

**ANNAMALAI UNIVERSITY**  
**FACULTY OF AGRICULTURE**  
**DEPARTMENT OF AGRICULTURAL ECONOMICS**  
**M.Sc. (Ag.) AGRICULTURAL ECONOMICS Degree Programme**  
**(Regular and Part – time)**  
**Rules and Regulations with effect from 2012-2013**

**1. Short title and commencement**

- 1.1. These rules and regulations shall govern the post graduate studies leading to the award of degree of Master of Science (Agriculture/Horticulture) in the Faculty of Agriculture.
- 1.2 They shall come into force with effect from the academic year 2012 – 2013.

**2. Definitions**

- 2.1 An “Academic Year” shall consist of two semesters.
- 1.2 .“Semester” means an academic term consisting of 110 working days including final theory examinations.
- 1.3 “Subject” means a unit of instruction to be covered in a semester having specific No., title and credits.
- 1.4 “Credit hour” means, one hour lecture plus two hours of library or home work or two and half hours of laboratory/field practical per week in a semester.
- 1.5 “Grade Point of a subject” means the value obtained by dividing the percentage of marks earned in a subject by 10 and the Grade Point is expressed on a 10 point scale.
- 1.6 “Credit Point” means the grade point multiplied by credit hours.
- 1.7 “Grade Point Average” (GPA) means the quotient of the total credit points obtained by a student in various subjects at the end of each semester, divided by the total credit hours taken by the student in that semester. The grading is done on a 10 point scale and the GPA has to be corrected to two decimals.
- 1.8 “Overall Grade Point Average” (OGPA) means the quotient of cumulative credit points obtained by a student in all the subjects taken from the beginning of the first semester of the year divided by the total credit hours of all the subjects which he/she had completed upto the end of a specified semester and determines the overall performance of a student in all subjects during the period covering more than one semester. The OGPA has to be arrived at the second decimal place.

**3. Courses offered**

The details of various post-graduate degree programmes at Masters’ level offered in the Faculty of Agriculture are as follows:

- i) Agronomy
- ii) Agricultural Bio technology
- iii) Agricultural Economics
- iv) Agricultural Entomology
- v) Agricultural Extension
- vi) Agricultural Microbiology
- vii) Genetic and Plant Breeding
- viii) Horticulture
  - a) Fruit Science
  - b) Vegetable Science
  - c) Floriculture and Landscape Gardening
  - d) Plantation, Spices, Medicinal and Aromatic Crops

- ix) Microbial Biotechnology
- x) Plant Pathology
- xi) Seed Science & Technology
- xii) Soil Science and Agricultural Chemistry

#### 4. Eligibility for admission

Candidates for admission to the M.Sc.Ag/(Hort.) programme should satisfy the following requirements.

- 4.1. Candidates seeking admission to the M.Sc. (Ag/Hort.) Degree programme should have completed any one of the following four year degree programmes from Universities recognized by Annamalai University.  
B.Sc.(Ag.) / B.Sc.(Hort.) / B.Tech. (Hort.) / B.Sc. (Forestry) / B.Tech. (Agri. Biotech)/Any other degree offered by Agriculture/Veterinary/Fisheries universities..
- 4.2. Candidates who have undergone the programme under conventional system should possess not less than a second class Bachelor's degree. The candidates under 4 point grade systems should possess a minimum **OGPA of 2.5 out of 4.00 and 2.75 out of 4.00 in the subject concerned.** For those under 10 point system a minimum **OGPA of 6.00 out of 10.00 and 6.50 out of 10.00 in the subject concerned** is required. **However, this will not apply to SC/ST candidates for whom a pass in the degree concerned is sufficient.**
- 4.3. An entrance test will be held separately for each Degree programme. Candidates shall be required to be present on the specified date and time for written test and interview at their own expenses.

#### 5.1. Duration of the programme

##### 5.1. A. Full-Time Programme

The duration for Full- time M.Sc. (Ag/Hort) programme will be of Two years with four semesters. A student registered for Full- time M.Sc. (Ag/Hort) programme should complete the course within four years from the date of his/her admission.

##### 5.1. B. Part-Time Programme

The duration for Part- time M.Sc. (Ag/Hort) programme will be of three years. Part- time students will be permitted to register up to a maximum of 11 credits per semester. The research credits will be offered from third semester. The distribution of research credits for the four semesters (Semester III to VI) will be the same as that of regular students. A student registered for Part- time M.Sc. (Ag/Hort) programme should complete the course within five years from the date of his admission.

#### 5.2. Credit Grade point requirements

A student enrolled for the Master's degree programme to earn eligibility for the degree is required to complete 55 credits as detailed below.

i) Major subjects	20
ii) Minor Subjects	9
ii) Statistical methods and design of experiments	3
iii) Computer application for Agricultural Research	2
iv) Seminar	1
v) Research	20
<b>Total credits</b>	<b>55</b>

**Minor courses:** Minor courses are to be chosen by the students from other discipline in consultation with the Head of the department and the Chairman based on their research specialization.

### 5.3 Non- credit compulsory courses

S.No.	Name of the Course	Department concerned
1.	Basic Concepts In Laboratory Techniques / Audio visual laboratory techniques*  (0+1)	Soil science and Agricultural Chemistry  Microbiology  Plant breeding and Genetics  * Agricultural Extension
2.	Technical writing and communication skills (0+1)	Parent Department and English
3.	Intellectual property and its management in agriculture(1+0)  e-course	Agricultural Economics
4.	Library and Information services (0+1)	Library Sciences
5.	Disaster Management(1+0)  e-course	Agronomy
6.	Agricultural Research Ethics and Methodology/Agricultural research, research ethics and rural development programmes */Research Data Analysis**  (0+1)	Parent department  * Agricultural Extension  **Agricultural Economics

### 5.4. Minimum Grade point requirement

A post graduate student should maintain a minimum Grade Point of 6.00 out of 10 to secure a pass in a subject. In the subjects in which a student fails, he/she has to reappear for the examination to get a pass in that subject. Overall Grade Point Average (OGPA) of 6.50 out of 10 is required to secure a degree.

### 6. Attendance requirement

6.1. "One hundred per cent attendance is expected of each student. A student, who fails to secure a minimum of 75 per cent of attendance in each subject separately for theory and practicals, shall not be permitted to appear for the final examination in that subject and will be required to repeat the subject when ever offered.

In case of new admission, the attendance will be calculated from the date of joining of the student who are permitted to join late due to administrative reasons. However, for genuine reasons, condonation of attendance deficiency may be considered by the Vice-Chancellor on the recommendation of the Head of the Department and Dean, Faculty of Agriculture on payment of condonation fee prescribed by the University.

6.2 Students absenting from the classes with prior permission of the Head of the Department/ Dean, Faculty of Agriculture on official University business shall be given due consideration in computing attendance.

6.3 In respect of the student who had absented for the Mid-Semester Examination (MSE) on University business with prior permission of the Head of the Department /Dean, Faculty of Agriculture, the makeup MSE should be conducted ordinarily within 15 working days from the date of conduct of the Mid-Semester Examinations.

6.4 The students who absent for Mid Semester Examination in a subject on genuine reasons shall be permitted to write the makeup MSE after payment of Rs. 500/- or the amount prescribed by the University.

## **7. Advisory Committee**

7.1. Each post-graduate student shall have an Advisory Committee to guide him/her in carrying out the research programme. The Advisory Committee shall comprise a Major Adviser (Chairman) and two members. Of the two members, one will be from the same Department of Faculty of Agriculture and the other in the related field from the other Departments of Faculty of Agriculture. The Advisory Committee shall be constituted within three weeks from the date of commencement of the first semester.

### **7.2. Major Adviser (Chairman)**

Every student shall have a Major Adviser who will be from his/her major field of studies. The appointment of Major Advisers (Chairman) shall be made by the Head of the Department concerned. The chairman in consultation with the Head of the Department will nominate the other two members. In the event of the Major Adviser being away on other duty/leave for a period of more than three months, the member of the Advisory Committee from the same Department will officiate as the Major Adviser.

### **7.3. Guidelines on the duties of the Advisory Committee**

- i) Guiding students in drawing the outline of research work
- ii) Guidance throughout the programme of study of the students.
- iii) Evaluation of research and seminar credits.
- iv) Correction and finalization of thesis draft.
- v) Conduct of final Viva-Voce examination.
- vi) The proceedings of the Advisory Committee will be sent to the Head of the Department concerned within 10 working days.
- vii) Periodical review of the Advisory Committee proceedings will be made by the Head of the Department concerned.

## **8. Programme of study:**

8.1 The student's plan for the post-graduate work, drawn up by the Advisory Committee, shall be finalized before the end of the first semester.

8.2 The programme shall be planned by the Advisory Committee taking into account his/her previous academic training and interest.

