum option gives the student opportunity to observe a farm, plant or laboratory, or other establishments, which will provide additional practical experience. The student is exposed to actual conditions, which are not normally encountered in the usual courses being offered by the university.

The student normally registers the major practice during summer (5 units), since this activity needs continuous attention. The remaining 1 unit is registered for Major Practice during the succeeding semester for completion. Thus, it is credited for 6 units. In some instances, a student may enroll the Major Practice or Practicum during the semester, provided that sufficient time is allotted for this purpose. The adviser is responsible in determining the appropriateness of the semestral enrollment.

### **I. Preparation of the Major Practice or Practicum Outline**

The following items must be included in the preparation of a major practice or practicum outline:

1. Cover Form. This form lists the course number, degree program, title of major practice or practicum, name of students, signature of adviser, unit head, college secretary, and probable date of graduation.
2. Title of Major Practice or Practicum. The title should include the place of major practice and date when it will be conducted.
3. Name of Student
4. Introduction. This will include the rationale / importance of the practicum.
5. Objectives
6. Expected Output
7. Review of Related Literature
8. Description and Schedule of Activities. This will include the time and place of practicum as well as the specific activities to be performed in various units of the farm, or place of the practicum.
9. Literature cited.

The adviser should require the major practice student to present the proposed practicum outline for checking his/her understanding and knowledge of the work activities and schedule before registration and fielding. The adviser and unit head prior to registration must approve the major practice or practicum outline.

### **II. Conduct of Major Practice or Practicum**

1. The appropriate forms must be properly submitted prior to the start of the conduct of the major practice or practicum. These forms will include: consent of parent or guardian (notarized), memorandum of understanding between the university/college and host establishment, and student's pledge.
2. It may be conducted on-campus, if facilities are available. Major practice or practicum may be conducted as a farm, plant, or laboratory practice, or a combination thereof.
3. The student shall render at least one full summer work, or its equivalent if the major practice is conducted on semestral basis.
4. The adviser should take effort to make periodic visits to assess the student's performance.
5. An evaluation form shall be given to the manager/owner of the farm/plant at the start of the practice. A copy of the evaluation form should be sent by the farm manager/owner directly to the adviser. The evaluation report will form part of the final grade of the student.

# FUNDAMENTAL AGRICULTURE COURSES

<b>COURSE NAME</b>	<b>CROP SCIENCE 1 – PRINCIPLES OF CROP SCIENCE</b>
<b>COURSE DESCRIPTION</b>	Principles and Practices of Crop Production
<b>COURSE OBJECTIVES</b>	At the end of the course, the students should be able to: <ol style="list-style-type: none"> <li>1. identify and categorize crops according to the types, uses, importance, origin and geographical distribution.;</li> <li>2. discuss the basic processes and factors in crop production;</li> <li>3. discuss the basic components of sustainable crop production; and</li> <li>4. discuss the socio-economic, cultural and political issues in crop production in relation to agricultural sustainability.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>COURSE OUTLINE</b>	<p>I. INTRODUCTION</p> <ol style="list-style-type: none"> <li>A. Agricultural development</li> <li>B. Origin, domestication and history of some important crops</li> <li>C. World food situation and centers of production</li> <li>D. Philippine agriculture</li> <li>E. Major Crops of the Philippines and their geographic distribution</li> <li>F. Meaning and Scope of Crop Science</li> </ol> <p>II. PHYSIOLOGICAL PROCESSES AFFECTING CROP PRODUCTION</p> <ol style="list-style-type: none"> <li>A. Photosynthesis</li> <li>B. Respiration</li> <li>C. Transpiration</li> <li>D. Translocation and partitioning of assimilates</li> <li>E. Mineral Nutrition</li> <li>F. Growth and development</li> <li>G. Plant movements</li> <li>H. Crop adaptation</li> </ol> <p>III. FACTORS AFFECTING CROP PRODUCTION</p> <ol style="list-style-type: none"> <li>A. Environmental</li> <li>B. Genetic Factors <ol style="list-style-type: none"> <li>1. Genotypes (definition and highly recommended varieties/cultivars)</li> <li>2. Genetically modified Organisms (GMOs) – definition and concepts and recent developments (e.g. Bt corn, tomato, soybean, cotton, sweet potato)</li> </ol> </li> <li>C. Human Factors <ol style="list-style-type: none"> <li>1. Preferences of farmers</li> <li>2. Capability of farmers (e.g. economic and social knowledge)</li> <li>3. Cultural practices (e.g. eco-social and political observations)</li> </ol> </li> </ol> <p>IV. SUSTAINABLE CROP PRODUCTION</p> <ol style="list-style-type: none"> <li>A. Man and crops in an ecosystems <ol style="list-style-type: none"> <li>1. Definition of Ecosystems/Agroecosystem</li> <li>2. The flow of energy</li> <li>3. The cycling of nutrients</li> <li>4. Pollution</li> </ol> </li> <li>B. Production systems and crop management <ol style="list-style-type: none"> <li>1. lowland</li> <li>2. upland</li> </ol> </li> <li>C. Features of sustainable crop production <ol style="list-style-type: none"> <li>1. Sustainable Agriculture Concept</li> <li>2. Diversification</li> </ol> </li> </ol>

	3. Resource conservation and regeneration 4. Productivity and stability of production systems  D. <ol style="list-style-type: none"> <li>1. Biotechnology and other recent advances in crop production system</li> <li>2. WTO (World Trade Organization) and Conservation on Crop Biodiversity (CBD)</li> <li>3. Patents and farmer's rights</li> <li>4. Government programs on agriculture</li> </ol>
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<b>COURSE NAME:</b>	<b>CROP SCIENCE 2 – PRACTICES OF CROP PRODUCTION</b>						
<b>COURSE DESCRIPTION</b>	Principles and Practices of Crop Production						
<b>COURSE OBJECTIVES</b>	At the end of the course, the students should be able to: <ol style="list-style-type: none"> <li>1. explain the variations in crop production practices with different environmental, crop, socio-cultural and political factors;</li> <li>2. discuss the basic concepts of cropping systems and identify the factors that are essential in the formulation of a cropping system to optimize crop productivity; and</li> <li>3. apply the principles and practices in growing and handling agronomic and horticultural crops in the Philippines, esp. those of commercial value.</li> </ol>						
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)						
<b>PREREQUISITES</b>	Crop Science 1						
<b>COURSE OUTLINE</b>	<ol style="list-style-type: none"> <li>I. Introduction (Issues in crop production and development)</li> <li>II. Crop Production, Agriculture and Trade (food chain, food utilization, nutrition, research, education, distribution, marketing, etc.)</li> <li>III. Site Characterization for Crop Production (Biophysical, associative economics, socio-cultural and political determinants)</li> <li>IV. Production Practices             <ol style="list-style-type: none"> <li>A. Land preparation for annual and perennial crops (Conventional vs. improved tillage methods; Practices for erosion control)</li> <li>B. Planting material selection and preparation</li> <li>C. Planting methods</li> <li>D. Water supply and management (Irrigation practices; effects on aquatic environment, farmland water collection and impounding/watershed).</li> <li>E. Soil nutrient management (Sources of plant nutrients, environmental affects of various nutrients sources, other nutrient management practices, integrated nutrient cycling)</li> <li>F. Pest Management (Use of pesticides, alternatives to pesticides)</li> <li>G. Specialized management practices (Wind/shelter breaks, physical and chemical control of growth and development, shading, other treatments)</li> <li>H. Specialized production systems (Landscape, ornamentals, plantations)</li> <li>I. Harvesting and post production technology (Harvesting methods, processing (primary and secondary), storage)</li> <li>J. Farming Systems (Monocropping, multi-storey system, diversified and integrated system, conversion to low-external input system)</li> </ol> </li> </ol> <p style="text-align: center;">LAB EXERCISES:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Exercise No.</th> <th style="text-align: center;">No of meetings</th> <th style="text-align: center;">Title</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Exercise No.	No of meetings	Title			
Exercise No.	No of meetings	Title					

	1	1	Land Preparation and Planting Practices
	2	1	Field Practices for Lowland Crop
	3	2	Nursery Practices and Plant Propagation
	4	1	Special Practices in Crop Production
	5	1	Bio-Intensive Approach to Food Production
	6	1	Crop Nutrition
	7	1	Integrated Pest Management
	8	2	Post Production Practices
	9	1	Site Evaluation for Farm Planning
	10	1	Farm Entrepreneurship
	11	1	Tropical Landscaping

<b>COURSE NAME</b>	<b>CROP PROTECTION 1 - PRINCIPLES OF CROP PROTECTION</b>
<b>COURSE DESCRIPTION</b>	Identification, biology and ecology of different tests and their natural enemies
<b>COURSE OBJECTIVES</b>	At the end of the course, the students should be able to: <ol style="list-style-type: none"> <li>1. know the basic concepts, principles and philosophy of pest management with emphasis on the biological information about pests and their complexity in the total ecosystem which are used as guides in formulating safe, ecologically sound, and economical pest management programs; and</li> <li>2. analyze pest situations in the field and the factors responsible for pest development, establishment and survival.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>COURSE OUTLINE</b>	<p>I. INTRODUCTION</p> <ol style="list-style-type: none"> <li>A. World population and food supply</li> <li>B. Role of crop protection in increasing food supply</li> <li>C. Definition of pest(s)</li> <li>D. Economic importance of pests</li> <li>E. Various disciplines involved in Crop Protection</li> </ol> <p>II. MAJOR PEST GROUPS</p> <p>A. PLANT PATHOGENS</p> <ol style="list-style-type: none"> <li>1. Plant Pathology (defined)</li> <li>2. II. Economic Importance of Plant Diseases</li> <li>3. III. Concepts of Plant Diseases</li> <li>4. IV. Causes of Plant Diseases</li> <li>5. Disease Cycle</li> <li>6. Plant Disease Epidemiology (The elements of an epidemic)</li> <li>7. Variability in Plant Pathogens</li> </ol> <p>B. Weeds</p> <ol style="list-style-type: none"> <li>1. Weed Science (defined), Concept of a Weed</li> <li>2. Characteristics of Weeds</li> <li>3. Weeds, Crops and Other Pests</li> <li>4. Classification of Weeds</li> <li>5. Effect of weeds on Human Affairs</li> <li>6. Reproduction and Establishment of Weeds</li> </ol>

	<ul style="list-style-type: none"> <li>7. Crop-Weed Competition</li> <li>8. Change in Weed Populations</li> </ul> <p>C. Arthropod and Vertebrates Pests</p> <ul style="list-style-type: none"> <li>1. Entomology defined</li> <li>2. Recognizing an insect and a mite</li> <li>3. Characteristics of insects that make them a very successful group of arthropods</li> <li>4. How insects affect man as a consequence of varied habits and behavior</li> <li>5. Recognizing Insect Orders</li> <li>6. Representative insect pests and important considerations to make in the formulation of strategies/programs for their management</li> <li>7. Important Vertebrates Pests</li> </ul> <p>III. INTEGRATED PEST MANAGEMENT PROGRAM AS A DEFENSIVE RESPONSE TO PEST ATTACK</p> <p>A. Pest Problem Diagnosis</p> <ul style="list-style-type: none"> <li>1. Determination of component factors causing the pest problem in the field</li> </ul> <p>B. The Pest Management Concept</p> <ul style="list-style-type: none"> <li>1. Definition of terms</li> <li>2. Factors that led to the development of the pest management concept</li> </ul> <p>C. General Considerations in Planning Pest Management Programs</p> <ul style="list-style-type: none"> <li>1. Consumer utilization of the product</li> <li>2. Conservation of the environment</li> <li>3. Safety of the pest control operation</li> <li>4. Profitability of the pest management strategy</li> </ul>
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<b>COURSE NAME:</b>	<b>CROP PROTECTION 2 APPROACHES AND PRACTICES IN PEST MANAGEMENT</b>
<b>COURSE DESCRIPTION</b>	Philosophies, Strategies and Methods in Pest and Disease
<b>COURSE OBJECTIVES</b>	<p>At the end of the course, the students should be able to:</p> <ul style="list-style-type: none"> <li>1. analyze the developments in pest management;</li> <li>2. describe and analyze the nature and field ecology of pests and natural biological control in the context of a dynamic farming system;</li> <li>3. assess the merits and limitations of the different approaches in managing pest problems; and</li> <li>4. determine the pest management methods appropriate for a given and farming situations.</li> </ul>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)



<b>PREREQUISITE</b>	Crop Protection I
<b>COURSE OUTLINE</b>	<p>I. Course Overview and Introduction</p> <p>A. Aims and scope of the course</p> <p>B. Course requirements</p> <p>II. The Concept of Integrated Pest Management (IPM or Pest Control)</p> <p>A. The current concept of IPM</p> <ol style="list-style-type: none"> <li>1. Goals and scope</li> <li>2. Management strategies</li> <li>3. Management rules</li> <li>4. Management tactics</li> <li>5. Features of IPM</li> </ol> <p>B. Historical Trends in IPM/PM</p> <ol style="list-style-type: none"> <li>1. Pre-IPM era</li> <li>2. Emergence of the early concepts of IPM</li> <li>3. The "ETL-Based" IPM</li> <li>4. The "Package of the Technology" IPM</li> <li>5. Emerging IPM/PM Concept</li> </ol> <p>III. Economic Concepts</p> <p>IV. Ecological Concepts</p> <p>V. Human Behavior and Decision-Making Concepts</p> <p>VI. Regulatory Control</p> <p>VII. Genetic Manipulation of Crops: Host Plant Resistance</p> <p>VIII. Behavioral Control</p> <p>IX. Biological Control</p> <p>X. Genetic Manipulation of Pests</p> <p>XI. Chemical Control and Bio-Pesticides</p> <p>XII. Mechanical and Physical Control</p> <p>XIII. Cultural Control and Agro-Ecology</p> <p>XIV. Selected Cases of IPM/PM Programs in the Philippines</p> <ol style="list-style-type: none"> <li>A. IPM in Rice <ol style="list-style-type: none"> <li>1. IRRI IPM Farmer Participatory Research</li> <li>2. FAO IPM Farmer Field School</li> </ol> </li> <li>B. IPM in Cabbage</li> <li>C. IPM in Corn</li> <li>D. IPM in Mango</li> </ol> <p>XV. Research, Extension and Policy Needs in IPM/PM</p> <ol style="list-style-type: none"> <li>A. Bt-Technology and IPM/PM (Debate)</li> <li>B. Towards an ecology-based IPM</li> <li>C. Can we teach Farmers to do IPM</li> </ol>

<b>COURSE NAME:</b>	<b>ANIMAL SCIENCE 1 INTRODUCTION TO ANIMAL SCIENCE</b>
<b>COURSE DESCRIPTION</b>	Principles of breeding, physiology, and nutrition in relation to production, processing and marketing of animal products

<b>COURSE OBJECTIVES</b>	
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITES</b>	Zoology or its equivalent
<b>COURSE OUTLINE</b>	<p style="text-align: right;">Lecture Outline</p> <p>I. INTRODUCTION</p> <ol style="list-style-type: none"> <li>A. Man, Animal and Ecosystems</li> <li>B. Animal and Their Economic Utility</li> <li>C. Animal Agriculture and the Population Problem</li> <li>D. Animal Science and the Animal Industry</li> </ol> <p>II. THE PHYSIOLOGY OF FARM ANIMALS</p> <ol style="list-style-type: none"> <li>A. Introduction</li> <li>B. The Nervous System <ol style="list-style-type: none"> <li>1. Importance</li> <li>2. Basic unit of the nervous system</li> <li>3. Structure of neurons</li> <li>4. The central nervous system</li> <li>5. The sensory modalities</li> <li>6. The somatic nervous system</li> <li>7. The automatic nervous system</li> </ol> </li> <li>C. The Endocrine System <ol style="list-style-type: none"> <li>1. Importance and basic concepts</li> <li>2. The hypophysis</li> <li>3. The thyroid gland</li> <li>4. The pancreas</li> <li>5. The adrenal gland</li> <li>6. The parathyroid gland</li> <li>7. The gonads (to be discussed under reproduction)</li> </ol> </li> <li>D. The Cardiovascular System <ol style="list-style-type: none"> <li>1. Importance</li> <li>2. The heart</li> <li>3. The heart sound</li> <li>4. The blood vessels</li> <li>5. Blood circulation</li> <li>6. The blood</li> <li>7. Blood coagulation</li> <li>8. Lymphatic system</li> <li>9. Inter-relationship between the circulatory and the lymphatic system</li> </ol> </li> <li>E. The Respiratory System <ol style="list-style-type: none"> <li>1. Importance</li> <li>2. The respiratory apparatus</li> <li>3. The respiratory center</li> <li>4. Regulation of respiratory center activity</li> <li>5. Mechanism of respiration (inspiration/expiration)</li> <li>6. Gas Exchanges</li> </ol> </li> <li>F. The Excretory System – Kidney and Body Fluids <ol style="list-style-type: none"> <li>1. Importance</li> <li>2. Structure of the Kidney</li> <li>3. Urine formation</li> <li>4. Role of ADH in water conservation</li> </ol> </li> <li>G. The Reproductive System</li> </ol>

1. Forms of reproduction
2. The female reproductive system
3. The male reproductive system
4. Puberty and estrous cycle
5. Signs of estrous and time of mating
6. Fertilization and pregnancy
7. Maternal recognition of pregnancy
8. Placental development
9. Parturition and lactation

#### H. Body Temperature Regulation

1. Homeotherms vs. poikilotherms
2. Process of heat dissipation
3. Physiological responses to heat and cold

### III. ANIMAL NUTRITION

#### A. Definition of Terms

1. Nutrition
2. Nutrients
3. Digestion
4. Absorption
5. Metabolism

#### B. Gross Chemical Composition of Plant and Animal Tissue

1. Elemental
2. Proximate composition

#### C. Classes of Nutrients, Functions and Deficiency Symptoms

1. Water
2. Carbohydrates
3. Fats
4. Proteins
5. Minerals
6. Vitamins

#### D. Digestion and Absorption

1. Physical factors in digestion
2. Digestion Process
3. Absorption of end-products of digestion

#### E. Metabolism

1. Energy metabolism
2. Protein metabolism

#### F. Nutrient Requirements of Farm Animals

3. Maintenance
1. Growth
2. Reproduction
3. Lactation
4. Egg production
5. Wool Production
6. Work

#### G. Measuring the Nutritive Value of Feeds

1. Chemical Analysis
2. Digestion and nitrogen balance experiments
3. Feeding and slaughter experiments
4. Measures of energy value of feeds
5. Measures of protein values of feeds

#### H. Feedstuff

1. Roughages
2. Concentrate

#### IV. GENETICS AND LIVESTOCK IMPROVEMENT

##### A. Genes and their Role in Animal Productivity

1. Genes and their functions
2. The role of genotype and environment on the phenotypic
3. Gene action

##### B. The Mechanics of Inheritance

1. Gametogenesis and fertilization
2. Probability and the Mendelian Inheritance
3. Non-Mendelian Inheritance

##### C. Genes in Population

1. Genetic composition of animal populations
2. Equilibrium population
3. Factors affecting change in the genetic composition of populations

##### D. Animal Breeding

1. The objectives of animal breeding
2. Systems of breeding

##### E. Reproduction and Genetic Improvement of Animals

1. Reproduction cycle and rate of genetic improvement
2. Artificial insemination
3. Embryo transfer technology

#### V. SLAUGHTER, PROCESSING AND MARKETING OF FARM ANIMALS

##### A. Slaughtering and Fabrication

1. Basic principles of selecting animals for slaughter
2. Handling prior to slaughter

##### B. Composition of Meat, Milk and Eggs

1. General characteristics
2. Composition – Common test
3. Constituents – Separation of constituents
4. Value of food

##### C. Basic Principles of Proper Handling and Processing of Meat and Milk

1. Causes of deterioration
2. Processing of milk
3. Pasteurization and sterilization
4. Processing of Meat
5. Processing of other livestock products

##### E. Marketing of Livestock and Livestock Products

1. Marketing live animals
2. Marketing livestock products

#### Laboratory Exercises

Exercise No.

Title

1. The External Anatomy and Body Measurements of Farm Animals
2. Measurements of the Pulse Rate, Respiration Rate and Body Temperature (PRT) of Some Farm Animals
3. Reproductive System: Structure and Function
4. Digestive System: Structure and Function

	<ul style="list-style-type: none"> <li>5. Records of Animal Performance</li> <li>6. Methods of Livestock Genetic Improvement</li> <li>7. Methods of Livestock Genetic Improvement</li> <li>8. Nutrient Sources:- Roughages, Concentrates and Supplements</li> <li>9. Methods of Feed Evaluation and Quality Control</li> <li>10. Evaluation of Rations for Livestock and Poultry</li> <li>11. Livestock Slaughtering and Meat Handling</li> <li>12. Processing of Meat Products</li> <li>13. Processing of Milk Products</li> </ul>
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<b>COURSE NAME:</b>	<b>ANIMAL SCIENCE 2- INTRODUCTION TO LIVESTOCK AND POULTRY PRODUCTION</b>
<b>COURSE DESCRIPTION</b>	Management of farm animals for efficient production of meat, milk, eggs and other animal products
<b>COURSE OBJECTIVES</b>	
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITES</b>	
<b>COURSE OUTLINE</b>	<p>Part I. BEEF CATTLE PRODUCTION</p> <ul style="list-style-type: none"> <li>A. Overview of the Beef Cattle Industry <ul style="list-style-type: none"> <li>1. Inventory</li> <li>2. Supply and Demand</li> <li>3. Competitive Advantages of Beef Production</li> <li>4. Constraints in the Cattle Sector</li> <li>5. Interventions</li> </ul> </li> <li>B. Beef production Systems in the Philippines <ul style="list-style-type: none"> <li>1. Ranching or Extensive System</li> <li>2. Feedlot Fattening Operation</li> <li>3. Backyard Cattle Raising or Semi-subsistence or Small Holder</li> </ul> </li> <li>C. Beef Cattle Breeds, Breeding and Reproduction <ul style="list-style-type: none"> <li>1. Breeds of Cattle</li> <li>2. Beef breeding</li> <li>3. Breeding Systems</li> <li>4. Reproduction</li> <li>5. Some Indicators of Good Breeding or Reproductive Management</li> </ul> </li> <li>D. Nutrition <ul style="list-style-type: none"> <li>1. Nutrients and Their Functions</li> <li>2. Common Feeds for Ruminants</li> </ul> </li> <li>E. Herd management <ul style="list-style-type: none"> <li>1. Herd Division</li> <li>2. Management of Breeding Females</li> <li>3. Management of Calves, Growers and Fatteners</li> <li>4. Management of Breeding Bulls</li> </ul> </li> <li>F. General Management Practices <ul style="list-style-type: none"> <li>1. Cattle Identification</li> <li>2. Dehorning</li> <li>3. Castration</li> <li>4. Record-Keeping</li> </ul> </li> </ul>

5. Selection and Culling

G. Animal Health Program

1. Herd Health Management
2. Health Program for Cattle

Part II. DAIRY PRODUCTION

A. Overview of Dairy Production

1. Milk and Milk Products
2. The Philippine Dairy Situation, Year 2000
3. Government Effort to Develop the Philippine Dairy Industry
4. Breeds of Dairy Cattle
5. Breeds of Dairy Cattle
6. Water buffaloes
7. Breeds of Goats

C. Dairy Cattle Reproduction

1. Physiology of Reproduction
2. Bull's Reproductive Physiology
3. Cow's Reproductive Physiology

D. Dairy Cattle Management

1. Breeding Management
2. Feeding Management
3. Herd Health
4. Milk Production

E. Pasture Management

1. The Need for Improved Pasture
2. Establishing Pastures
3. Sowing Time
4. Management of Improved Pastures
5. Efficient Pasture Use

F. Forage Preservation for a Year-Round Feed Supply

1. Strategy of Preservation
2. Types of Silo

G. Dairy Cattle Production Terms

Part III. POULTRY PRODUCTION

A. Overview of the Poultry Industry

1. The poultry Industry Situation, Problems and Prospects

B. Species of Poultry

1. The Chicken: Classes, Breeds and Varieties

C. Specialized Fields in Poultry

1. Breeding Farm
2. Egg Farm
3. Broiler Farm
4. Support Services

D. Production and Management

1. Brooding Requirement
2. Growing Management
3. Layer flock Management

E. Broiler Production

1. Factors to Consider in Broiler Raising

2. Systems of Broiler Operation

F. Poultry Production Glossary of Terms

Part IV. SWINE PRODUCTION

A. Overview of Swine Industry

1. Advantage and Disadvantage of Swine Production
2. Hog Zoological Scheme

B. Breed of Swine

3. The Philippine Native Swine
4. Pure Breeds
5. Upgrades
6. Synthetic Breeds (Hybrids)

C. Management of the Boar

1. Buying Replacement Boars
2. Transporting Newly Purchased Boar
3. Handling Newly Purchased Boar
4. Assessing Boar Breeding Potential
5. Health Care
6. Feeding Boar
7. Housing and Environment
8. Reproductive Phenomena
9. Breeding Frequency
10. Boar to Sow Ratio
11. Reproductive Problems Associated with the Boar

D. Care and Management of Sows and Gilts

1. Prior to pregnancy
2. Management at Breeding Time
3. Management During Gestation
4. Management During Farrowing
5. Management after Farrowing

E. Care and Management of Baby Pigs from Birth to Weaning

1. Keeping Newborn Piglets Warm and Comfortable
2. Cutting Umbilical Cord
3. Cutting the Needle Teeth
4. Prevention of Tail Biting
5. Feeding the Suckling Pigs with Colostrum
6. Identifying the Piglets
7. Prevention of Baby Pig Anemia
8. Creep Feeding the Baby Pigs
9. Rearing the Orphan Pigs
10. Castration
11. Weaning the Piglets