### 8.3 Programme of research work

The outline of research work of the student, in the prescribed manner and as approved by the Advisory Committee, shall be forwarded by the Chairman to the Head of the Department Concerned by the end of the first semester.

## 9 . Evaluation of students' performance

9.1 The duration of Mid-Semester Examination (MSE) should be of one hour. The duration of the final theory and final practical examinations shall be three hours each.

### 9.2. Grading

- i) Every teacher handling a subject shall conduct Mid-Semester Examination (MSE) as per the scheme drawn by Head of the Department Concerned, evaluate and send the marks obtained by the students to the Controller of Examinations through the Head of the Department Concerned within seven working days.
- ii) There will be final examinations separately for theory and practical which will be conducted by the University.
- iii) Each final examination will be evaluated by two examiners (one internal and one external). The practical examination will be conducted and evaluated by two examiners (one internal and one external).
- iv) The distribution of marks will be as indicated below.

<b>Test</b>	<b>Courses with Practical and Theory</b>	<b>Courses without Practical</b>	<b>Courses without Theory</b>
Mid-Semester	20 Theory only	30	30
Final theory	40	70	-
Final practical	40	-	70
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

The question paper model and distribution of marks for Mid Semester and final theory examinations are as follows.

### Mid-Semester

For Subjects with practical (20 marks)

1. Objective type	10 out of 12	(10 x 0.5)	5 marks
2. Definitions / concepts	5 out of 7	(5 x 1)	5 marks
3. Short notes	2 out of 3	(2 x 2 ½)	5 marks
4. Essay type	1 out of 2	(1 x 5)	5 marks

## Final Theory

For subjects with practical (40 marks)

1. Definitions	5 out of 7	(5x1)	5 marks
2. Short notes	5 out of 7	(5x2)	10 marks
3. Essay type	Either or type	(5x5)	25 marks

- v) The student should secure a minimum of 60 per cent marks separately in theory and practical and also in aggregate to secure a pass in the subject.
- vi) Each subject shall carry a maximum of 100 marks for purpose of grading. The grading shall be done as grade point, i.e., the percentage of marks earned in a subject is divided by ten. The grade point is expressed on a 10 point scale up to two decimals.
- vii) Students who secure marks below 60 per cent in a subject will be awarded 'F' grade. The supplementary examinations for the candidates who fail in a subject or subjects will be held in the subsequent semester.
- viii) Students who did not have the required minimum attendance of 75 per cent will be awarded 'E' grade and has to repeat the subject.

### 9.3. Non- Credit Compulsory Subject

For Non–Credit Compulsory subjects the evaluation processes will be as that of the regular subjects, however, the marks obtained will not be taken into account to calculate the OGPA.

## 10. Credit Seminar

Seminar is compulsory for all the students and each student should register and present a seminar of 0+1 credit.

10.1 a. The seminar topic should be only from the major field and should not be related to the area of thesis research.

10.1. b. The seminar topics are to be assigned to the students by the Chairman of the Advisory Committee in consultation with the Head of the Department concerned within 2 weeks after the commencement of the semester.

10.2. Under the guidance and supervision of the Chairman of the Advisory Committee, the student will prepare the seminar paper containing not less than 25 typed/printed pages with a minimum number of 50 references covering the recent 10 years time and present the seminar 2 weeks after completion of Mid-Semester Examination in the presence of the Head of the Department, Advisory Committee, staff members and PG students of the Department concerned.

10.3. The circular on the seminars by the post-graduate students shall be sent to other Departments to enable those interested to attend the same.

10.4. The Chairman will monitor the progress of the preparation of the seminar paper and correct the manuscript. The student will submit 2 copies of the corrected manuscript to the Head of the Department Concerned through the Chairman before presentation.

The student will incorporate suggestions and carry out corrections made during the presentation and resubmit three fair copies to the Head of the Department concerned through the Chairman (one copy each to Dept. Library, Chairman and the student) within 10 days after presentation.

10.5 The performance of the student will be evaluated and Grade Point awarded by the Head of the Department concerned along with Advisory Committee. The Grade Point may be given based on the following norms.

Coverage of literature	40
Presentation	30
Use of audio–visual aids	10
Capacity to participate in the discussion and answer the questions	20
<b>Total</b>	<b>100</b>

### 11. Term paper / Special assignment

This has to be assigned to the student by the teacher in subject with theory and practicals. Term papers should cover a wide range of topics within the subject limits. The topic should be different from that of the credit seminar. Term papers / special assignments will be evaluated during practical examination.

### 12. Research work

12.1. The topic of thesis research to be carried out by the student will be assigned by the Chairman of the Advisory Committee in consultation with the Head of the Department concerned. After assigning the topic, each student may be instructed to submit a detailed programme of work to be carried out by him/her during the semester in the prescribed proforma. After scrutiny and approval, a copy of the programme may be given to the student for carrying out the work during the semester in the prescribed proforma. The evaluation of research work done by the student should be based on the approved programme.

12.2. The distribution of research credits will be as follows:

I Semester	0+ 2
II Semester	0+ 4
III Semester	0+ 6
IV Semester	0+ 6
	0+ 2 (Thesis Viva-Voce)
<b>Total</b>	<b>0 + 20</b>

12.3. The student has to submit his /her research observation note book to the Major Adviser. The Major Adviser will scrutinize the progress and sign the note book with remarks as frequently as possible. This note book will form the basis for evaluation of research progress.

12.4. Before the end of the semester the Advisory Committee should evaluate the work and award Grade Point depending upon the quality and quantity of work done by him/her with reference to the approved programme during the semester.

12.5. Attendance register must be maintained for the research students by the Chairman while monitoring his/her research programme.

12.6. The procedure for evaluation of research under different situations are explained hereunder.

#### ***Situation - 1***

The student should complete the research work as prescribed by the Advisory Committee.

Grade Point shall be awarded as evaluated by the Advisory Committee.

The student can be permitted to work for fresh research credits in the following semester.

#### ***Situation - 2***

- The student who does not satisfy the required 75 per cent attendance shall be awarded grade 'E'.
- The student who could not complete the research work for reasons found satisfactory to the Advisory Committee shall be awarded the grade 'EE'
- The student has to reregister the same block of research credits for which 'E / EE' grade was awarded in the following semester.
- The student should not be allowed to register for fresh (first time) research credits.

### ***Situation – 3***

The student who fails to complete the research work after repeating the registration for the second time shall be awarded grade 'EE'.

- In the mark sheet the registration for 'second time' should be mentioned.
- For the registration of research credits for the third time permission has to be obtained from the Dean of the Faculty and permission for further registration for the fourth time has to be obtained from the University.
- Re-registration of further research credits shall be decided by the University based on the recommendation of the Advisory Committee, Head of the Department Concerned.

### **13. Other regulations.**

- 13.1. The valued answer books of each Mid-Semester Examination shall be returned to the student for his/her information and guidance within seven days from the date of examination.
- 13.2. The various subjects taken by a student along with the credits and the grade obtained shall be shown on his transcript. Based on the total credits admitted, the final Grade Point Average shall be calculated and given.
- 13.3. At the end of each semester, the student will be given the mark list.

### **14. Thesis**

14.1. The thesis for his/her Master's degree should be of such a nature as to indicate a student's potentialities for conduct of independent research. The thesis shall be on topic falling within the field of the major subject and shall be the result of the student's own work. A certificate to this effect duly endorsed by the Major Adviser (Chairman) shall accompany the thesis.

#### **14.2. Evaluation of thesis**

The students completing the thesis work to the satisfaction of the Advisory Committee should submit two copies of the thesis in paper pack within four weeks from the last working day of the semester.

The students who could not submit the thesis in the final form within four weeks will be awarded 'EE' grade and he/she has to re-register in the next semester. The thesis submitted in partial fulfillment of a Master's degree shall be evaluated by an external examiner. The external examiner shall be a specialist in the student's major field of study from outside Annamalai University and shall be appointed by the University in consultation with the Head of the Department. The external examiner will send the evaluation report separately to the Controller of Examinations. If the report is favourable, Viva-Voce will be arranged by the Head of the Department concerned and conducted by the Advisory Committee, Head of the Department concerned and the external examiner who may preferably be the same who evaluated the thesis. The Head of the Department shall send the recommendations of the examining committee to the Controller of Examinations. On the unanimous recommendation of the committee and with the approval of the University, the degree shall be awarded to the candidate.

14.2.1 In case rejection of the thesis by the external examiner, the Controller of Examinations may on the recommendation of the Head of the Department concerned and Advisory Committee



refer the thesis for valuation by a second external examiner chosen by the University. If the second external examiner recommend the thesis for acceptance, Viva-Voce will be conducted.

14.2.2 If the revision of the thesis is recommended for repeating experiments, field trial etc., resubmission must be done by the candidate concerned after a minimum of six months. The revised version should be sent to the examiner who recommended revision.