F. Care and Management of Growing-Finishing Pigs

1. Scour Control
2. Gastro-intestinal Parasite Control
3. External Parasite Control
4. Vaccination
5. Feeding

<b>COURSE NAME:</b>	<b>SOIL SCIENCE 1 PRINCIPLES OF SOIL SCIENCE</b>
<b>COURSE DESCRIPTION</b>	Nature, Properties and Management of Soils
<b>COURSE OBJECTIVES</b>	<p>At the end of the semester the students must be able to:</p> <ol style="list-style-type: none"> <li>1. present to the students a unified view of the soil as a medium for plant growth and as a natural resource;</li> <li>2. develop in the student skills in problem solving problems requiring the use of numerical data obtained from physical, chemical and biological experiments involving the soil;</li> <li>3. provide basic information about the role of plant nutrients so that the students will be able to recognize and diagnose soil problems associated with poor plant growth;</li> <li>4. develop in the student the ability to apply the principles of soil management in the control of soil fertility. Soil pH, and soil erosion; and</li> <li>5. develop in the student the ability to interpret soil survey report.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITES</b>	Chemistry
<b>COURSE OUTLINE</b>	<p>I. Definition and Composition of Soil</p> <ol style="list-style-type: none"> <li>A. Soil defined: edaphological and pedological</li> <li>B. Fields of specialization in soil science</li> <li>C. Composition of the soil <ol style="list-style-type: none"> <li>1. Air</li> <li>2. Water</li> <li>3. Organic matter</li> <li>4. Mineral matter</li> </ol> </li> <li>D. Composition of the mineral matter <ol style="list-style-type: none"> <li>1. The three major fractions: sand, silt and clay</li> <li>2. The clay fraction: crystalline and non-crystalline components</li> </ol> </li> <li>E. Elemental composition of the Earth's crust</li> <li>F. The essential nutrient elements <ol style="list-style-type: none"> <li>1. Macro and Micronutrients</li> <li>2. Criteria of Essentiality</li> <li>3. Ionic forms of nutrients</li> </ol> </li> </ol> <p>II. Soil Formation and Development</p> <ol style="list-style-type: none"> <li>B. Soil forming rocks and minerals <ol style="list-style-type: none"> <li>1. Rocks and minerals: definition</li> <li>2. Classes of rocks: igneous, sedimentary, metamorphic</li> <li>3. Mode of formation of igneous rock: intrusive, extrusive</li> <li>4. Other points of differences of igneous rock: texture, color, acidity</li> <li>5. Examples of sedimentary, metamorphic and igneous rocks</li> <li>6. Primary vs Secondary minerals and examples of each class</li> </ol> </li> <li>C. Weathering <ol style="list-style-type: none"> <li>1. Definition</li> <li>2. Physical weathering: exfoliation and cracking due to</li> </ol> </li> </ol>



	<p>temperature changes, crystal growth, abrasion, movement of earth's crust, prying action of roots</p> <ol style="list-style-type: none"> <li>3. Chemical weathering: hydrolysis, hydration, oxidation, carbonation, solution</li> </ol> <p>D. Soil formation</p> <ol style="list-style-type: none"> <li>1. Factors of soil formation: climate, organisms, relief, parent material, time</li> </ol> <p>E. Soil development</p> <ol style="list-style-type: none"> <li>1. Pedogenic processes: addition, losses, translocation in the soil body</li> </ol> <p>F. The Soil profile</p> <p>III. Physical Properties of Soils</p> <p>A. Definition of physical properties</p> <ol style="list-style-type: none"> <li>1. Texture, structure, bulk density, particle density, porosity, water holding capacity, hydraulic conductivity, consistency and color</li> </ol> <p>B. Soil texture</p> <ol style="list-style-type: none"> <li>1. The twelve textural grades</li> <li>2. Properties of sand, silt and clay: size ranges, shapes, chemical composition, specific surface area</li> <li>3. Significance of soil texture on soil fertility, crop suitability, porosity/aeration, water relations, tillage</li> <li>4. Soil texture determination: feel method, hydrometer method, pipette method</li> </ol> <p>C. Soil structure</p> <ol style="list-style-type: none"> <li>1. Types: platy, prismatic and columnar, blocky and sub-angular blocky, granular and crumbly, structureless</li> <li>2. Cementing agents: O.M., lime, microbial gums, fine clay</li> <li>3. Soil management related to soil structure</li> </ol> <p>D. Soil densities</p> <ol style="list-style-type: none"> <li>1. Definition and formulas for B.D., P.D. and % porosity</li> <li>2. Factors affecting B.D.</li> <li>3. Sample problems</li> </ol> <p>E. Soil water</p> <ol style="list-style-type: none"> <li>1. Importance of Water</li> <li>2. Properties of water</li> <li>3. Forces affecting soil water retention and movement: cohesion, adhesion, osmotic pressure, capillary forces</li> <li>4. Soil moisture tension concepts, unit of expression</li> <li>5. Soil moisture availability: field capacity, hygroscopic coefficient, permanent wilting point</li> <li>6. Soil moisture measurements</li> </ol> <p>F. Soil consistency and color</p> <p>IV. Chemical Properties of Soils</p> <p>A. Soil Colloids</p> <ol style="list-style-type: none"> <li>1. Definition</li> <li>2. Classification and examples: organic and inorganic</li> </ol>
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- B. Silicate Clays
  1. Basic structural units: tetrahedron
  2. Properties of silicate clays: expansion and contraction (type), bonding, crystal size, specific surface area, shape
  3. Sources of negative charges;
- C. Organic colloids
  - sources of negative charges
- D. Factors affecting strength of absorption of ions in soil colloids
- E. Cat ion exchange capacity
- F. Base saturation and exchangeable sodium percentage (ESP)
- G. Soil pH
  1. Definition and significance
  2. Sources of soil acidity
  3. Kinds of acidity: active and reserve acidity
  4. Buffering capacity
  5. Effects on nutrient availability
- H. Liming
  1. Definition and examples of lime
  2. Relative Neutralizing Value (RNV)
  3. Sample problems
- I. Soil Salinity and sodicity

#### V. Soil Organism and Organic Matter

- A. Kinds of soil organisms: Microorganisms and macro organisms
- B. Bacteria: characteristics and classification
  1. Oxygen requirements-aerobic, anaerobic, facultative
  2. Energy and carbon requirements – autotrophic (phototrophic and chemoautotrophic) and heterotrophic
  3. Temperature adaption – psychrophillic, mesophyllic, thermophyllic
- C. Actinomycetes: characteristics and similarity and difference from bacteria and fungi
- D. Fungi: Characteristics and unique adaptation to soil conditions
- E. Other organisms: viruses, protozoa, algal, worms, insects, rodents
- F. Beneficial activities of soil organisms
  1. Decomposition of organic matter
  2. Transformation of soil nutrients
  3. Promoting soil aggregation through by-products of their activities
  4. Nitrogen fixation (rhizobia) and phosphorus solubilization (mycorrhiza)
- G. Composition of organic matter: carbohydrates, proteins, lignins, fats, waxes, tannins
- H. Organic matter decomposition and end products
  1. Aerobic (oxidative) decomposition
  2. Anaerobic (fermentation) decomposition

	<ul style="list-style-type: none"> <li>I. Transformation of nitrogen             <ul style="list-style-type: none"> <li>1. mineralization, ammonification, nitrification, denitrification, immobilization, ammonia volatilization, leaching</li> </ul> </li> <li>J. Effects of inorganic matter on soil properties</li> </ul> <p>VI. Nature, Properties And Management Of Soils</p> <ul style="list-style-type: none"> <li>A. Definition</li> <li>B. Essential Nutrient             <ul style="list-style-type: none"> <li>1. Criteria of Essentiality</li> <li>2. Available forms and functions of nutrients in plants</li> <li>3. Methods of assessing soil fertility status</li> <li>4. Fertilizer nutrients: their properties and usage</li> <li>5. Fertilizer Computation</li> <li>6. Causes of decline in soil fertility</li> </ul> </li> </ul>
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<b>COURSE TITLE:</b>	<b>SOIL SCIENCE 2 – SOIL FERTILITY, CONSERVATION AND MANAGEMENT.</b>
<b>COURSE DESCRIPTION:</b>	Soil nutrient elements, their availability, measurement and evaluation; soil degradation and its control, and maintenance and improvement of soil fertility and productivity.
<b>NUMBER OF UNITS</b>	3 units ( 2 hrs lecture; 3 hrs lab )
<b>COURSE OBJECTIVES</b>	<p>At the end of the course, the student must be able to:</p> <ul style="list-style-type: none"> <li>1. Appreciate the role of soil fertility in sustainable up production</li> <li>2. Relate soil behavior and properties with crop performance</li> <li>3. apply the theories of nutrient availability, mobility and exchange in soils and between soil and plant</li> <li>4. Relate factors enhancing soil erosion with soil properties</li> <li>5. Asses and measure soil loss</li> <li>6. Develop / design soil and water conservation management strategies for specific land uses, and</li> <li>7. Integrate the knowledge in soil fertility with soil conservation and management.</li> </ul>
<b>COURSE CONTENT</b>	<p>I. SOIL FERTILITY MANAGEMENT</p> <p>A. INTRODUCTION</p> <ul style="list-style-type: none"> <li>1. Historical background of soil fertility</li> <li>2. Soil fertility defined</li> <li>3. Importance of soil fertility and conservation</li> <li>4. Basic concepts in plant nutrition</li> </ul> <p>B. SOIL-PLANT RELATIONSHIPS</p> <ul style="list-style-type: none"> <li>1. Essential elements in soils and their forms</li> <li>2. Profile distribution of elements</li> <li>3. Roles of essential elements in plant nutrition</li> <li>4. Biochemical classification of nutrients</li> <li>5. Availability of nutrients</li> <li>6. Mechanism of nutrient uptake</li> <li>7. Relationship between soil nutrient supply and plant growth</li> <li>8. Linear response plateau model (LRP)</li> <li>9. Law of the Minimum (Leibig)</li> <li>10. Mitscherlich's Equation</li> <li>11. Nitrogen, phosphorus, potassium and sulfur economy of soils</li> </ul>

12. Micronutrients
13. Causes of decline in soil fertility

C. EVALUATION OF SOIL FERTILITY

1. Diagnostic Procedures
2. Procedures for determining amounts of nutrients needed
3. Microbiological Methods
4. Pot Cultures

i. PROBLEM SOILS

1. Characteristics of Different Problem Soils
2. Formation of saline and sodic soils
3. Growth of plants on halomorphic soils
4. Management of saline, sodic, zinc deficient and acid soils

II. SOIL CONSERVATION AND MANAGEMENT

A. EROSION PROCESS AND MECHANICS

1. Definition
2. Factors that influence the rate of erosion
3. Process and energy available for soil erosion
4. Action of various detaching and transporting agents
5. Factors enhancing soil erosion

B. ASSESMENT OF EROSION HAZARD AND EROSION MODELLING

1. Methods of general assessment
2. Semi-detailed assessment
3. Land capability classification
4. Using land capability classification in farm planning soil conservation
5. The Wischmeier and Smith model (The Universal Soil Loss Equation-USLE)
6. Limitation of the USLE
7. Wind erosion prediction equation
8. Model validation

C. SOIL EROSION MEASUREMENT

1. Field experiments
2. Run-off plots
3. Field splash cups or splash boards
4. Radioactive process
5. Pointed stones or erosion pins
6. Transport of rills
7. Laboratory experiments
8. Rainfall simulator
9. Use of Alumni and Plexiglass Flume

D. SOIL AND WATER CONSERVATION AND MANAGEMENT STRATEGIES

1. Soil conservation strategies

LABORATORY EXERCISES

EXERCISE NO.	TITLE
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	<ol style="list-style-type: none"> <li>1. Composting</li> <li>2. Rapid Soil Testing</li> <li>3. Field Fertilizer Trial</li> <li>4. Minus One Element Technique ( Moet )</li> <li>5. Nutrient Dificiency Symptoms And Diagnosing</li> <li>6. Nitrogen Status In Rice</li> <li>7. Leaching Process</li> <li>8. Terrain Quantification And Mapping</li> <li>9. Land Capability Assesment</li> <li>10. Crop Suitability Evaluation</li> <li>11. Design And Evaluation Of Soil And Water</li> <li>12. Conservation Strategies</li> </ol>
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<b>COURSE NAME:</b>	<b>AGRICULTURAL EXTENSION AND COMMUNICATION</b>
<b>COURSE DESCRIPTION</b>	Principles and methods of extension communication in agriculture
<b>COURSE OBJECTIVES</b>	
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (3 hours lecture)
<b>PREREQUISITES</b>	
<b>COURSE OUTLINE</b>	<ol style="list-style-type: none"> <li>I. The Context of Extension <ol style="list-style-type: none"> <li>A. Population and Agricultural Production: Global and Country Statistics</li> <li>B. Agricultural Modernization and Development</li> <li>C. Sustainable Agricultural Development</li> <li>D. Philippine Agriculture Over the Years</li> </ol> </li> <li>II. Agricultural Extension: An Intervention for Sustainable Development <ol style="list-style-type: none"> <li>A. Historical Antecedents of Agricultural Extension</li> <li>B. Extension in Europe and in the USA</li> <li>C. Extension in the Philippine Setting</li> <li>D. Extension in State Colleges and Universities</li> </ol> </li> <li>III. Practice of Agricultural Extension <ol style="list-style-type: none"> <li>A. Roles and Functions of the Extension Worker <ol style="list-style-type: none"> <li>1. Enabler</li> <li>2. Educator</li> <li>3. Mediator</li> <li>4. Farmer Aid</li> <li>5. Facilitator</li> </ol> </li> <li>B. Principles of Extension <ol style="list-style-type: none"> <li>1. Communication and Extension</li> <li>2. Accountability to client</li> <li>3. Works with rural people</li> <li>4. Two-way process linkage</li> <li>5. Cooperates with other agencies</li> <li>6. Different target groups</li> <li>7. Developing rural leadership</li> </ol> </li> <li>C. Extension Teaching Methods and Techniques <ol style="list-style-type: none"> <li>1. Categories of extension teaching method</li> <li>2. Factors in the choice of a method</li> </ol> </li> <li>D. Approaches in Extension <ol style="list-style-type: none"> <li>1. General Agricultural Extension Approach</li> <li>2. Community Approach</li> <li>3. Project Approach</li> </ol> </li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>4. Farming Systems Development Approach</li> <li>5. Training and Visit System Approach</li> <li>6. Cost-Sharing Approach</li> <li>7. Participatory Agricultural Extension Approach</li> <li>8. Educational Institution Approach</li> </ul> <ul style="list-style-type: none"> <li>E. Communication in Extension <ul style="list-style-type: none"> <li>1. The communication process</li> <li>2. The elements of communication</li> <li>3. Models of communication</li> <li>4. Communication effects</li> <li>5. Strategies for effective communication</li> <li>6. Extension as communication intervention</li> </ul> </li> <li>F. Diffusion and Adoption Process <ul style="list-style-type: none"> <li>1. The diffusion process</li> <li>2. Stages in the adoption process</li> <li>3. Adopter categories</li> <li>4. Problems and issues in adoption</li> </ul> </li> <li>G. Target Categories in Extension <ul style="list-style-type: none"> <li>1 Target groups and agricultural extension</li> <li>2 Identifying target categories</li> <li>3 Access of target categories</li> </ul> </li> <li>H. Adult Teaching and Learning <ul style="list-style-type: none"> <li>1 Andragogy: A theory of adult learning</li> <li>2 Principles of adult teaching and learning</li> <li>3 Teaching-learning models for adults</li> </ul> </li> <li>I. Program Planning and Evaluation <ul style="list-style-type: none"> <li>1 Stages in program planning</li> <li>2 Evaluating extension programs</li> <li>3 Country experiences</li> </ul> </li> <li>J. Improving Extension Effectiveness: Major Problems and Issues</li> </ul> <p>III. Prospects and Opportunities in Agricultural Extension</p>
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<b>COURSE NAME</b>	<b>AGRICULTURAL ECONOMICS AND MARKETING</b>
<b>COURSE DESCRIPTION</b>	Principles underlying farm management and their application on agricultural business, offices and programs.
<b>COURSE OBJECTIVES</b>	
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (3 hours lecture)
<b>PREREQUISITES</b>	
<b>COURSE OUTLINE</b>	<ul style="list-style-type: none"> <li>I. Introduction <ul style="list-style-type: none"> <li>A. Definitions <ul style="list-style-type: none"> <li>1. Economics</li> <li>2. Microeconomics</li> <li>3. Macroeconomics</li> <li>4. Agricultural Economics</li> <li>5. Positive Economics</li> <li>6. Normative Economics</li> </ul> </li> <li>B. Nature and Scope <ul style="list-style-type: none"> <li>1. Relationship of Economics to other Social Sciences</li> </ul> </li> </ul> </li> </ul>

	<ol style="list-style-type: none"> <li>2. Basic economic problems</li> <li>3. Economic goals</li> </ol> <p>C. Foundation of Economics</p> <p>D. Economic ideologies of nations</p> <ol style="list-style-type: none"> <li>1. Capitalism</li> <li>2. Communism</li> <li>3. Socialism</li> <li>4. Fascism</li> <li>5. Nazism</li> </ol> <p>E. Economic Theories</p> <ol style="list-style-type: none"> <li>1. Development of Economic Theory</li> <li>2. Application of Economic Theory</li> </ol>
	<p>II. Microeconomics</p> <p>A. Production and costs</p> <ol style="list-style-type: none"> <li>1. Theory of production</li> <li>2. Factors of production</li> <li>3. Theory of Costs</li> <li>4. Price and Output determination</li> <li>5. Demand</li> <li>6. Supply</li> <li>7. Elasticity</li> </ol> <p>B. Consumption</p> <ol style="list-style-type: none"> <li>1. Definitions – consumption and consumers</li> <li>2. Consumption in relation with production</li> <li>3. Consumer and price</li> </ol>
	<p>III. Macroeconomics</p> <p>A. National income account</p> <ol style="list-style-type: none"> <li>7. Approaches to GNP computations</li> <li>8. National income accounts</li> </ol> <p>B. Consumption, savings and investment</p> <ol style="list-style-type: none"> <li>1. The consumption function</li> <li>2. Factors affecting the level of aggregate consumption</li> <li>3. Simple income determination</li> </ol> <p>C. Unemployment and inflation</p> <ol style="list-style-type: none"> <li>1. Definition of Unemployment, Employment and Inflation</li> <li>2. Causes of unemployment and inflation</li> <li>3. Effects of unemployment and inflation</li> <li>4. Measures to address unemployment and inflation</li> </ol> <p>D. Monetary and Fiscal Policy</p> <ol style="list-style-type: none"> <li>1. Monetary policy</li> <li>2. Fiscal policy</li> </ol> <p>E. Money and Banking</p> <ol style="list-style-type: none"> <li>1. Money and money supply</li> <li>2. Theories on demand for money</li> <li>3. Commercial banking</li> </ol>
	<p>III. Agriculture and Economic Growth</p> <p>A. Definition – Agriculture, Sustainable Development, Economic Growth, Economic Development</p>

	<p>B. Strategies for Economic Growth and Development</p> <p>C. Policies and Programs for Agricultural Development and legal parameters:</p> <ol style="list-style-type: none"> <li>1. Agricultural and related laws vs agrarian reform law <ul style="list-style-type: none"> <li>vs AFMA LAW</li> <li>vs crop insurance law</li> <li>vs bio-safety law</li> <li>vs pest control laws in the Philippines</li> <li>vs high value crops law</li> <li>vs reorganization of the dept. of agriculture</li> <li>vs taxation</li> <li>vs creation of the Board of Agriculture</li> <li>vs Professional Regulation Commission</li> </ul> </li> <li>2. SONA (Based on Latest S.O.N.A.)</li> <li>3. Irrigation Act</li> <li>4. Omnibus Power Bill</li> <li>5. Other recent policies and programs</li> </ol> <p>D. Intensive and extensive agriculture</p> <ol style="list-style-type: none"> <li>1. Economies of scale</li> <li>2. Law of comparative advantage</li> </ol> <p>E. International Economics</p> <ol style="list-style-type: none"> <li>1. WTO-GATT-UR</li> <li>2. Balance of payment</li> <li>3. Foreign Exchange</li> <li>4. International reserve</li> </ol> <p>F. Agricultural Marketing</p> <ol style="list-style-type: none"> <li>1. Basic concepts of marketing</li> <li>2. Approaches to the study of agricultural marketing</li> <li>3. Marketing function</li> <li>4. Marketing margin and costs</li> <li>5. Marketing Program – 4 P's of marketing</li> </ol> <p>IV. Farm Management</p>
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<b>COURSE NAME</b>	<b>INTRODUCTION TO ENTERPRISE AND ENTREPRENEURSHIP</b>
<b>COURSE DESCRIPTION</b>	Basic concepts related to starting and managing an agriculture enterprise with focus on farming as a business and role of farmers as entrepreneurs, to include planning a business and preparing business plans
<b>OBJECTIVES</b>	At the end of the course the learner should be able to: <ol style="list-style-type: none"> <li>1. Discuss and understand concept of farming as a business and the entrepreneurial role of farmers;</li> <li>2. Identify factors related to the choice of a business enterprise;</li> <li>3. Familiarize with the steps and processes in establishing an enterprise;</li> <li>4. Prepare a business plan/feasibility study;</li> <li>5. Validate concepts on agricultural entrepreneurship through interaction with entrepreneurs.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREQUISITES</b>	
<b>COURSE OUTLINES</b>	<p>Lecture</p> <p>I. INTRODUCTORY CONCEPTS</p> <ol style="list-style-type: none"> <li>A. Entrepreneurship: What does it mean?</li> <li>B. Farming as a business</li> <li>C. Characteristics that differentiates from industrial/manufacturing enterprises</li> <li>D. Role of farmers as Entrepreneurs</li> </ol> <p>II. PREPARING FOR BUSINESS</p> <ol style="list-style-type: none"> <li>A. Factors to consider in choosing an enterprise</li> <li>B. Steps and processes in establishing an enterprise</li> </ol> <p>III. PLANNING A BUSINESS</p> <ol style="list-style-type: none"> <li>A. Kind and size of business</li> <li>B. Financial requirements</li> <li>C. Sources of capitalization</li> <li>D. Feasibility study</li> <li>E. Government requirements</li> </ol> <p>IV. PREPARING BUSINESS PLANS</p> <ol style="list-style-type: none"> <li>A. The 4 P's of business: Product, Price, Place, Promotion</li> <li>B. Business organization and structure</li> <li>C. Business licenses/permits</li> </ol> <p>V. CASE STUDIES</p> <ol style="list-style-type: none"> <li>A. Analysis of some existing agricultural enterprises</li> </ol> <p>VI. INDIVIDUAL/GROUP Visits to some Agriculture-based enterprises</p> <ol style="list-style-type: none"> <li>A. Meeting and interacting with graduates of agriculture who are engaged in agriculture-based/related enterprises</li> <li>B. Validating concepts of agricultural entrepreneurship through exposure to actual operations of a business enterprise.</li> </ol>

<b>COURSE NAME:</b>	<b>INTRODUCTION TO AGRICULTURE</b>
<b>COURSE DESCRIPTION</b>	Overview of agriculture with emphasis on Philippine agriculture
<b>COURSE OBJECTIVES</b>	1. Broaden students' perspective on agriculture and its vital role in advancing

	<p>farmer's progress and national development in capitalist and non-capitalists societies.</p> <p>2. Develop students' sense of awareness about rural poverty and their commitment to agricultural development geared towards the economic and social uplift of the rural poor.</p>
<b>NO. OF UNITS AND CONTACT HOURS</b>	1 unit (1 hour lecture)
<b>PREREQUISITES</b>	None
<b>COURSE OUTLINE</b>	<p>I. GROWTH AND DEVELOPMENT OF AGRICULTURE</p> <p>A. Brief historical development of world agriculture and Philippine agriculture</p> <p>B. Agriculture as an economic factor in capitalist and non-capitalist societies</p> <p>C. Agriculture as an industry, a science and a profession</p> <p>II. INTRODUCTION TO AGRICULTURE AND THE ECOSYSTEM</p> <p>A. Agriculture and the environment</p> <p>B. Agriculture and society</p> <p>III. ANALYSIS OF FOOD PRODUCTION AND POPULATION GROWTH IN DEVELOPED AND DEVELOPING COUNTRIES</p> <p>IV. OVERVIEW OF PHILIPPINE AGRICULTURE</p> <p>A. Resources</p> <p>B. Production Systems</p> <p>C. Small-hold farming and agribusiness</p> <p>D. Need for balanced agro-industrial growth in agricultural production</p> <p>V. PROFILE OF THE FILIPINO FARMER</p> <p>A. Socio-cultural and economic status; needs and aspiration</p> <p>VI. AGRICULTURE AND DEVELOPMENT</p> <p>A. Agriculture and rural poverty in developing countries and underdeveloped countries</p> <p>B. Development goals and strategies</p> <p>C. Organizations for agriculture: functions, models of operations and institutional linkages</p> <p>D. Assessment of some development programs</p> <p>VII. WHERE DO WE GO FROM HERE?--Directions for growth</p>

<b>COURSE NAME:</b>	<b>AGRICULTURAL ENGINEERING - FUNDAMENTALS OF AGRICULTURAL ENGINEERING 1</b>
<b>COURSE DESCRIPTION</b>	Hydrology, irrigation and drainage; soil and water conservation engineering; weather elements, climate classification, crop and livestock environment.
<b>COURSE OBJECTIVES</b>	
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITE</b>	Physics 1
<b>COURSE OUTLINE</b>	<p>LECTURE COURSE OUTLINE</p> <p>I. INTRODUCTION</p> <p>A. Overview of land and water resources engineering</p> <p>B. Role of irrigation and water resources engineering in agricultural</p>