14.2.3 After the successful completion of thesis Viva-Voce, the student has to submit 4 bound copies of the corrected thesis (one each for Department Library, Faculty Library Chairman and the student), 3 copies of abstract of thesis, 2 copies of the summary of the findings both in Tamil and English (in 10-15 lines) and also in C.D. form.

14.2.4 The student should submit 4 copies of thesis after completion of thesis Viva-Voice within the time as specified by the Head of the Department. In case of failure to submit, the student will be awarded EE grade for final Viva-Voice evaluation credits (0+2).

### **15. Award of Medals**

Medal should be awarded only if the student secures at least 8.0 OGPA, clears all courses in first attempt and in the programme having a batch of at least three students.

**ANNAMALAI UNIVERSITY**  
**Faculty of Agriculture**  
**Department of Agricultural Economics**  
**M.Sc. (Ag) Agricultural Economics - 2012**  
**Distribution of Courses**

**Major**

S. No.	Course No.	Title	Credit Hours T + P
1.	AEC-611	History of Economic Thought	1+0
2.	AEC-612	Micro Economics	1+1
3.	AEC-613	Agricultural Marketing and International Trade	1+1
4.	AEC-614	Research Methodology	0+1
5.	AEC-621	Macro Economics	1+0
6.	AEC-622	Agricultural Production Economics	1+1
7.	AEC-623	Natural Resources & Environmental Economics	2+1
8.	AEC-711	Econometrics	1+1
9.	AEC-712	Agri. Project Planning and Evaluation	2+1
10.	AEC-721	Agricultural Finance, Insurance & Cooperation	2+0
11.	AEC-722	Agricultural Development & Policy	1+0
<b>Total</b>			<b>13+7=20</b>

**Minor**

S. No.	Course No.	Title	Credit Hours
1.		Minor from other Department	2+1
2.		Minor from other Department	2+1
3.		Minor from other Department	2+1
<b>Total</b>			<b>6+3=9</b>

**Supporting courses**

S. No.	Course No.	Title	Credit Hours
1.	STA-611	Statistics for Social Sciences	2+1
2.	COM-615	Computer Applications for Agri. Research	1+1
<b>Total</b>			<b>3+2=5</b>

S. No.	Course No.	Title	Credit Hours
1.	AEC-032	Seminar	<b>0+1</b>
2.		Research	<b>0+20</b>
<b>Grand Total</b>			<b>23 + 32 = 55</b>

**Non-Credit Compulsory Course**

**2+4=6**

**Semester wise – Full time**

S. No.	Course No.	Title	Credit Hours T + P
<b>I Semester</b>			
1.	AEC-611	History of Economic Thought	1+0
2.	AEC-612	Micro Economics	1+1
3.	AEC-613	Agricultural Marketing and International Trade	1+1
4.	AEC-614	Research Methodology	0+1
5.	STA-611	Statistics for Social Science	2+1
6.	COM-615	Computer Applications for Agrl. Research	1+1
7.	AEC-011	Research	0+2
8.	PGS-611	Forecasting Techniques **	0+1
9.	PGS-612	Research Data Analysis**	0+1
		<b>Total</b>	<b>6+7=13</b>
<b>II Semester</b>			
1.	AEC-621	Macro Economics	1+0
2.	AEC-622	Agricultural Production Economics	1+1
3.	AEC-623	Natural Resources & Environmental Economics	2+1
4..		Minor	2+1
5.	AEC-021	Research	0+4
6.	PGS-622	Technical Writing and Communication Skills**	0+1
7.	PGS-623	Intellectual Property and Its Management in Agriculture (e-Course)**	1+0
		<b>Total</b>	<b>6+7=13</b>
<b>III Semester</b>			
1.	AEC-711	Econometrics	1+1
2.	AEC-712	Agrl. Project Planning and Evaluation	2+1
3.		Minor***	2+1
4.		Minor	2+1
5.	AEC-031	Research	0+6
6.	AEC-032	Seminar	0+1
7.	PGS-714	Library and Information Services**	0+1
		<b>Total</b>	<b>7+11=18</b>
<b>IV Semester</b>			
1.	AEC-721	Agricultural Finance, Insurance & Cooperation	2+0
2.	AEC-722	Agricultural Development & Policy	1+0
3.	AEC-041	Research	0+6
4.	AEC-042	Viva-voce	0+2
5.	PGS-725	Disaster Management (e-course)**	1+0
		<b>Total</b>	<b>3+8=11</b>
		<b>Grand Total</b>	<b>23+32=55</b>

\*\* Non-Credit Compulsory Course

\*\*\*Third semester minor course was replaced by value added course with 3+0 credits for the students in the year 2017-18.

**Semester wise – Part time**

S. No.	Course No.	Title	Credit Hours T + P
<b>I Semester</b>			
1.	AEC-611	History of Economic Thought	1+0
2.	AEC-612	Micro Economics	2+0
3.	AEC-613	Agricultural Marketing and International Trade	1+1
4.	AEC-614	Research Methodology	0+1
5.	STA-611	Statistics for Social Science	2+1
6.	PGS-611	Forecasting Techniques **	0+1
7.	PGS-612	Research Data Analysis **	0+1
		<b>Total</b>	<b>6+3=9</b>
<b>II Semester</b>			
1.	AEC-621	Macro Economics	1+0
2.	AEC-622	Agricultural Production Economics	1+1
3.	AEC-623	Natural Resources & Environmental Economics	2+1
4.		Minor	2+1
5.	PGS-622	Technical Writing and Communication Skills**	0+1
6.	PGS-623	Intellectual Property and Its Management in Agriculture (e-Course)**	1+0
		<b>Total</b>	<b>6+3=9</b>
<b>III Semester</b>			
1.	AEC-712	Agri. Project Planning and Evaluation	2+1
2.		Minor	2+1
3.	COM-615	Computer applications for Agri. Research	1+1
4.	AEC-011	Research	0+2
5.	AEC-032	Seminar	0+1
6.	PGS-714	Library and Information Services**	0+1
		<b>Total</b>	<b>5+6=11</b>
<b>IV Semester</b>			
1.	AEC-721	Agricultural Finance, Insurance & Cooperation	2+0
2.	AEC-722	Agricultural Development & Policy	1+0
3.	AEC-021	Research	0+4
4.	PGS-725	Disaster Management (e-course)**	1+0
		<b>Total</b>	<b>3+4=7</b>
<b>V Semester</b>			
1.	AEC-711	Econometrics	1+1
2.		Minor	2+1
3.	AEC-031	Research	0+6
		<b>Total</b>	<b>3+8=11</b>
<b>VI Semester</b>			
1.	AEC-041	Research	0+6
2.	AEC-042	Viva-voce	0+2
		<b>Total</b>	<b>0+8=8</b>
		<b>Grand Total</b>	<b>23+32=55</b>

\*\* Non-Credit Compulsory Course

## **AEC 611 HISTORY OF ECONOMIC THOUGHT (1+0)**

### **Objective**

To introduce the students to the evolution of economic thought over a period of time, the background of emanation of thoughts and approaches, as acts of balancing and counter balancing events and criticisms. The course will also in an comprehensive way help the students to know and appreciate the contributions of the Galaxy of Economists.

### **Theory**

#### **Unit-I Genesis**

Approaches for the study of history of economic thought – Absolutist Vs. Relativist approaches – Evolution of Economic Thought Vs. Economic History. Ancient economic thought – medieval economic thought – mercantilism – physiocracy – Forerunners of classical political economy.

#### **Unit-II Classical Economic Thought**

Development of classical thoughts (Adam Smith, Robert Malthus and David Ricardo) – Critics of classical thoughts - socialist critics – socialist and marxian economic ideas – Austrian school of thought – Origins of formal microeconomic analysis – William Stanley Jevons, Cournot and Dupuit.

#### **Unit-III Modern Economic Thought**

The birth of neoclassical economic thought – Marshall and Walras – General Equilibrium theory - Welfare theory – Keynesian economics.

#### **Unit-IV Economic Thought After Globalization**

The Era of globalization – experiences of developing world - rigidity of the past Vs. emerging realism – the changing path of international institutions to economic growth and development approaches – recent economic thought after WTO

#### **Unit-V Economic Thought in India**

Economic thought in India – Naoroji and Gokhale – Gandhian economics - economic thought of independent India – Nehru's economic philosophy - experiences of the structural adjustment programmes of the post liberalization era.