	<p>development</p> <p>C. Brief historical perspective of irrigation and water resources development</p> <p>II. WEATHER, CLIMATE AND AGRICULTURE</p> <p>A. Earth-sun relationship</p> <p>B. The earth's atmosphere; general circulation</p> <p>C. Weather elements and weather patterns</p> <p>D. Hydrologic cycle and the hydrologic processes</p> <p>E. Crop-weather-animal interactions</p> <p>III. WATER RESOURCES</p> <p>A. Sources and distribution of water</p> <p>B. Rainfall and streamflow dependability; probability concepts</p> <p>C. Surface water and groundwater development</p> <p>D. Water quality considerations</p> <p>IV. IRRIGATION AND DRAINAGE PRINCIPLES</p> <p>A. Methods of irrigations</p> <p>B. Irrigation losses and efficiencies</p> <p>C. Estimation of irrigation and diversion requirements</p> <p>D. Irrigation networks</p> <p>E. Flow measurement</p> <p>F. Fundamental concepts of drainage</p> <p>G. Types of drainage systems</p> <p>V. LEGAL AND ADMINISTRATIVE ASPECTS</p> <p>A. Rights and doctrines for surface streams and other water sources</p> <p>B. Water law of the land</p> <p>C. The National Irrigation Administration</p> <p>VI. FARM POWER AND MACHINERY</p> <p>LAB COURSE OUTLINE</p> <table border="1"> <thead> <tr> <th>EXERCISE/ PROBLEM SET NO.</th> <th>TITLE</th> </tr> </thead> <tbody> <tr> <td>Ex. 1</td> <td>Agrometeorological Observation Practices</td> </tr> <tr> <td>Ex. 2</td> <td>Estimation of Average Areal Precipitation</td> </tr> <tr> <td>Ex. 3</td> <td>Simple Hydrologic Frequency Analysis</td> </tr> <tr> <td>PS1</td> <td>Basic Soil Water Relations FIRST LAB EXAM</td> </tr> <tr> <td>Ex. 4</td> <td>Soil Moisture Measurement</td> </tr> <tr> <td>Ex. 5</td> <td>Measurement of Soil's Specific Gravity</td> </tr> <tr> <td>PS 2</td> <td>Evapotranspiration SECOND LAB EXAM</td> </tr> <tr> <td>Ex. 6</td> <td>Cropping Pattern and Irrigation Water Requirements</td> </tr> <tr> <td>PS 3</td> <td>Flow Measurement</td> </tr> <tr> <td>PS 4</td> <td>Pumps and Pumping Units THIRD LAB EXAMP</td> </tr> </tbody> </table>	EXERCISE/ PROBLEM SET NO.	TITLE	Ex. 1	Agrometeorological Observation Practices	Ex. 2	Estimation of Average Areal Precipitation	Ex. 3	Simple Hydrologic Frequency Analysis	PS1	Basic Soil Water Relations FIRST LAB EXAM	Ex. 4	Soil Moisture Measurement	Ex. 5	Measurement of Soil's Specific Gravity	PS 2	Evapotranspiration SECOND LAB EXAM	Ex. 6	Cropping Pattern and Irrigation Water Requirements	PS 3	Flow Measurement	PS 4	Pumps and Pumping Units THIRD LAB EXAMP
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<b>COURSE NAME:</b>	<b>GENETICS</b>
<b>COURSE DESCRIPTION</b>	Mechanisms of heredity and variation, cytogenetics, mutation, nature of genes, population genetics and evolutionary genetics, biometrical procedures
<b>COURSE OBJECTIVES</b>	To enable the students to understand the following basic principles underlying heredity and variation:

	<ol style="list-style-type: none"> <li>1. The nature, expression, and regulation of genes in the individual.</li> <li>2. The mechanisms of genetic transmissions.</li> <li>3. The sources of variation in individuals and populations.</li> <li>4. The behavior of genes in populations.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITES</b>	General Botany 1 and General Zoology 1
<b>COURSE OUTLINE</b>	<p>I. Genetics: The Science of Heredity and Variation</p> <ol style="list-style-type: none"> <li>A. Definition of Genetics</li> <li>B. The Beginnings of Genetics</li> <li>C. The Scope of Genetics</li> <li>D. Applications of Genetics</li> </ol> <p>II. The Chromosomal Basis of Heredity</p> <ol style="list-style-type: none"> <li>A. The Cell</li> <li>B. The chromosome structure</li> <li>C. Cell Division: Mitosis, Meiosis</li> <li>D. Life cycles: Germinal or Gametic Meiosis, Intermediary or sporic Meiosis, Initial or Zygotic Meiosis</li> </ol> <p>III. Gene Segregation and Interaction</p> <ol style="list-style-type: none"> <li>A. Law of Segregation</li> <li>B. Law of Independent Assortment</li> <li>C. Segregation and Assortment in Haploid Organisms</li> <li>D. Dominance Relationships: Complete Dominance, Incomplete Dominance, Overdominance, Co-dominance</li> <li>E. Multiple Alleles</li> <li>F. Lethal Genes: Recessive Lethal, Dominant Lethal</li> <li>G. Modifier Genes</li> <li>H. Gene Interactions: Novel Phenotypes, Recessive Epistasis, Dominant Epistasis, Complementary Genes, Duplicate Genes</li> <li>I. Pseudoalleles</li> <li>J. Environmental Influence on Gene Expression: Definition of Terms, External Environment, Internal Environment</li> <li>K. Twin Studies: Concordance and Discordance</li> <li>L. Probability and Statistical Testing: Level of Significance, Chi-Square Test, Binomial Distribution</li> </ol> <p>IV. Linkage and Recombination</p> <ol style="list-style-type: none"> <li>A. Definition of Linkage</li> <li>B. Determination of Linkage</li> <li>C. Chromosome Mapping</li> <li>D. Factors Affecting Recombination Frequencies</li> <li>E. Sex Determination</li> <li>F. Sex Linkage</li> </ol> <p>V. Chemical Basis of Heredity</p> <ol style="list-style-type: none"> <li>A. The concept of the gene</li> <li>B. Chemical Composition of the Chromosome</li> <li>C. DNA as the Genetic Material</li> <li>D. Chemical Composition of the DNA</li> <li>E. Molecular Structure of DNA</li> <li>F. Organization of DNA in Chromosomes: Prokaryotic Chromosome, Eukaryotic Chromosome</li> <li>G. Replication or synthesis of DNA: Mode of Replication, Process of Replication, Conformation of DNA Replication</li> <li>H. Error Correction in DNA Replication</li> <li>I. RNA as the genetic material</li> </ol>

VI. Gene Function: Proteins and Enzymes

- A. Genetic Control of Proteins: Gene-Enzyme Relationship: Inborn Error of Metabolism One Gene-One Enzyme Hypothesis, Protein Structure, Colinearity of DNA Proteins
- B. Protein Synthesis: Central Dogma of Molecular Biology, General Information Transfers, Interrupted Genes
- C. The Genetic Code: The triplet Code, Universality of the Genetic Code
- D. Regulation of Gene Action: Regulation of Gene Action in Prokaryotes

VII. Genes in Development

- A. Differential Gene Action: The basis of cell differentiation
- B. Nucleoplasmic Interaction: Molecular Exchanges between Nucleus and
- C. Genes and Morphogenesis: Gene Effects on System of Embryonic Induction

VIII. Mutation

- A. Variation in Genome Structure or Numerical Changes of the Chromosome
- B. Changes in Chromosome Structure or Chromosomal Aberrations
- C. Gene Mutations
- D. Reverse Mutations
- E. Mutagenic Agents
- F. Evolutionary Significance of Mutations

IX. Delayed Chromosomal and Extrachromosomal Inheritance

- A. Delayed Chromosomal Inheritance
- B. Extrachromosomal Inheritance: Cytoplasmic Inheritance, Cytoplasmic Particles, Chloroplast, Mitochondria
- C. Plasmids of Extracellular Origin: Infective Heredity Episomes
- D. Criteria for extrachromosomal Inheritance

X. Quantitative Inheritance

- A. Inheritance of Quantitative Characters: Multiple Genes
- B. Analysis of quantitative Characteristics
- C. Components of Phenotypic Variance
- D. Heritability: Heritability in the Narrow Sense
- E. Heritability in the Broad Sense

XI. Genes in Populations

- A. Population Genetics
- B. Gene Frequencies and Equilibrium: Gene Frequencies, Gene Pool, Model-system for Population Stability (Hardy-Weinberg Law)
- C. Changes in Gene Frequencies: Mutation Selection
- D. Race and Species Formation: The Concept of Races, The Concept of Species

XII. Genetics and Man

- A. Cytogenetics
- B. Inborn Error Metabolism
- C. Behavioral Genetics

XIII. Genetic Engineering and Biotechnology

- A. Recombinant DNA/Genetic Engineering
- B. Applications of Genetic Engineering

<b>COURSE NAME</b>	<b>BIOTECHNOLOGY AND SOCIETY</b>
<b>COURSE DESCRIPTION</b>	Biotechnology and its techniques; genetically modified organisms (GMOs) regulatory procedures; biotechnology products labeling and their impacts to humans and the environment (biosafety); intellectual property rights and international and local regulations affecting biotechnology.
<b>NUMBER OF CREDITS</b>	3 units (3 hrs lecture)
<b>COURSE OBJECTIVES</b>	At the end of the course, the student must be able to: <ol style="list-style-type: none"> <li>1. Appreciate the importance of biotechnology to humans, society and the environment</li> <li>2. Acquire and apply some techniques of biotechnology</li> <li>3. Discuss regulatory procedures on genetically modified organisms (GMOs)</li> <li>4. Relate the impacts of biotechnology products to the environment</li> <li>5. Explain the different international and local regulations about biotechnology</li> </ol>
<b>COURSE CONTENT</b>	<p>I. INTRODUCTION</p> <p>A. History of biotechnology</p> <p>B. Relationship to plant breeding</p> <p>C. Importance of biotechnology</p> <p>D. Extent of adoption</p> <p>E. Review of products currently used</p> <p>II. TECHNIQUES IN BIOTECHNOLOGY</p> <p>A. Tissue culture</p> <p>B. DNA extraction</p> <p>C. DNA cloning</p> <p>D. Gene coding</p> <p>E. Gene gun and alternative techniques</p> <p>F. Backcross breeding</p> <p>G. Cloning</p> <p>H. DNA sequencing</p> <p>III. GENETICALLY MODIFIED ORGANISMS</p> <p>A. Regulatory procedures</p> <p>B. Regulatory processes</p> <p>C. Impacts on food quality and quantity</p> <p>D. Impacts on health and medicine</p> <p>E. Impacts on the environment</p> <p>F. Impacts on economy</p> <p>IV. CONTROVERSIES IN BIOTECHNOLOGY</p> <p>A. Monarch butterfly controversy</p> <p>B. Starlink corn controversy</p> <p>C. Poisonous potato controversy</p> <p>D. The Mexican corn gene escape controversy</p> <p>V. ISSUES IN BIOTECHNOLOGY</p> <p>A. Banning and moratorium</p> <p>B. Labelling</p> <p>C. Intellectual property</p> <p>D. Germ line therapy</p> <p>E. Gene therapy</p> <p>F. Cloning</p> <p>G. Status of local biotechnology</p> <p>VI. LAWS AND REGULATIONS ON BIOTECHNOLOGY</p> <p>A. International conventions affecting biotechnology</p> <p>B. Local regulations and biosafety</p> <p>C. Principles behind laws and regulations</p> <p>D. Role of institutions</p> <p>E. Alternatives in biotechnology</p>

<b>COURSE NAME:</b>	<b>INTRODUCTION TO ECOLOGICAL AGRICULTURE</b>
<b>COURSE DESCRIPTION</b>	Principles and Practices of Ecological Agriculture
<b>COURSE OBJECTIVES</b>	At the end of the course, the students should be able to: 1. explain the principles of ecological agriculture; 2. distinguish and differentiate agricultural practices in terms of ecological soundness and other sustainability parameters; and 3. compare the features of the various approaches to ecological agriculture.
<b>NO. OF UNITS AND CONTACT HOURS</b>	<b>3 units (3 hours lecture)</b>
<b>PREREQUISITES</b>	<b>Crop Science 2</b>
<b>COURSE OUTLINE</b>	I. Introduction <ul style="list-style-type: none"> <li>A. Background/Overview of Agriculture <ul style="list-style-type: none"> <li>1. Historical and Ecological Context of Agriculture</li> <li>2. Modern Agriculture: Its Features and Impacts</li> <li>3. Issues and Concerns in Agriculture</li> </ul> </li> <li>B. Relevance of Ecological Agriculture Practices to Food Security</li> <li>C. Basic Ecological Concepts</li> </ul> II. Principles of Ecological Agriculture <ul style="list-style-type: none"> <li>A. Diversity (genetic, species, ecosystem)</li> <li>B. Integrated nutrient cycling</li> <li>C. Soil and water conservation</li> </ul> III. Ecological Agriculture Practices <ul style="list-style-type: none"> <li>A. Soil Biology, Soil Fertility Restoration/</li> <li>B. Building process</li> <li>C. Ecological Pest Management (insects, weeds, pathogens)</li> <li>D. Ecological Crop Husbandry Practices</li> <li>E. Ecological Animal Husbandry Practices</li> <li>F. Seeds and Cultivars Improvement in Ecological Agriculture</li> </ul> IV. Comparison of Various Models or Approaches to Ecological Agriculture <ul style="list-style-type: none"> <li>A. Organic Farming</li> <li>B. Bio-dynamic farming</li> <li>C. Permaculture</li> <li>D. Natural Farming</li> <li>E. Others (Low External Input Sustainable Agriculture, Regenerative Agriculture, Resource Efficient Production, Keyline Farming, etc.)</li> <li>F. Conversion studies/models</li> <li>G. Planning the conservation process from</li> <li>H. high external input to low external input agriculture</li> </ul> V. Sustainable Agriculture (SA) <ul style="list-style-type: none"> <li>A. Definition, concepts</li> <li>B. Barriers to the Adoption of SA</li> <li>C. Institutional and Policy Aspects of SA</li> </ul> VI. Field Exposure and Discussion

<b>COURSE NAME:</b>	<b>METHODS OF AGRICULTURAL RESEARCH</b>
<b>COURSE DESCRIPTION</b>	Qualitative and quantitative methods in the conduct of agricultural research
<b>OBJECTIVES</b>	<p>At the end of the course, the students are expected to:</p> <ol style="list-style-type: none"> <li>1. explain the importance of conducting research in the light of current research issues in agriculture;</li> <li>2. identify and use appropriate research and statistical methods and research designs that shall guide the collection and observation of data;</li> <li>3. Analyze data using appropriate tools;</li> <li>4. Prepare / write research proposals, scientific or technical reports in agriculture; and</li> <li>5. Follow appropriate format for presentation in scientific meetings and/or fora.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PREREQUISITE</b>	Statistics 1; Scientific Writing, Junior Standing
<b>COURSE OUTLINE</b>	<p>Lecture Topics</p> <ol style="list-style-type: none"> <li>I. Introduction <ol style="list-style-type: none"> <li>A. Comparison between science and common sense</li> <li>B. The scientific method</li> </ol> </li> <li>II. Elements of experimentation <ol style="list-style-type: none"> <li>D. Estimates of error ( replication and randomization)</li> <li>E. Control of error (Blocking, proper plot technique and data analysis)</li> <li>F. Interpretation of results</li> </ol> </li> <li>III. Research methodologies <ol style="list-style-type: none"> <li>A. Qualitative / descriptive and action research (CPAR, FGD, Case Study,</li> <li>B. Quantitative – Basic experimental designs as applicable to agricultural research</li> </ol> </li> <li>IV. Research proposal scope and format requirements <ol style="list-style-type: none"> <li>A. Problem identification</li> <li>B. Statement of objectives and hypothesis</li> <li>C. Review of Related Literatures</li> <li>D. Selection and use of appropriate research designs</li> <li>E. Preparation of log frame</li> <li>F. Analysis and interpretation of data</li> <li>G. Format and Mechanics in the Presentation of Results</li> <li>H. Print format ( Scientific journals and popular publications)</li> <li>I. Audio-visual format (Oral and poster presentation)</li> </ol> </li> </ol>





# **CORE COURSES IN AGRICULTURE**

<b>COURSE NAME</b>	<b>POST HARVEST HANDLING AND SEED TECHNOLOGY</b>
<b>COURSE DESCRIPTION</b>	Post harvest technology of handling and storage of agricultural crops and the science and technology of seed production, processing, storage, testing and quality control
<b>OBJECTIVES</b>	<p>After finishing the course, the students should be able to:</p> <ol style="list-style-type: none"> <li>1. learn and discuss the principles and techniques involved in post harvest handling of agricultural crops and in seed production, processing, storage, testing and quality control.</li> <li>2. identify and describe the biological aspects of post harvest handling; the pre-harvest factors and post harvest behavior of horticultural crops; harvesting indices and methods; packaging operations; storage techniques; and quality evaluation methods.</li> <li>3. enumerate and explain the factors affecting the life processes of reproduction, seed formation and development, germination, dormancy and deterioration; the basic techniques in seed technology; and the variation in seed and seed morphology of major crop species.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>REQUISITES</b>	Botany 20; Crop Science 1 and 2; Crop Protection 1 and 2.
<b>OUTLINES</b>	<p>Introduction  Definition of terms  Historical development and importance of post harvest technology of handling and storage of crops and of seeds and seed technology.</p> <p>Part A. Post Harvest Technology of Handling and Storage of Agricultural Crops</p> <p>Biological Aspects of Post Harvest Handling</p> <ol style="list-style-type: none"> <li>A. General characteristics of fruits, vegetables and cut flowers</li> <li>B. Product deterioration</li> </ol> <p>Pre-harvest factors and post harvest behavior of horticultural crops</p> <p>Harvesting</p> <ol style="list-style-type: none"> <li>A. Maturity indices</li> <li>B. Harvesting method</li> </ol> <p>Packaging Operations</p> <ol style="list-style-type: none"> <li>A. Produce collection</li> <li>B. trimming and cleaning</li> <li>C. Curing, sorting and grading</li> <li>D. Waxing and packaging</li> <li>E. Pre-cooling</li> </ol> <p>Transport and Storage</p> <ol style="list-style-type: none"> <li>A. Transport types; their engineering aspects and corresponding handling practices</li> <li>B. Storage types and techniques</li> </ol> <p>Post Harvest Control of Senescence and Related Processes</p> <ol style="list-style-type: none"> <li>A. Controlled ripening methods</li> <li>B. Fruit degreening</li> <li>C. Use of chemical preservative for cut flowers</li> </ol> <p>Loss Assessment and quality Evaluation</p> <ol style="list-style-type: none"> <li>A. Types of losses and methods of loss assessments</li> <li>B. Quality evaluation methods</li> <li>C. Amelioration methods of various post harvest problems</li> </ol>

Part B. Science and Technology of Seed Production, Processing, Storage, Testing and Quality Control

Reproductive Processes in Plants

- A. Factors for flower induction
- B. Floral initiation

Seed Formation and Development

- C. Seed formation
- D. Seed development

Seed Chemistry, Viability and Germination

- A. Organic components of seeds and other chemical compounds
- B. Pattern/stages of seed germination; kinds of and requirements for germination
- C. Physiology of germination

Seed and Seedling Vigor

- A. Factors affecting vigor
- B. Increasing seed and seedling vigor
- C. Evaluating seed and seedling vigor

Seed Longevity; Deterioration and Pathology

- A. Factors affecting life span of seeds
- B. Seed moisture relationships
- C. Maintaining seeds in storage
- D. Symptoms and possible causes of seed deterioration

Seed Production Techniques for selected Crops

Seed Drying, Processing and Handling

- A. Seed drying principles and types of dryers
- B. Principles of seed processing
- C. Seed cleaning equipment
- D. Seed treatment, packaging and handling
- E. Seed processing plant layout

Seed Quality Control

- A. Seed certification
- B. Seed regulations (Seed laws and standards)
- C. Role of seed testing laboratory

<b>COURSE NAME</b>	<b>PRINCIPLES AND PRACTICES PLANT BREEDING, PROPAGATION AND NURSERY MANAGEMENT</b>
<b>DESCRIPTION</b>	Principles and practices underlying the development, evaluation, propagation and management of improved crop plants and the care and management of plant nurseries
<b>OBJECTIVES</b>	At the end of the semester the students must be able to: <ol style="list-style-type: none"> <li>1. Discuss the scope, nature and importance of plant breeding, propagation and nursery management in crop improvement and production</li> <li>2. Explain the mode of reproduction as it affects breeding methodology and plant propagation and nursery management</li> <li>3. Outline the general breeding procedures for self and cross-pollinated crops as well as for apomictic and vegetatively propagated plants</li> <li>4. Demonstrate and perform the different plant breeding and nursery management practices.</li> </ol>
<b>PREREQUISITES</b>	Crop Science 1 and 2
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>COURSE OUTLINE</b>	<p>I. Introduction</p> <ol style="list-style-type: none"> <li>A. Definition, nature and importance of plant breeding, plant propagation and nursery management.</li> <li>B. Historical developments and relevance of the issue of plant breeding in the development and improvement of crop varieties and subsequent multiplication of planting materials.</li> </ol> <p>II. Objectives:</p> <ol style="list-style-type: none"> <li>A. Discuss the scope and importance of plant breeding, propagation and nursery management.</li> <li>B. Explain the science and practice of plant breeding, plant propagation and nursery management.</li> <li>C. Outline and discuss the general procedures used in plant breeding, plant propagation and nursery management.</li> <li>D. Discuss the role of biotechnology in plant breeding, propagation and management of crops bred using the tools of modern biotechnology.</li> <li>E. Demonstrate and perform basic techniques in plant breeding, plant propagation and nursery management.</li> </ol> <p>III. Patterns of evolution of cultivated species and the concept of centers of origin and diversity</p> <p>IV. Modes of reproduction of crop species, pollination control and breeding methods for specific characters</p> <ol style="list-style-type: none"> <li>A. Self Pollinated Crops</li> <li>B. Cross Pollinated Crops</li> <li>C. Apomictic and vegetatively reproduced crops</li> <li>D. Principles of breeding for high yields, pests resistance and tolerance to environmental stresses.</li> </ol> <p>V. Variety testing and release, seed production and distribution of commercial varieties in the Philippines</p> <ol style="list-style-type: none"> <li>A. The Philippine National Seed Industry Council (NSIC) and the variety testing, release and seed distribution.</li> </ol> <p>VI. Nature, requirements and techniques of seed germination</p>

- A. The germination process and factors affecting seed germination
- B. Breaking seed dormancy and seed testing
- C. Techniques for seed germination for specific kind of plants

VII. Basic types of reproduction/propagation

A. Seeds

- 5. seed structure and development
- 6. principles of seed production, selection and handling seed storage and pest control

B. Asexual reproduction and propagation

- 1. Principles and types of vegetative reproduction

C. Specialized propagation techniques: Embryo and Tissue Cultures

- 1. Principles and procedures of embryo and tissue cultures
- 2. Importance of propagation by embryo and tissue culture

VIII. Principles and Practice of Plant Nursery Establishment and Management

A. Importance and basic requirement of plant of nursery establishment

B. Types and classification of plant nurseries

- 1. ownership
- 2. function
- 7. production system
- 8. product
- 9. tissue culture materials

COURSE NAME	BENEFICIAL ARTHROPODS AND MICROORGANISM																						
DESCRIPTION																							
OBJECTIVES	<p>At the end of the semester, the students must be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss the concepts and principles of biological control of agricultural plants</li> <li>2. Characterize factors affecting the growth and survival of beneficial arthropods and microorganism</li> <li>3. Explain the nature, mechanism and interactions involved among the host and parasite system</li> <li>4. Outline and discuss the various methods of mass production, application and evaluation of effectiveness</li> </ol>																						
PREREQUISITES																							
NO. OF UNITS AND CONTACT HOURS	3 units (2 hours lecture and 3 hours laboratory)																						
COURSE OUTLINE	<p>I. Introduction</p> <ol style="list-style-type: none"> <li>A. The biological world and its balancing mechanism</li> <li>B. Review of ecological concepts and principles – basis of biological control</li> <li>C. Review basic definition of pests and their characteristics</li> <li>D. Factors that determine the existence of an organism in an ecosystem</li> </ol> <p>II. Concept of Biological Control of Agricultural Pests</p> <ol style="list-style-type: none"> <li>A. Definition and concepts of biological control</li> <li>B. Unique characteristics of pests as it affect biological control strategies</li> <li>C. The host plant and important component of biological control – types of host plant resistance affecting the pests</li> </ol> <p>III. Nature of Biological Control Agents</p> <ol style="list-style-type: none"> <li>A. Parasitoids, Pathogens and Predators of Insects and Vertebrate Pests</li> <li>B. Antagonist of Pathogens</li> <li>C. Biological control agents of weeds</li> </ol> <p>IV. Assessment, mass production and Field Releases</p> <ol style="list-style-type: none"> <li>A. Assessment of parasitism</li> <li>B. Nutrition and Mass production of biological agents</li> </ol> <p>V. Methods and Approaches to Biological Control</p> <ol style="list-style-type: none"> <li>A. Quarantined and exclusion</li> <li>B. Use of resistant host plants</li> <li>C. Destruction by cultural management or direct removal of infected/affected host.</li> <li>D. Conservation and augmentation</li> <li>E. Integration with other control tactics for pest management</li> </ol> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Exercise s</th> <th style="text-align: center;">Topics</th> <th style="text-align: center;">Mtgs</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">I</td> <td>The biological world – survey, collection and identification</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">II</td> <td>Naturally occurring biological agents – sampling techniques</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">III</td> <td>The host plant as important biological control agent – mechanism of resistance to pests</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">IV</td> <td>Handling and mass production of biological control agents</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">V</td> <td>Evaluation of effectiveness of biological control agents</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">VI</td> <td>Final Examination</td> <td style="text-align: center;">1</td> </tr> </tbody> </table>		Exercise s	Topics	Mtgs	I	The biological world – survey, collection and identification	3	II	Naturally occurring biological agents – sampling techniques	3	III	The host plant as important biological control agent – mechanism of resistance to pests	3	IV	Handling and mass production of biological control agents	3	V	Evaluation of effectiveness of biological control agents	3	VI	Final Examination	1
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<b>COURSE NAME</b>	<b>GENERAL PHYSIOLOGY AND TOXICOLOGY</b>
<b>COURSE DESCRIPTION</b>	Chemical and physical properties of pesticides, their behavior and biological impact and comparative physiology and functional mechanism of pest groups
<b>OBJECTIVES</b>	<p>After finishing the course, the students should be able to:</p> <ol style="list-style-type: none"> <li>1. learn and discuss the principles of insect physiology with emphasis on insect growth, development, reproduction, the metabolic systems, coordination and integration.</li> <li>2. identify and describe insecticide research and development process, data generation and safety value; bioassay types and the classification of insecticides.</li> <li>3. enumerate and explain the types of insecticide formulations and the surface active agents.</li> <li>4. know and describe the chemical structures and nomenclature; chemical and physical properties and their mode of action of the classes of insecticides.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>REQUISITES</b>	Crop Protection courses 1 and 2
<b>OUTLINES</b>	<p style="text-align: center;"><b>LECTURE</b></p> <ol style="list-style-type: none"> <li>I. Introduction <ol style="list-style-type: none"> <li>A. Definition of terms</li> <li>B. Concept of insect physiology and toxicology</li> <li>C. Insecticide use patterns.</li> </ol> </li> <li>II. Insect Physiology <ol style="list-style-type: none"> <li>A. Insect growth, development and reproduction</li> <li>B. Metabolic systems of insects</li> <li>C. Insect coordination and integration.</li> </ol> </li> <li>III. Insecticide Research and Development and Bioassay <ol style="list-style-type: none"> <li>A. Research and development process.</li> <li>B. Data generation and their value of safety</li> <li>C. Economic and legal aspects of insecticide use.</li> <li>D. Types of bioassay and the factors to consider</li> <li>E. Probit analysis</li> </ol> </li> <li>IV. Insecticide Formulations <ol style="list-style-type: none"> <li>A. Organophosphorus insecticides</li> <li>B. Carbamates</li> <li>C. Chlorinated Hydrocarbons</li> <li>D. Pyrethroids</li> <li>E. Neonicotinoids</li> <li>F. Developmental insecticides</li> <li>G. Microbial insecticides</li> <li>H. Other groups of insecticides</li> </ol> </li> <li>V. Movement of Insecticides in the Environment <ol style="list-style-type: none"> <li>A. Penetration of insecticides through the insect cuticle</li> <li>B. Residues of insecticides</li> <li>C. Environmental alteration of insecticide residues</li> <li>D. Hazards of insecticides to non-target organisms</li> </ol> </li> </ol> <p style="text-align: center;"><b>LABORATORY EXERCISES</b></p> <ol style="list-style-type: none"> <li>1. Mass Rearing of Insects for insecticide testing (1 semester)</li> <li>2. Feeding and Digestion</li> <li>3. Hemolymph and circulation</li> <li>4. Respiration and Excretion</li> <li>5. Insect integument</li> </ol>