## Theory Schedule

1. Approaches for the study of history of economic thought - Absolutist Vs. Relativist approaches
2. Evolution of Economic Thought Vs. Economic History. Ancient economic thought
3. Medieval economic thought - Mercantilism
4. Physiocracy - Forerunners of Classical Political Economy.
5. Development of Classical Thoughts (Adam Smith, Robert Malthus and David Ricardo)
6. Critics of Classical Thoughts - Socialist critics
7. Socialist and Marxian Economic Ideas - Austrian School of thought
8. **Mid Semester Examination**
9. Origins of formal Microeconomic Analysis - William Stanley Jevons, Cournot and Dupuit
10. The birth of neoclassical economic thought - Marshall and Walras
11. General Equilibrium theory - Welfare theory - Keynesian economics - The Era of globalization
12. Experiences of developing world - Rigidity of the past Vs. emerging realism
13. The changing path of international institutions to economic growth and development approaches
14. Recent economic thought after WTO - Economic thought in India
15. Naoroji and Gokhale - Gandhian economics
16. Economic thought of independent India - Nehru's economic philosophy
17. Experiences of the structural adjustment programmes of the post liberalization era.

## Reference Books

1. Blaug, Mark, 1986, *Economic History and the History of Economic Thought*, Wheatsheaf Books, Brighton.
2. Ekelund RB & Hebert RF., 1975, *A History of Economic Theory and Methods*, McGraw-Hill, New Delhi.
3. John Mills A., 2002, *Critical History of Economics: Missed Opportunities*, Palgrave Macmillan.
4. Neelakanan S., 1992, *New Institutional Economics and Agrarian Change: A Primer*, Indian Economic Association Trust for Research for Development, New Delhi.
5. Screpanti E & Zamagni S., 1995, *An Outline of the History of Economic Thought*, Clarendon Press, Oxford.

## **AEC 612 MICRO ECONOMICS (1+1)**

### **Objective**

To introduce the basic concepts of microeconomics to the students and teach their applications in agriculture.

### **Theory**

#### **Unit-I Microeconomics – Meaning - Basic Concepts**

Meaning and nature of microeconomics – economic systems – methods of economic analysis – theory of consumer behaviour – cardinal utility theory – ordinal utility theory – revealed preference hypothesis – consumer's surplus – risk aversion – decision making process – theory of demand function – elasticity.

#### **Unit-II Production Functions - Costs - Economies of Scale**

Theory of firms – production functions – laws of production – technological progress and production function – cost concepts – cost functions – traditional and modern theory of costs – envelope curve – economies of scale – profit function.

#### **Unit-III Market Structure and Price Determination**

Market structure – perfect competition – short run and long run equilibrium – monopoly – bilateral monopoly – price discrimination – monopolistic competition – duopoly (Cournot, Stackelberg's models) – oligopoly (Kinked demand model).

#### **Unit-IV Factor Pricing**

Factor pricing in perfect and imperfect competitive markets – factor pricing and income distribution.

#### **Unit-V Welfare Economics**

General equilibrium theory – conditions and concepts – interdependence in the economy – The Walrasian system – General equilibrium and allocation of resources. Welfare economics – Pareto criterion – The Kaldor – Hicks compensation criterion – The Bergson criterion - social welfare function.

### **Practical**

Theory of consumer behaviour – discussion and exercises in demand analysis – derivation of elasticity of demand – estimation of various demand functions – equilibrium price analysis – production function analysis – analysis of short run and long run costs – profit function – analysis and discussions of market structure – performance under various parameters of imperfection through graphical and mathematical means – cost function – economies of size

and scale – price discrimination – factor pricing analysis – income distribution analysis – discussion of economic rent – Pareto optimality concept – models on partial and general equilibrium.

### **Theory Schedule**

1. Meaning and nature of microeconomics - economic systems
2. Methods of economic analysis - Theory of consumer behaviour
3. Cardinal utility theory - Ordinal utility theory - Revealed preference hypothesis – Consumers' surplus
4. Risk aversion - Decision making process - Theory of demand function – elasticity - Theory of firm
5. Production functions - Laws of production
6. Technological progress and production function - Cost concepts – cost functions
7. Traditional and modern theory of costs - Envelope curve
8. **Mid Semester Examination**
9. Economies of scale - Profit function - Market structure - Perfect competition
10. Short run and long run equilibrium – Monopoly - Bilateral monopoly - Price discrimination
11. Monopolistic competition - Duopoly (Cournot, Stackelberg's models)
12. Oligopoly (Kinked demand model) - Factor pricing in perfect and imperfect competitive markets
13. Factor pricing and income distribution
14. General equilibrium theory - Conditions and concepts - Interdependence in the economy
15. The Walrasian system - General equilibrium and allocation of resources. Welfare economics
16. Pareto criterion - The Kaldor - Hicks compensation criterion
17. The Bergson criterion - social welfare function.

### **Practical Schedule**

- 1) Theory of consumer behaviour
- 2) Demand analysis – Elasticity of demand
- 3) Estimation of demand functions
- 4) Equilibrium price analysis
- 5) Production function analysis
- 6) Analysis of short run costs
- 7) Analysis of long run costs
- 8) Price determination under perfect market situation
- 9) Price determination under imperfect market situation
- 10) Cost function
- 11) Economies of size and scale
- 12) Exercises on monopolistic competition
- 13) Price discrimination
- 14) Factor pricing analysis
- 15) Income distribution analysis
- 16) Partial and general equilibrium theory
- 17) Pareto optimality criteria



## Reference Books

1. Barthwal, R.R., 1992, *Microeconomic Analysis*, Wiley Eastern, New Delhi.
2. Chiang Alpha. C., 1981, *Fundamental Methods of Mathematical Economics*, Tata McGraw Hill, New York.
3. Hal R. Varian., 1992, *Microeconomic Analysis*, W.W. Norton and Company, New York.
4. Henderson, J.M., and R.E. Duandt, 1958, *Microeconomic Theory: A Mathematical Approach*, Tata McGraw Hill, New Delhi.
5. Koutsoyiannis, A., 1985, *Modern Microeconomics*, The Macmillian Publication, London.

## **AEC 613 AGRICULTURAL MARKETING AND INTERNATIONAL TRADE (1+1)**

### **Objective**

This course aims at teaching the students about the various principles and dynamic changes of agricultural marketing and price analysis with their application at both micro and macro levels

### **Theory**

#### **Unit-I Agricultural Marketing**

Agricultural marketing and economic development – characteristics of agricultural products and production – marketed and marketable surplus – marketing costs, margins and price spread.

#### **Unit-II Marketing Efficiency**

Market structure, conduct and performance – vertical and horizontal integration – vertical co-ordination – marketing system and sub-sector analysis – marketing efficiency – market research and information

#### **Unit-III Agricultural Price Analysis and Policy**

Price indices and parity concepts – price support programmes – subsidies – spatial and temporal price relationships – price forecasting – agricultural fairs – agricultural export zones – export promotion agencies in India – introduction to commodity models – price policy and economic development. Marketing institutions – co-operatives – regulated markets – state trading and government intervention – Agmark - Agri export promotion zones – agricultural fairs.

#### **Unit-IV Demand – Supply Relationship and Prices**

Role of agricultural prices – supply and demand relationships – demand and supply models - incorporation of risk – determination of inputs and output prices under different market situations – Future markets – Price speculations, Hedging – Commodity exchange – Marketing of Derivatives – Integration of spot and future markets - FMC

#### **Unit-V International Trade**

Introduction and scope – Basic concepts – Foreign exchange market – Transactions – Terms of trade – International & trade agreements – WTO and their role in promotion of trade – Export and import policies of India – Export promotion organization – Export promotion zone – Government policy on agricultural trade – Role of EXIM bank, Commercial banks in Foreign trade – IPR.

## **Practical**

Producer's surplus – Price spread analysis – Estimation of marketing efficiency – Estimation of index numbers – Time series analysis and forecasting – Demand & supply estimation in single and multimarket situation – Value chain analysis for major agricultural commodities – Market integration – Markov chain model – Spatial equilibrium analysis – visit to cooperative marketing institution – Visit to regulated market and grading centre – Visit to agro processing units – Visit to export organizations – Visit to EXIM bank – Visit to patent office, Chennai – Case study on rice, wheat and other major food grains – Case study on horticultural crops.

## **Theory Schedule**

1. Agricultural marketing and economic development - Characteristics of agricultural products and production
2. Marketed and marketable surplus - Marketing costs, margins and price spread.
3. Market structure, conduct and performance - Vertical and horizontal integration - Vertical co-ordination
4. Marketing system and sub-sector analysis - Marketing efficiency - Market research and information
5. Price indices and parity concepts - Price support programmes - Subsidies
6. Spatial and temporal price relationships -
7. Price forecasting - Agricultural fairs - Agricultural export zones
8. **Mid Semester Examinations**
9. Export promotion agencies in India - Introduction to commodity models
10. Price policy and economic development - Marketing institutions - Co-operatives
11. Regulated markets - State trading and government intervention - Agmark- Agri export promotion zones
12. Agricultural fairs - Role of agricultural prices - Supply and demand relationships
13. Demand and supply models - Incorporation of risk
14. Determination of inputs and output prices under different market situations - Future markets - Price speculations, Hedging
15. Commodity exchange - Marketing of derivatives - Integration of spot and future markets - FMC - Introduction and scope
16. Basic concepts - Foreign exchange market - Transactions - Terms of trade
17. International & trade agreements - WTO and their role in promotion of trade - Export and import policies of India - Export promotion organization - Export promotion zone - Government policy on agricultural trade - Role of EXIM bank, commercial banks in Foreign trade – IPR.

## **Practical Schedule**

1. Producers surplus
2. Price spread Analysis – Estimation of marketing efficiency
3. Estimation of index numbers
4. Time series analysis and forecasting
5. Demand & supply estimation in single and multimarket situation

6. Value chain analysis for major agricultural commodities
7. Market integration
8. Markov chain model
9. Spatial equilibrium analysis
10. Visit to cooperative marketing institution
11. Visit to regulated market and grading centre
12. Visit to agro processing units
13. Visit to export organizations
14. Visit to EXIM bank
15. Visit to patent office, Chennai
16. Case study on rice, wheat and other major food grains
17. Case study on horticultural crops.

### **Reference Books**

1. Acharya, S.S., and N.L. Agarwal, 2004, *Agricultural Prices – Analysis and Policy*, Oxford and IBH, New Delhi
2. Acharya, S.S., and N.L. Agarwal, 2008, *Agricultural Marketing in India*, Oxford and IBH, New Delhi.
3. Dhal C. Dale and Hammond W. Jerome, 1997, *Market and Price Analysis – The Agricultural Industries*, McGraw Hill Book Company , New York
4. Francis Cherunilam, 2006, *International Trade and Export management*, Himalaya Publishing House, Mumbai.
5. Gulati, Ashok, 1996, *Agricultural Price Policy in India – An Econometric Approach*, Concept Publishing Company, New Delhi

## **AEC 614 RESEARCH METHODOLOGY (0+1)**

### **Objective**

This course aims at molding the students with research aptitude and guide them to pursue their own research based on scientific methods.

### **Practical**

Exercises in problem identification – concept of researchable problem – project proposals – contents and scope – different types of projects to meet different needs – trade off between scope and cost of the study – formulation of objectives and hypotheses – assessment of data needs – sources of data – data collection – methods of sampling – criteria to choose – discussion on sampling under different situations. Preparation of schedule – field testing, finalization and coding – method of conducting survey – demonstration – tabulation of data – grouping – testing for homogeneity – problems of outliers – missing data – scaling techniques – sociometry – use of econometric software in data analysis – report writing – general guidelines.

### **Practical Schedule**

1. Exercises in problem identification
2. Concept of researchable problem
3. Project proposals - Contents and scope
4. Different types of projects to meet different needs
5. Trade off between scope and cost of the study
6. Formulation of objectives and hypotheses
7. Assessment of data needs
8. Sources of data - Data collection
9. Methods of sampling - Criteria to choose
10. Discussion on sampling under different situations.
11. Preparation of schedule – field testing, finalization and coding
12. Method of conducting survey – demonstration
13. Tabulation of data – grouping – testing for homogeneity
14. Problems of outliers – missing data
15. Scaling techniques – sociometry
16. Use of econometric software in data analysis
17. Report writing – general guidelines.

## **Reference Books**

1. Dhondyal, S.P., 1997, *Research Methodology in Social Sciences and Elements of Thesis Writing*, Amman Publishing House, New Delhi.
2. Kothari, C.R., 1994, *Research Methodology*, Wiley Eastern Ltd., New Delhi.
3. Singh, Arun Kumar, 1993, *Tests, Measurements and Research Methods in Behavioural Sciences*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. Thakur, D., 1993, *Research Methodology in Social Sciences*, Deep and Deep Publications, New Delhi.
5. Thomas R. Black, 1993, *Evaluating Social Science Research – An Introduction*, Sage Publications, New Delhi.

## STA 611 STATISTICS FOR SOCIAL SCIENCE (2+1)

### **Objective**

To understand the concept of sampling and methods of sampling, distribution – free methods, time series analysis and use of index numbers and to acquire skill in sampling and application of statistical tools.

### **Theory**

#### **Unit–I Theory of Sampling**

Basic concepts – unit and frame, population and sample – sampling and complete enumeration – probability and non-probability sampling – sampling and non-sampling errors – measurement and control of non-sampling errors. Simple random sampling with and without replacement – estimation of mean and proportion – determination of sample size, stratified sampling – principles of stratification – allocation procedures – proportional allocation, Neymanns optimum allocation – estimation of mean and proportion – multistage sampling, multiple sampling – cluster – estimation of mean and variance under cluster sampling – estimation of population under multistage sampling.

#### **Unit–II Distribution – Free Tests, Correlation and Regression**

Distribution – free tests – advantages – disadvantages – run test – test for randomness – median test – sign test – Mann Whitney U test for two samples – Kolmogrov - Smirnov one sample and two sample test, Kruskal – Walli's test – chi-square – correlation coefficients – regression coefficients – standard error – significance tests – student's t and F distribution.

#### **Unit-III Correlation, Regression and Test of Significance**

Correlation and regression theory – curve fitting least square method for straight line – parabolic curves – form reducible linear type – partial and multiple coorelations. Rank Correlation – multiple regression. Test of significance based on t, chi square, F distributions – large sample tests – small sample tests.

#### **Unit – IV: Time Series Analysis**

Time series analysis – components of time series trend, seasonal, cyclical and irregular movements – elimination of trend – moving average method – least square method – seasonal movement – simple average and ratio to trend method – link relative method.

## **Unit–V Index Numbers, Estimation and SPSS**

Index numbers – definition and uses – simple and weighted index numbers – selection of base year – fixed base and chain base methods – Laspeyre, Paasches, Fisher, Marshall – Edgeworth index numbers – reversal tests – cost of living index numbers of agricultural production deflation. Estimation – point estimation, interval estimation. Statistical Package for Social Sciences (SPSS).

### **Practical**

Simple random sample – selection-estimation – determination of sample size in simple random sampling – stratified random sampling – cluster sample – selection – estimation – multistage sampling – selection-estimation of parameters in two stage sampling – determination of sample size in two stage sampling – application of double sampling – distribution free methods for one sample and two sample problems method of least squares – moving averages – correlation regression and rank correlation coefficient – forecasting using regression technique – construction of index numbers of agricultural production.

### **Theory Schedule**

1. Basic concepts
2. Unit and frame, population and sample
3. Sampling and complete enumeration
4. Probability and non-probability sampling
5. Sampling and non-sampling errors
6. Measurement and control of non-sampling errors.
7. Simple random sampling with and without replacement
8. Estimation of mean and proportion
9. Determination of sample size, stratified sampling
10. Principles of stratification
11. Allocation procedures
12. Proportional allocation, Neymanns optimum allocation
13. Estimation of mean and proportion
14. Multistage sampling, multiple sampling
15. Cluster – estimation of mean and variance under cluster sampling
16. Estimation of population under multistage sampling.
- 17. Mid Semester Examination**
18. Distribution – free tests – advantages – disadvantages
19. Run test – test for randomness – median test – sign test
20. Mann Whitney U test for two samples
21. Kolmogrov - Smirnov one sample and two sample test, Kruskal – Walli’s test – chi-square
22. Correlation coefficients – regression coefficients – standard error
23. Significance tests – student’s t and F distribution - Correlation and regression theory
24. Curve fitting least square method for straight line
25. Parabolic curves – form reducible linear type



26. Partial and multiple correlations. Rank Correlation
27. Multiple regression.
28. Test of significance based on t, chi square, F distributions – large sample tests – small sample tests.
29. Time series analysis – components of time series trend, seasonal, cyclical and irregular movements
30. Elimination of trend – moving average method – least square method – seasonal movement – simple average and ratio to trend method – link relative method.
31. Index numbers – definition and uses – simple and weighted index numbers – selection of base year – fixed base and chain base methods
32. Laspeyre, Paasches, Fisher, Marshall – Edgeworth index numbers
33. reversal tests – cost of living index numbers of agricultural production deflation. Estimation – point estimation, interval estimation.
34. Statistical Package for Social Sciences (SPSS).

### **Practical Schedule**

1. Simple random sample
2. Selection-estimation
3. Determination of sample size in simple random sampling
4. Stratified random sampling
5. Cluster sample – selection – estimation
6. Multistage sampling – selection
7. Estimation of parameters in two stage sampling
8. Determination of sample size in two stage sampling
9. Application of double sampling
10. Distribution free methods for one sample
11. Two sample problem method of least squares
12. Moving averages
13. Correlation regression
14. Rank correlation coefficient
15. Forecasting using regression technique
- 16&17. Construction of index numbers of agricultural production.