	6. Probit Analysis 7. Bioassay 8. Insecticide Formulations 9. Field Efficacy of Insecticides
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<b>COURSE NAME</b>	<b>ANIMAL NUTRITION AND FEEDING</b>
<b>COURSE DESCRIPTION</b>	Composition and use of feeds, formulations of rations and feeding practices for livestock and poultry
<b>OBJECTIVES</b>	At the end of the course, students must be able to: <ol style="list-style-type: none"> <li>1. Identify basics components of animal diet;</li> <li>2. Discuss the use and functions of feed by animals;</li> <li>3. Formulate/compound rations to meet nutritional needs ; and</li> <li>4. Apply appropriate and sound management practices.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>REQUISITE</b>	Animal Science 2
<b>OUTLINES</b>	<ol style="list-style-type: none"> <li>I. Introduction             <ol style="list-style-type: none"> <li>A. Animal nutrition</li> <li>B. The functions of feeds</li> <li>C. Relationships between animal and its feeds</li> </ol> </li> <li>II. Nutrient Composition of feed and feed stuffs             <ol style="list-style-type: none"> <li>A. The feed elements</li> <li>B. The proximate composition</li> <li>C. Factors that affect composition of feed stuff</li> </ol> </li> <li>III. Different classification of feedstuffs             <ol style="list-style-type: none"> <li>A. Based on Origin</li> <li>B. Based on Uses</li> </ol> </li> <li>IV. Nutrient requirements of farm animals             <ol style="list-style-type: none"> <li>A. Feeding standards</li> <li>B. Meeting nutrient requirements for various physiological activities (Maintenance and production)</li> </ol> </li> <li>V. Ration formulation             <ol style="list-style-type: none"> <li>A. Rules in balancing rations</li> <li>B. Methods of compounding rations</li> </ol> </li> <li>VI. Feeding practices             <ol style="list-style-type: none"> <li>A. Ad libitum vs. Restricted feeding</li> <li>B. Wet vs. Dry feeding</li> <li>C. Use of Mash vs. Pelleted feeds</li> </ol> </li> <li>VII. Special topics             <ol style="list-style-type: none"> <li>A. The different ways of expressing feed value ( fresh-, ADM, DM-basis)</li> <li>B. The use of Caloric system and TDN system to describe energy values of feeds, rations and nutrient requirements</li> <li>C. The different feed analyses (proximate analysis and detergent fiber analysis)</li> </ol> </li> </ol>



<b>COURSE NAME</b>	<b>SLAUGHTER OF ANIMALS AND PROCESSING OF THEIR PRODUCTS</b>
<b>COURSE DESCRIPTION</b>	Inspection of live animals; slaughter and proper flaying; dressing poultry; fabrication and carcass evaluation; processing of meat, poultry products and milk.
<b>OBJECTIVES</b>	At the end of the course, students should be able to:  <ol style="list-style-type: none"> <li>1. Conduct ante-and post-mortem inspection;</li> <li>2. Follow standard slaughter/dressing and flaying procedures;</li> <li>3. Fabricate and evaluate animal products</li> <li>4. Process meat, milk and poultry products.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (1 hours lecture and 6 hours laboratory)
<b>PREREQUISITES</b>	
<b>OUTLINES</b>	<ol style="list-style-type: none"> <li>I. Introduction: <ol style="list-style-type: none"> <li>A. Importance of animal product processing</li> <li>B. Definition of terms</li> </ol> </li> <li>II. Handling Animals Before Slaughter/Dressing: <ol style="list-style-type: none"> <li>A. Pre-abattoir handling</li> <li>B. Transport of animals <ol style="list-style-type: none"> <li>1. Responsibilities of the transporter</li> <li>2. Veterinary regulations in the transport of animals</li> <li>3. Transport management of slaughter animals</li> <li>4. Loading/Unloading animals</li> </ol> </li> <li>C. Fasting animals</li> </ol> </li> <li>III. Rules and Regulations Governing Meat Inspection in the Philippines <ol style="list-style-type: none"> <li>A. R.A. No. 8485 – The Animal Welfare Act of 1998.</li> <li>B. Ante-mortem inspection</li> <li>C. Post-mortem examination</li> <li>D. Philippines Trade Standards Specifications for:</li> <li>E. Meats</li> <li>F. Chilling and Freezing</li> </ol> </li> <li>IV. Factors Affecting Carcass Yield</li> <li>V. Processing Plant <ol style="list-style-type: none"> <li>C. Slaughter house/dressing plant</li> <li>D. Tools and equipment</li> <li>E. Storage facilities</li> </ol> </li> <li>VI. Slaughter Procedure <ol style="list-style-type: none"> <li>A. Humane slaughter of animals</li> <li>B. Proper handling and animal behavior</li> <li>C. Hygienic slaughter of animals</li> </ol> </li> <li>VII. Fabrication and Identification of Wholesale and Retail Cuts of Livestock/ Poultry Carcasses. <ol style="list-style-type: none"> <li>A. Farmer style</li> <li>B. American meat cut standard</li> <li>C. Identification of meat cuts and their local names</li> </ol> </li> <li>VIII. Product Processing <ol style="list-style-type: none"> <li>A. Meats</li> <li>B. Milk</li> <li>C. Eggs</li> </ol> </li> <li>IX. Animal Products – Borne Diseases</li> </ol>

<b>COURSE TITLE:</b>	<b>SOIL SCIENCE 3 - SOIL SURVEY, CLASSIFICATION AND LAND USE</b>
<b>COURSE DESCRIPTION</b>	Survey and classification of soils based on their morphology, genesis and properties; land resources data and information their interpretation and application for land use design and planning and environmental assessment of land uses.
<b>CREDIT UNITS</b>	3 Units ( 2 hrs Lecture; 3 hrs Laboratory )
<b>PRE- REQUISITE</b>	Soil Science 2
<b>COURSE OBJECTIVES</b>	At the end of the course, the student must be able to. <ol style="list-style-type: none"> <li>1. Organize plan and conduct soil survey</li> <li>2. Prepare a soil survey report</li> <li>3. Describe and classify a soil profile / pedon</li> <li>4. Conduct land capability classification and crop suitability evaluation</li> <li>5. Interpret and apply land resources data for planning and assessment</li> </ol>
<b>COURSE CONTENT</b>	<p>I. SOIL SURVEY PRINCIPLES AND ORGANIZATION</p> <ol style="list-style-type: none"> <li>A. Definitions</li> <li>B. Strategies in soil survey</li> <li>C. Uses and applications of soil survey</li> <li>D. Principles of soil survey</li> <li>E. What soil survey cannot do</li> <li>F. Kinds of soil survey and its uses</li> <li>G. Soil mapping unit</li> <li>H. Planning soil survey and sequence of operations</li> </ol> <p>II. FIELD SURVEY AND THE REPORT</p> <ol style="list-style-type: none"> <li>A. Research phase</li> <li>B. Mapping phase</li> <li>C. Field observation data</li> <li>D. Interpretation phase</li> <li>E. Presentation of results</li> <li>F. General soil map for land use planning</li> <li>G. Use and management of soils</li> <li>H. Description of soils</li> <li>I. Formation and classification of soils</li> <li>J. 2.10 Outline for soil survey report <ol style="list-style-type: none"> <li>1. Methods of soil survey</li> <li>2. Soils</li> <li>3. Land evaluation and soil survey interpretation</li> <li>4. Soil and land management unit</li> <li>5. Closing section</li> <li>6. Technical appendices</li> <li>7. Maps</li> </ol> </li> </ol> <p>III. DESCRIPTION AND CLASSIFICATION OF SOILS</p> <ol style="list-style-type: none"> <li>A. Description of Individual Soil Profile <ol style="list-style-type: none"> <li>1. Order of presentation</li> <li>2. Information on the site sampled</li> <li>3. General information on the soil</li> <li>4. Brief general description of the profile</li> <li>5. Description of individual horizons</li> <li>6. Interpreted information on the soil</li> </ol> </li> <li>B. Classification of soils</li> <li>C. Soil classification systems</li> <li>D. The US Soil Taxonomy System and its nomenclature</li> <li>E. Naming of soils</li> <li>F. The Soil Map of the World (FAO)</li> </ol>

#### IV. LAND EVALUATION

- A. Types of land evaluation
- B. Purposes of land evaluation
- C. Principles of land evaluation
- D. Land capability classification
  - 1. The USDA Land Capability Classification
  - 2. Procedure
- E. Crop suitability evaluation
  - 1. Procedure
  - 2. The World Soil Atlas
- F. Other agricultural land classification systems

#### V. LAND USES AND DECISION MAKING

- A. Land as a basic natural resource
- B. Land as an ecosystem
- C. Land as a space
- D. Land as a landscape
- E. Land use as an economic activity
- F. Nature of land use in an area
- G. Decision-making and processes in land use
- H. Objectives of land users
- I. Choice of use and management

#### VI. LAND USE STRUCTURES, TRENDS AND THE GOVERNMENT

- A. Land use surveys
  - 1. World land use survey
  - 2. United States Geological Survey
- B. Classification of land uses
- C. Trends in land uses
- D. Land use and the government
- E. Forms of government interventions

#### VII. LAND USE AND ENVIRONMENT

- A. Agriculture and its impacts
- B. Rangeland
- C. Forestry
- D. Recreation
- E. Identification of land use constraints
- F. Land utilization types and characterization
- G. Human impacts on land use and the environment

#### LABORATORY EXERCISES

EXERCISE NO.	TITLE
1	Soil Profile Description
2	Laboratory Analyses for Soil Survey and Classification
3	Classification of Soils Using Soil Taxonomy
4	Land Capability Classification
5	Crop Suitability Evaluation
6	Land Productivity Index
7	Characterization of Land Use and Land Utilization Types

	8	Identification of Land Use Constraints
	9	Maximizing Land Use Productivity
	10	Agricultural land Use Planning

<b>COURSE NAME</b>	<b>PLANNING, IMPLEMENTATION, MONITORING AND EVALUATION OF EXTENSION PROGRAMS</b>
<b>COURSE DESCRIPTION</b>	Principles and practices of program development planning, implementation, monitoring and evaluation for sustainable rural development.
<b>OBJECTIVES</b>	<p>General Objectives: At the end of the course, the students should be able to:</p> <ol style="list-style-type: none"> <li>1. Explain important concepts in program planning and evaluation and differentiate between monitoring and evaluation.</li> <li>2. Explain community survey as a research tool in generating necessary information for development planning in the community</li> <li>3. Discuss the process of preparing focused questions based on identified problem(s);</li> <li>4. Perform community survey to be able to gather baseline data in the community, analyze and interpret community problems and generate implications for program planning;</li> <li>5. Perform and construct a problem tree, objective tree as inputs to community planning</li> <li>6. Discuss the factors considered in program planning and apply the principles of program planning in practical community settings.</li> <li>7. Develop values on cooperation, responsibility and appreciation of one's work.</li> </ol>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (2 hours lecture and 3 hours laboratory)
<b>PRE-REQUISITE</b>	Agricultural Extension and Communication
<b>COURSE OUTLINE</b>	<p><b>LECTURE TOPICS</b></p> <p>I. Definition of Important Concepts</p> <ol style="list-style-type: none"> <li>A. Program monitoring and evaluation</li> <li>B. Elements of program evaluation</li> <li>C. Kinds of evaluation</li> <li>D. Community survey and other evaluation methods</li> <li>E. Kinds of community survey</li> <li>F. Program Planning</li> <li>G. Strategic vs. tactical planning</li> </ol> <p>II. Basic Concepts in Community Surveying</p> <ol style="list-style-type: none"> <li>A. Survey questionnaire, focused group discussion (FGD), rapid rural appraisal (RRA)</li> <li>B. Sampling techniques and data gathering</li> <li>C. Data processing and analysis</li> <li>D. Data interpretation and report writing</li> </ol> <p>III. Basic Concepts in Planning</p> <ol style="list-style-type: none"> <li>A. Definition of planning</li> <li>B. Types of planning</li> <li>C. Purposes of the plan</li> <li>D. Scope of a plan</li> <li>E. Elements of program planning</li> <li>F. Stages of the planning process</li> <li>G. Planning approaches</li> <li>H. Phases of Program/Project Development</li> </ol>