### **Reference Books**

1. Gupta, S.P., 1985, *Statistical Methods*, Sultan Chand & Sons, New Delhi.
2. Kapoor, V.K., and S.C. Gupta, 1987, *Fundamentals of Applied Statistics*, Sultan Chand and Sons, New Delhi.
3. Panse, V.G., and P.V. Sukhatme, 1978, *Statistical Methods for Agricultural Workers*, ICAR, New Delhi.
4. Rangasamy, R.A., 1995, *Textbook of Agricultural Statistics*, Wiley Eastern Ltd., New Delhi.
5. Snedecor, G.W., and W.G. Cochran, 1967, *Statistical Methods*, Oxford & IBH Publishers, New Delhi.

## **COM 615 COMPUTER APPLICATIONS FOR AGRICULTURAL RESEARCH (1+1)**

### **Objective**

To understand the basic concepts of computer and their peripherals, to get the knowledge in office automation tools like MS Word, MS Excel, and MS Access. And to get exposed to the current trends in the internet and their usages. And also to make them acquire sound knowledge in various Agricultural statistical software and their analysis.

### **Theory**

#### **Unit – I: Introduction to Computer**

Overview of computers - basic principle of operation - devices of a computer and their functions - current trends in hardware and software. Computer applications - Operating systems - DOS - Windows - feature of windows - version of windows.

#### **Unit – II: Word Processor**

MS Word - Creation, Editing and Printing of a document - using the features of word like page setting, underlining, bold, italics, spell check, grammar check etc.-creation of tables in word, inserting graphics.

#### **Unit-III: Data Processing & Database**

MS Excel - creation of excel sheet - statistical analysis using the features in excel. MS Access - creation of database and retrieval - Query - Applications to Agricultures.

#### **Unit-IV: Agricultural Statistical Software**

SAS, MSTAT, IRRISTAT, AGRES, AGRISTAT, STATISTICA- MANOVA AND MANCOVA.

#### **Unit-V: Internet**

Internet Definition - getting the connectivity - service providers - web – sites – home page – email – retrieval of information from internet.

## **Practical:**

Introduction to hardware, software and operating systems - Study of various DOS commands - Creating and Editing of a word Document - Study of various features in MS-WORD (spelling and grammar check, protection of a document) - Operation of tables and Mail-merge - Working with different statistical packages in MS-EXCEL - Drawing of different graphs for the given data - Various string operations (Concatenation, count, left string, right string, type conversion etc.) - Table creation using wizards - Forms and reports - Retrieval of data from the database using queries - Correlation and multiple regression analysis - T test and Chi-square test, Creation of data file system and importing a data file from other packages - SAS, MSTAT, IRRISTAT - AGRES, AGRISTAT, STATISTICA - Creating E-Mail account (sending and receiving mails), Information retrieval from Internet - Model Practical Examinations.

## **Theory Schedule**

- 1) Introduction to computers, input, output devices and their operation.
- 2) Components of computers (hardware and software) and their applications.
- 3) Booting sequences of operating system (DOS, WINDOWS) and their features.
- 4) Introduction to word processor and their special features.
- 5) Creating, editing printing of a document, Formatting features (underline, bold, italic etc) and operation of table.
- 6) Introduction to data processing and creation of excel sheets, Working with different built-in-function.
- 7) Creating different types of graphs and working procedures of various statistical functions.
- 8) Importing and exporting objects among different application (MS-word, MS-excel, MS-access).
- 9) Mid semester Examination.
- 10) Database and MS- access- Creation, storing and retrieval of data from database.
- 11) Working of various statistical function (mean, variance, sd, T test etc).
- 12) SAS, MSTAT, IRRISTAT.
- 13) AGRES, AGRISTAT.
- 14) STATISTICA-MANOVA AND MANCOVA.
- 15) Introduction to internet, Features of internet.
- 16) Need for Internet service provider, creation and working principle of E-mail.
- 17) Information retrieval from various web pages of internet.

## **Practical Schedule**

- 1) Introduction to hardware, software and operating systems.
- 2) Study of various DOS commands.
- 3) Creating and Editing of a word Document.
- 4) Study of various features in MS-WORD (spelling and grammar check, protection of a document).
- 5) Operation of tables and Mail-merge.
- 6) Working with different statistical packages in MS-EXCEL.
- 7) Drawing of different graphs for the given data.
- 8) Various string operations (Concatenation, count, left string, right string, type conversion etc.).
- 9) Table creation using wizards.

- 10) Forms and reports.
- 11) Retrieval of data from the database using queries.
- 12) Correlation and multiple regression analysis.
- 13) T test and Chi-square test, Creation of data file system and importing a data file from other packages.
- 14) SAS, MSTAT, IRRISTAT.
- 15) AGRES, AGRISTAT, STATISTICA.
- 16) Creating E-Mail account (sending and receiving mails), Information retrieval from Internet.
- 17) Model Practical Examinations

### **Reference Books**

1. Kapoor V.K. 2004. *Introduction to Computers and Information Systems*. Sultan Chand and Sons, New Delhi.
2. Karthy Jacobs. 2007 *Microsoft office Excel*”, *The Express Line to Learning*, Willey Chand & Sons, New Delhi.
3. Peter Norton’s 2001, *Introduction to Computer (4<sup>th</sup> edition)*, Tata McGraw-Hill Publishing Company Limited, New Delhi.
4. TNAU 2004, *Advanced Quantitative Techniques and Data Analysis*, Training Manual- Agrl. Engineering College and Research Institute, Coimbatore.
5. Ron Mansfield, 2003, *Working in Microsoft Office*, Tata McGraw Hill, New Delhi.

## AEC 621 MACRO ECONOMICS (1+0)

### **Objective**

To explain the basic concepts, theories and various macroeconomics indicators to the students and make them to understand the various macroeconomic policy measures.

### **Theory**

#### **Unit-I Macroeconomics – Basic Concepts**

Basic concepts – development of macroeconomics – analytical approach to macroeconomics – analytical approach to macroeconomics – national income accounting – determination of national income – GNP as a welfare measure.

#### **Unit-II Consumption, Saving and Investment**

Consumption function - theories of the consumption function – saving function – investment function – marginal efficiency of investment – investment demand and output growth – saving investment balance – determination of equilibrium income – concepts of multiplier and accelerator – derivation of expenditure multiplier.

#### **Unit-III Distribution Economics**

Classical theory of output and employment – Keynesian theory of income, output and employment – equilibrium of commodity, money and labour markets – policy effects on demand

#### **Unit-IV Public Finance**

Money, banking and public finance – internal and external aid – deficit financing – monetary and fiscal policies – monetary policy and fiscal policy as instruments of development – inflation and unemployment – business cycle and its alternative equilibrium model – stability analysis.

#### **Unit-V Macroeconomic Policy**

Trade policies – balance of payments – balance of payments adjustment policy with fixed exchange rates and flexible exchange rates – international macroeconomic policies – economic growth and public policy.

### **Theory Schedule**

1. Basic concepts - Development of macroeconomics - Analytical approach to macroeconomics
2. Analytical approach to macroeconomics - National income accounting
3. Determination of national income - GNP as a welfare measure
4. Consumption function - Theories of the consumption function
5. Saving function - Investment function - Marginal efficiency of investment - Investment demand and output growth
6. Saving, investment balance - Determination of equilibrium income
7. Concepts of multiplier and accelerator - Derivation of expenditure multiplier

## 8. Mid Semester Examination

9. Classical theory of output and employment - Keynesian theory of income, output and employment
10. Equilibrium of commodity, money and labour markets - Policy effects on demand
11. Money, banking and public finance - Internal and external aid
12. Deficit financing - Monetary and fiscal policies
13. Monetary policy and fiscal policy as instruments of development - Inflation and unemployment
14. Business cycle and its alternative equilibrium model - Stability analysis.
15. Trade policies - Balance of payments
16. Balance of payments adjustment policy with fixed exchange rates and flexible exchange rates
17. International macroeconomic policies - Economic growth and public policy

## Reference Books

1. Ackley, Gardner, 1987, *Macro economics: Theory and Policy*, Macmillan, London.
2. Ahuja, H.L., 2004, *Macro Economics – Theory and Policy*, S. Chand & Co. Ltd., New Delhi.
3. Branson, H. William, 1986, *Macroeconomic Theory and Policy*, Harper Collins, New Delhi.
4. Miora, S. Kord, and V.K. Prui, 1977, *Modern Macroeconomic Theory*, Himalaya Publishing House, New Delhi.
5. Shapiro, Edward, 1989, *Macroeconomic Analysis*, Galgotta Publications, New Delhi.

## **AEC 622 AGRICULTURAL PRODUCTION ECONOMICS (1+1)**

### **Objective**

The objectives of this course is to provide applied and practical understanding of production economics and farm management techniques with emphasis on its economic analysis.

### **Theory**

#### **Unit-I Basics of Production Economics**

Agricultural Production process – relationship between farm planning and production economics – scope of agricultural production and planning. Neo classical production function – three stages – physical and economic optimum – elasticity of production.

#### **Unit-II Production and Cost Functions**

Production function – forms and types - economies of size and scale – returns to scale – factor-factor and product-product relationship. Cost concepts and cost functions. Linkages between cost and production functions – duality of cost and production functions.

#### **Unit-III Economic Efficiency**

Economic efficiency in agricultural production – technology, input use and factor shares - decomposition analysis – measurement of technical efficiency and frontier production functions.

#### **Unit-IV Linear Programming**

Linear programming and marginal analysis – simplex method, maximization and minimization – duality – simulation and programming techniques in agricultural production.

#### **Unit-V Risk & Uncertainty**

Elements of risk and uncertainty in agriculture – measurement of risk and adjustment to risk – incorporation of weather uncertainty in decision making – risk constrained linear programming model – MOTAD model – game theory models.

### **Practical**

Principle of marginal returns – estimation of different forms of production functions using farm level data – estimation of elasticity - estimation of isoquant and least cost combinations of crops – product – product relationship – cost function analysis - factor share analysis – decomposition analysis – technical efficiency estimation and frontier production functions - linear programming maximization and minimization – MOTAD – Goal programming.

## **Theory Schedule**

1. Agricultural Production process - Relationship between farm planning and production economics
2. Scope of Agricultural production and planning - Neo classical production function
3. Three stages – Physical and economic optimum – Elasticity of production
4. Production function - Forms and types
5. Economies of size and scale - Returns to scale – factor-factor and product-product relationship
6. Cost concepts and cost functions - Linkages between cost and production functions
7. Duality of cost and production functions
- 8. Mid Semester Examination**
9. Economic efficiency in agricultural production - Technology, input use and factor shares
10. Decomposition analysis
11. Measurement of technical efficiency and frontier production functions.
12. Linear programming and marginal analysis
13. Simplex method, maximization and minimization – Duality
14. Simulation and programming techniques in agricultural production
15. Elements of risk and uncertainty in agriculture
16. Measurement of risk and adjustment to risk – Incorporation of weather uncertainty in decision making
17. Risk constrained linear programming model - MOTAD model – Game theory models.

## **Practical Schedule**

1. Principle of marginal returns
2. Estimation of different forms of production functions using farm level data
3. Estimation of different forms of production functions using farm level data (cont.)
4. Estimation of elasticity
5. Estimation of isoquant and least cost combinations of crops
6. Product – Product relationship
7. Cost function analysis
8. Factor share analysis
9. Decomposition analysis
10. Technical efficiency estimation and frontier production functions
11. Technical efficiency estimation and frontier production functions (cont.)
12. Linear programming maximization and minimization
13. Linear programming maximization and minimization (Cont.)
14. Dual problems
15. Dual problems (cont.)
16. MOTAD
17. Goal programming.



## Reference Books

1. David L. Debertin, 1986, *Agricultural Production Economics*, MacMillan Publishing Company, New York
2. Dhondyal S.P., G.N. Singh, 2011, *Production Economics & Farm Management*, Aman Publishing House, Meerut.
3. Palanisami K., P. Paramasivan and C.R. Ranganathan, 2002, *Agricultural Production Economics – Analytical Methods & Applications*, Associated Publishing Company, New Delhi
4. Peter B.R., Hazell and Roger D. Norton, 1986, *Mathematical Programming for Economic Analysis in Agriculture*, Macmillan Publishing Company, New York
5. Sankhayan, P.L., 1998, *Introduction to the Economics of Agricultural Production*, Prentice Hall of India, New Delhi.

## **AEC 623 NATURAL RESOURCES AND ENVIRONMENTAL ECONOMICS (2+1)**

### **Objective**

To introduce economics principles related to natural resource and environmental economics, explore the concept of efficiency and the efficient allocation of natural resources, understand the economics of why environmental problems occur, explore the concept of efficiency and the efficient allocation of pollution, control and pollution prevention decisions and understand the environmental policy issues and alternative instruments of environmental policies.

### **Theory**

#### **Unit-I Basic Concepts**

Concepts, classification and problems of natural resource economics. Economy - environment interaction – the material balance principle, entropy law- resources scarcity - limits to growth - measuring and mitigating natural resource scarcity – Malthusian and Recardian scarcity – scarcity indices - resource scarcity and technical change.

#### **Unit-II Optimal Use**

Theory of optimal extraction - renewable resources – economic models of oil extraction- efficiency - time path of prices and extraction - Hotelling's rule, Solow-Harwick's rule. Theory of optimal extraction - exhaustible resources – economic models of forestry and fishery.

#### **Unit-III Markets and Natural Resources**

Efficiency and markets – market failures - externalities – types - property rights – transaction costs – Coase's theorem and its critique - public goods – common property and open access resource management - collective action.

#### **Unit-IV Economic Instruments**

Environmental regulation – economic instruments - pollution charges – Pigovian tax – Carbon trading - tradable permits – indirect instruments - environmental legislations in India.

#### **Unit-V Sustainability**

Concept of sustainable development - economic perspective - indicators of sustainability Relation between development and environment stress - environmental Kuznet's curve Environmental accounting – resource accounting methods. International environmental issues – climate change – likely impacts – adaptation and mitigation efforts - international treaties.

## **Practical**

Exhaustible resource management – optimum rate of oil extraction. Renewable resource management – optimum harvest of Forestry/fishery. Exercise on pollution abatement –I. Exercise on pollution abatement –II. Concepts in valuing the environment. Taxonomy of valuation techniques. Productivity change method – substitute cost method - Hedonic price method - Travel cost method – Contingent valuation methods. Discount rate in natural resource management. Environment impact assessment. Visit to Pollution Control Board.

## **Theory Schedule**

1. Concepts, Classification and Problems of Natural Resource Economics
2. Economy - Environment interaction
3. The Material Balance principle, Entropy law
4. Resources Scarcity - Limits to Growth
5. Measuring and mitigating natural resource scarcity
6. Malthusian and Recardian scarcity - Scarcity indices
7. Resource Scarcity and Technical Change
8. Theory of optimal extraction renewable resources
9. Economic models of oil extraction
10. Efficiency - Time path of prices and extraction
11. Hotelling's rule, Solow - Harwick's Rule
12. Theory of optimal extraction exhaustible resources
13. Economic models of forestry and fishery
14. Efficiency and markets - Market failures
15. Externalities - Types
16. Property rights - Transaction costs
- 17. Mid Semester Examination**
18. Coase's theorem and its critique
19. Public goods - Common property and open access resource management
20. Collective action - Environmental regulation
21. Economic instruments
22. Pollution charges - Pigovian tax
23. Carbon trading
24. Tradable permits
25. Indirect instruments
26. Environmental legislations in India.
27. Concept of sustainable development
28. Economic perspective
29. Indicators of sustainability Relation between development and environment stress  
Environmental Kuznet's curve - Environmental accounting
30. Resource accounting methods
31. International environmental issues
32. Climate change - Likely impacts
33. Adaptation and mitigation efforts
34. International treaties

## Reference Books

1. Conard J.M. and W. Collin, 1987, *Natural Resource Economics*, Notes & Problems, Cambridge University Press, London.
2. Hartwick JM & Olewiler ND. 1998. *The Economics of Natural Resource Use*. 2nd Ed. Addison-Wesley Educational Publ., New Delhi.
3. Pearce DW & Turner K. 1990. *Economics of Natural Resources and the Environment*. John Hopkins Univ. Press., London.
4. Sengupta R. 2000. *Ecology and Economy, an Indian Perspective*. Oxford Univ. Press., New Delhi.
5. Tony Prato., 1998, *Natural Resource and Environmental Economics*, Iowa State University Press, Ames.

## **AEC 711 ECONOMETRICS (1+1)**

### **Objective**

To teach the students the basic concepts of econometrics and various econometric methods that are applicable in agricultural research.

### **Theory**

#### **Unit-I Basic Concepts**

Methods of analysis in social sciences, positive and normative analysis – econometrics – single and multivariate analysis – concepts of function – specification of models – data, variables and models – Regression – normality assumptions – multiple regression – Methods of estimation – OLSW, MLE, BLUE.

#### **Unit-II Problems in Estimation**

Interval estimation and hypothesis testing. The classical linear regression model – assumptions - violation of assumptions – problems in estimation – problem of inference – non linearity, multicollinearity, heteroskedasticity and auto correlation.

#### **Unit-III Econometric Models**

Auto regression model – recursive model – distributed lag model – identification of dummy variables – problems in specification and estimation – residual analysis - normative models – simultaneous equation models – identification and approaches to estimation.

#### **Unit-IV Qualitative Response Models**

Models of qualitative choice - regression on dummy dependent variables – binary choice models - LPM, logit, probit and tobit models.

#### **Unit – V: Time Series Analysis and Forecasting Models**

Stationarity, unit roots, and co integration – Extrapolation models – Moving average models. Forecasting with ARCH, ARIMA,VAR and GARCH Models.