- IV. Goal-Oriented Project Planning (GOPP)- The Logical Framework Approach
  - A. Basic features of the GOPP: Problem analysis and Objective analysis
  - B. How to construct a problem tree
  - C. How to construct objective tree
  - D. Program/Project planning matrix

- V. Monitoring and Evaluation
  - A. Basic concepts of monitoring and evaluation
  - B. Definition and objectives of M & E
  - C. Types of Evaluation, how to collect data
  - D. Program planning and evaluation
  - E. Uses of evaluation
  - F. Aspects of evaluation

- VI. Evaluation Models
  - A. The CIPP Model
  - B. Merit evaluation
  - C. Pre and Post evaluation model

- VII. The Quantitative and Qualitative Methods of Evaluation
  - A. The quantitative method of evaluation
  - B. The qualitative method of evaluation

#### LABORATORY ACTIVITIES

- 1 Community Survey
  - a Preparation of Questionnaire
  - b Conduct of Survey
- 2 Focused Group Discussion
  - a Preparation of Questionnaire
  - b Conduct of Focused Group Discussion
- 3 Problem Tree Analysis
- 4 Objective Tree Analysis
- 5 Program Development Planning
- 6 Preparation of Monitoring and Evaluation Instrument
- 7 Conduct of Monitoring and Evaluation
- 8 Analysis and Report Writing

<b>COURSE NAME</b>	<b>BASICS OF PROJECT STUDY AND DEVELOPMENT</b>
<b>COURSE DESCRIPTION</b>	Fundamental concepts, components and tools in making project studies and development for agri-based industries.
<b>OBJECTIVES</b>	At the end of the Course, the students are able to: <ul style="list-style-type: none"> <li>1. Explain the fundamental concepts, components and tools of Project Development.</li> <li>2. Prepare a sample project study indicating techniques and operations in selected agriculture – based projects</li> </ul>
<b>NO. OF UNITS AND CONTACT HOURS</b>	3 units (3 hours lecture)
<b>REQUISITES</b>	Agricultural Economics & Marketing
<b>OUTLINE OF THE COURSE</b>	<p>I. Why Project Study and Development?</p> <ul style="list-style-type: none"> <li>A. Concept of Project, the “cutting edge” of Development</li> <li>B. Programs vs. Plans</li> <li>C. Definition of Projects</li> <li>D. Reasons why Project Fail?</li> </ul> <p>II. Characteristics of Projects</p> <ul style="list-style-type: none"> <li>A. Purposes and Objectives</li> <li>B. Behavior / Characteristics of Projects</li> </ul> <p>III. Process of Project Development Cycle</p> <p style="padding-left: 40px;">The general cyclical phases and steps involve are as follows:</p> <ul style="list-style-type: none"> <li>A. The Pre – investment Phase steps: <ul style="list-style-type: none"> <li>1. Project Identification (conception)</li> <li>2. Project Formulation or preparation (Feasibility study)</li> <li>3. Project Design</li> <li>4. Project Appraisal (Analysis) and Financing</li> </ul> </li> <li>B. The In vestment Phase steps: <ul style="list-style-type: none"> <li>1. Detailed project Engineering</li> <li>2. Project Implementation</li> </ul> </li> <li>C. Post – Investment or Operational Phase <ul style="list-style-type: none"> <li>1. Project operation</li> <li>2. Ex – post Project Evaluation</li> </ul> </li> </ul> <p>IV. Some Approaches / tools used in Project Development</p> <ul style="list-style-type: none"> <li>A. The Feasibility Study</li> <li>B. Two types of Economic Analysis</li> <li>C. Project Management</li> <li>D. Types of Evaluation</li> <li>E. Decision making tools</li> </ul> <p>V. Preparation of Sample Project Study in Agri – based Industry.</p> <ul style="list-style-type: none"> <li>-A. Crops Project</li> <li>B. Animal Project</li> <li>C. Integrated Farms or Processing</li> </ul>

<b>COURSE NAME</b>	<b>AGRICULTURAL POLICY AND DEVELOPMENT</b>
<b>Course Description</b>	Evaluation and formulation of policies, the policy-making process, description and analysis of policies and programs affecting agriculture and development and the political aspects of agricultural decisions.
<b>Objectives</b>	At the end of the Semester, the students must be able to: <ol style="list-style-type: none"> <li>1. Explain the basic concepts of public policy and agricultural development.</li> <li>2. Discuss the evolution and formulation of policies, policy advocacy and policy-making process;</li> <li>3. Analyze and comprehend the extent of government intervention in agriculture affecting agriculture development;</li> <li>4. Know and analyze the agricultural policies and programs in the Philippines; and</li> <li>5. Describe the political aspects of agricultural polices and programs.</li> </ol>
<b>No. Of Units And Contact Hours</b>	3 units (3 hours lecture)
<b>Requisites</b>	Soc Sci 1 and Agric. Economics and Marketing
<b>Outlines</b>	<p>I. Basic Concepts of Public Policy and Development</p> <ol style="list-style-type: none"> <li>A. Definition of Terms <ol style="list-style-type: none"> <li>1. Policy, Public Policy, Agricultural Policy</li> <li>2. Development, Economic Development Sustainable</li> </ol> </li> <li>B. Development</li> <li>C. Problem Arising from Agricultural Production <ol style="list-style-type: none"> <li>1. Role of Agriculture in Economic Development</li> <li>2. The Interrelationship of Agriculture, Development and Environment</li> </ol> </li> <li>D. Critical Issues that Need to be Addressed</li> <li>E. Development Perspectives</li> </ol> <p>II. The Policy Making Process</p> <ol style="list-style-type: none"> <li>A. Policy Formulation</li> <li>B. Policy Making Process and Practice <ol style="list-style-type: none"> <li>1. Characteristics of Policy Making Process</li> <li>2. Dimensions of Policy Making Process</li> </ol> </li> <li>C. Institutions/Sectors Involved in the Policy-making process</li> <li>D. The Role of Economist in the Policy Making Process</li> <li>E. Policy Advocacy</li> </ol> <p>III. Agricultural Incentives and Protection</p> <ol style="list-style-type: none"> <li>A. Price Intervention and Protectionist Policies</li> <li>B. Empirical Measures of Protection</li> <li>C. Consequence of agricultural incentives and protection</li> </ol> <p>IV. Agriculture Policies/Program in the Philippines 15 hours</p> <ol style="list-style-type: none"> <li>A. Agrarian Reform</li> </ol>

	<ul style="list-style-type: none"> <li>D. Credit and Financial Policies</li> <li>E. Pricing, Marketing and Post-harvest</li> <li>F. Research and Development</li> <li>G. Cooperative Development Programs</li> <li>H. Biotechnology</li> <li>I. AFMA</li> <li>J. Trade: GATT-UR-WTO</li> <li>K. Other Related Policies and Programs</li> </ul> <p>V. The Political Aspects of Agriculture Policy 6 hours</p> <p>VI. The Political Market for Policies</p> <p>VII. Demand and supply Side Explanations for Weak Agricultural Policies in Developing Countries</p> <p>VIII. Reasons for strong Agricultural Protection in Developed Countries</p>
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<b>COURSE NAME</b>	<b>AGRIBUSINESS COMMODITY SYSTEMS</b>
<b>Course Description</b>	The course envisions presenting to students a systems approach of undertaking business in agriculture. It will highlight the interactions of all activities and factors affecting the sourcing of inputs; production activities performed on farm commodities and other product that can be made from them. It will also deal on distribution of these outputs at the global market. All these will be considered within the socio-cultural, political, economic, environment and development landscape of the country.
<b>Objectives</b>	After completing the course, the students are expected to: <ul style="list-style-type: none"> <li>1. know the interrelationship of input sourcing, production and processing and marketing as it affects the over-all operation of an agribusiness firm.</li> <li>2. recognize the impact of the external environment on the operation and management of an agribusiness firm.</li> <li>3. be familiar with commodity/industry case studies</li> </ul>
<b>Units for Lecture and Laboratory</b>	3 units
<b>Contact Hours per Week</b>	2 hours of lecture per week; 2.5 hours of laboratory (the laboratory component will center on field studies to agribusiness firms and other relevant agencies.
<b>Pre-requisite</b>	None
<b>Lecture Topics</b>	<ul style="list-style-type: none"> <li>I. Agribusiness in Retrospect <ul style="list-style-type: none"> <li>A. The growth and development of Agribusiness</li> <li>B. The Agribusiness Systems Concepts</li> <li>C. Agribusiness Enterprise Formation</li> <li>D. The role of Agribusiness Sector to Economic Development</li> <li>E. Growth Trends and Prospects in the Food Sector</li> </ul> </li> <li>II. Commodity Systems Analysis (Supply Chain Analysis) <ul style="list-style-type: none"> <li>A. Input Sub-system</li> <li>B. Production Sub-system</li> <li>C. Processing Sub-system</li> <li>D. Marketing Sub-system</li> <li>E. Support Sub-system</li> </ul> </li> </ul>



	<p>III. Industry Situationers /Industry Case Studies</p> <p>A. Guidelines in Conducting a Case Analysis</p> <p>B., Presentation of Sample Commodity/Industry Case Studies</p> <p>C. Analysis of Commodity/Industry Case Study</p>
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<b>COURSE NAME</b>	<b>FINANCIAL MANAGEMENT FOR AGRI-BASED ENTERPRISES</b>
<b>Course Description</b>	This course is designed to expose students to the analysis of financial statements as basis for financial decision-making, planning and control. Other forms of analyses like simple cost and return, partial budgeting and capital budgeting will likewise be tackled.
<b>Objectives</b>	<p>After completing the course, the students are expected to:</p> <ol style="list-style-type: none"> <li>1. know how to prepare financial statements</li> <li>2. be aware of the different methods of analyzing financial statements</li> </ol> <p>be able to use financial statements as basis for decision making, financial planning and control.</p>
<b>Units for Lecture and Laboratory</b>	3 units
<b>Contact Hours per Week</b>	3 hours of lecture per week
<b>Pre-requisite</b>	AGRIC 120 (Fundamentals of Agricultural Entrepreneurship)
<b>Lecture Topics</b>	<p>I. Review of Financial Statement Preparation</p> <ol style="list-style-type: none"> <li>A. Income statement</li> <li>B. Balance Sheet</li> <li>C. Cash Flow Statement</li> </ol> <p>II. Analysis of Financial Statements according to</p> <ol style="list-style-type: none"> <li>A. Liquidity</li> <li>B. Solvency</li> <li>C. Profitability</li> <li>D. Efficiency</li> </ol> <p>III. Management of Financial Resources</p> <ol style="list-style-type: none"> <li>A. Management of Cash</li> <li>B. Management of Working Capital</li> <li>C. Management of Receivables</li> <li>D. Management of Inventories</li> </ol> <p>IV. Other Tools in Financial Management</p> <ol style="list-style-type: none"> <li>A. Cost and Return Analysis</li> <li>B. Partial Budgeting</li> <li>C. Capital Budgeting</li> </ol>

## MINIMUM FIELD/PHYSICAL FACILITIES AND EQUIPMENT

- A. College Facilities and Equipments
1. Experiment farm 40 ha
  2. Orchard 3 ha
  3. Fruit crop nursery 1 ha
  4. Working sheds
  5. Green houses / screen houses 3
  6. Animal farm with poultry, swine and shed for small and large ruminants and basic feed milling equipments
  7. Tool / Equipment room
  8. Internet facility, multi-media equipments and computers that will support basics computer science courses
  9. Analytical Laboratory with basic Laboratory equipments
  10. Basic agromet facility
  11. Basic irrigation facility
- B. Laboratory facilities
1. Crop science
  2. Crop protection
  3. Animal science
  4. Soil science
- C. General laboratory equipments/facilities (numbers of units depending on class size of the laboratory)
1. Microscopes
  2. Autoclave
  3. Photographic equipments
  4. Soil Auger
- D. Field equipment
1. Four-wheel tractor
  2. Hand tractor (for small operations)
  3. Power tiller
  4. Native plough and harrow
  5. Panicle thresher motor-driven, 0.75 Hp 1
  6. Seed blower motor-driven, 0.5 Hp 2
  7. Sprayer locally-manufactured knapsack type, 16 liters capacity 4
  8. Shovel, spade, hoe and rake 30 each
  9. Wheel barrow 5
  10. Pruning saw and shear 15 each
  11. Budding knife 15 each
  12. Steel tape 150 m long, metric scale 2
  13. Spring balance 25 and 50 kg capacity 1 each
  14. Weighing scale 20-30 kg capacity, top loading 2
  15. Water sprinkler 8-10 l capacity, plastic or galvanized 10
  16. Draft animal carabao and/or cattle 2
  17. Rice thresher portable, 500 kg/hr capacity with cleaner, throw-in type, axial-flow type, with 7 Hp engine 1
  18. Corn sheller hand operated 10
  19. Corn sheller 0.5-1.0 t/hr capacity, 5-7 Hp engine 1
  20. Rotary weeder double rotor type, single row, cono or spike type, steel frames 5
  21. Grain dryer batch type, flat bed, 1-2 t/batch capacity, with rice hull furnace, axial fan driven by 5 Hp engine 1
- E. Income-Generating / Entrepreneurial Demonstration Facilities for Practicum
1. Minimum of 1 ha for crops
  2. 1000 heads of poultry
  3. 20 sow level
  4. 30 heads of goats
  5. 10 cows
  6. 2 bulls