### **Practical**

Selection of model for collected data – identification of variables – correlation analysis – estimation of regression models – testing of hypothesis – testing for multicollinearity, heteroskedasticity and autocorrelation – distributed lag models – regression on dummy dependent variable – moving average models – auto regressive model - LPM, Logit, Probit, and Tobit Models – time series analysis – simultaneous equation models – application of Excel, SPSS and LIMDEP.

## **Theory Schedule**

1. Methods of analysis in social sciences, positive and normative analysis
2. Econometrics - Single and multivariate analysis - Concepts of function - Specification of models
3. Data, variables and models - Regression - Normality assumptions - Multiple regression
4. Methods of estimation - OLSW, MLE, BLUE - Interval estimation and hypothesis testing
5. The classical linear regression model - Assumptions - Violation of assumptions
6. Problems in estimation - Problem of inference
7. Non linearity, multicollinearity, heteroskedasticity and auto correlation
- 8. Mid Semester Examination**
9. Auto regression model - Recursive model
10. Distributed lag model - Identification of dummy variables
11. Problems in specification and estimation - Residual analysis
12. Normative models - Simultaneous equation models - Identification and approaches to estimation
13. Models of qualitative choice - Regression on dummy dependent variables
14. Binary choice models - LPM, logit, probit and tobit models
15. Stationarity, unit roots, and cointegration
16. Extrapolation models – Moving average models
17. Forecasting with ARIMA, VAR, ARCH and GARCH Models

## **Practical Schedule**

1. Selection of model for collected data
2. Identification of variables
3. Correlation analysis
4. Estimation of regression models
5. Testing of hypothesis
6. Testing for multicollinearity, heteroskedasticity and autocorrelation
7. Distributed lag models
8. Regression on dummy dependent variable
9. Moving average models
10. Auto regressive models
11. LPM, Logit, and Probit Models
12. Tobit Model
13. Time series analysis
14. Simultaneous equation models
15. Application of Excel
16. Application of SPSS
17. Application of LIMDEP

## References Books

1. Damodar N.Gujarati, 1995, *Basic Econometrics*, Mc-Graw Hill Book Company, New York:
2. Harry. H.Kelejan, and Wallace E.Oates, 1974, *Introduction to Econometrics Principles and Applications*, Harper and Row Pub, NewYork
3. Koutsoyianis A., 1977, *Theory of Econometrics*, Barner and Noble, NewYork.
4. Maddala G.S., 1992, *Introduction to Econometrics*, MacMillan, New York.
5. Robert S. Pindyck and Daniel L. Rubinfeld, 1991, *Econometric Models and Economic Forecasts*, Mc-Graw-Hill Inc., New Delhi.

## **AEC 712 AGRICULTURAL PROJECT PLANNING AND EVALUATION (2+1)**

### **Objective**

The objective of this course is to provide the students a thorough understanding on project selection, formulation, financial feasibility analysis, monitoring and evaluation techniques with special reference to agricultural sector.

### **Theory**

#### **Unit – I Agricultural Projects – Introduction**

Project - definition – agricultural projects – project preparation and analysis – project cycle – identification, formulation, appraisal, implementation and evaluation – criteria for selection of projects.

#### **Unit – II Project Costs and Benefit**

Defining and identification of project costs and benefits – methodological issues in financial and economic evaluation of projects – measuring intangible costs and benefits – managerial analysis of a project.

#### **Unit – III Pricing Project Cost and Benefit**

Pricing project cost and benefit for financial analysis - adjustments of financial prices into economic value for economic analysis – social cost and benefit analysis – choice among mutually exclusive projects – project monitoring and evaluation.

#### **Unit – IV Project Analysis and Evaluation**

Risk Analysis – Repayment methods - Measures of project worth – feasibility analysis – discounted measures – BCR, NPV and IRR. Methods of Project monitoring and evaluation - sensitivity analysis. Preparation of case studies – review of world bank aided projects.

#### **Unit-V Project Management Techniques**

Project management – network techniques – PERT, CPM and crash programme methods. Analyzing risk in projects – Environmental Impact Assessment (EIA) – decision tree analysis.

### **Practical**

Developing skills in identification of projects – formulation of projects – measuring of cost and benefit of projects – appraisal of project using undiscounted and discounted techniques – use of sensitivity analysis – selection methods among mutually exclusive projects – preparation of case studies – social cost benefit analysis – developing network techniques for project management – use of management tools in project monitoring – analyzing risk in projects – environmental impact assessment – decision tree analysis – methods of evaluation – SWOT techniques – PERT, CPM and Crash programme methods.



## **Theory Schedule**

1. Project
2. Definition
3. Agricultural projects
4. Project preparation and analysis
5. Project cycle
6. Identification, formulation, appraisal, implementation and evaluation
7. Criteria for selection of projects
8. Defining and identification of project costs and benefits
9. Methodological issues in financial and economic evaluation of projects
10. Measuring intangible costs and benefits
11. Managerial analysis of a project
12. Pricing project cost
13. Benefit for financial analysis
14. Adjustments of financial prices into economic value for economic analysis
15. Social cost and benefit analysis
16. Choice among mutually exclusive projects
- 17. Mid Semester Exam**
18. Project monitoring and evaluation.
19. Risk Analysis
20. Repayment methods
21. Measures of project worth
22. Feasibility analysis
23. Discounted measures
24. BCR, NPV and IRR
25. Methods of Project Monitoring and Evaluation
26. Sensitivity analysis
27. Preparation of case studies
28. Review of world bank aided projects
29. Project management
30. Network techniques
31. PERT, CPM and Crash Programme methods
32. Analyzing risk in projects
33. Environmental Impact Assessment (EIA)
34. Decision tree analysis

## **Practical Schedule**

1. Developing skills in identification of projects
2. Formulation of projects
3. Measuring of cost and benefit of projects
4. Appraisal of project using undiscounted and discounted techniques
5. Use of sensitivity analysis
6. Selection methods among mutually exclusive projects
7. Preparation of case studies
8. Social cost benefit analysis
9. Developing network techniques for project management

10. Use of management tools in project monitoring
11. Analyzing risk in projects
12. Environmental Impact Assessment
13. Decision tree analysis
14. Methods of Evaluation
15. SWOT techniques
- 16 & 17. PERT, CPM and Crash programme methods.

### **Reference Books**

1. Chandra, Prasanna, 1995, *Projects: Preparation, Appraisal, Budgeting and Implementation*, Tata McGraw Hill Publications, New Delhi.
2. Gittinger J. Price J., 1982, *Economic Analysis of Agricultural Projects*, The John Hopkins University Press, London.
3. Goel, B.B., 1989, *Project Management*, Deep & Deep Publications, New Delhi.
4. Jerome, D. Wiest, and Ferdinand K. Lezy, 1991, *A Management Guide to PERT/CPM with GERT/PLM/DCPM and other Networks*, Prentice Hall of India Pvt. Ltd., New Delhi.
5. Little I.M.D., and J.A. Mirlees, 1974, *Project Appraisal and Planning for Developing Countries*, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

## **AEC 721 AGRICULTURAL FINANCE, INSURANCE AND CO-OPERATION (2+0)**

### **Objective**

To provide knowledge on principles, problems and practice of agricultural finance, insurance and co-operation and to study the issues related to lending to priority sector credit management

### **Theory**

#### **Unit-I Importance and Scope of Agricultural Finance**

Role and Importance of Agricultural Finance. Financial Institutions and credit flow to rural/priority sector. Agricultural lending – direct and indirect financing - financing through Co-operatives, NABARD and Commercial Banks and RRBs. District Credit Plan and lending to agriculture/priority sector. Micro Financing and Role of MFIs - NGOs, and SHGs.

#### **Unit-II Role of Commercial Banks**

Financial literacy - lending to farmers – The concept of 3 C's, 7 P's and 3 R's of credit. Credit counseling centers - estimation of technical feasibility, economic viability and repaying capacity of borrowers and appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions – credit widening and credit deepening – risk in borrowing – consequences.

#### **Unit-III Agricultural Insurance**

Risks in financing agriculture - risk management strategies and coping mechanism. Agencies of Agricultural insurance - crop Insurance programmes – review of different crop insurance schemes – yield loss and weather based insurance and their applications – appraisal – claiming and repayment.

#### **Unit-IV Principles of Cooperation**

Principles of co-operation – theories of cooperation – genesis of cooperatives – cooperative movement in India – experiences of developed countries – present trend of cooperative institutions in India – NAFED – NDDB – KRIBCO. Organization, structure and practice of cooperation.

#### **Unit-V Cooperative Management and Policy**

Non credit cooperatives and their performance, cooperative farming - marketing cooperatives for input supply and product marketing - integrated credit and marketing, - State aid and cooperative movement - legislations - role of Reserve Bank of India, NABARD and Commercial Banks - management of cooperatives in rural / agricultural development problems and perspectives of cooperative institutions - policy options.

## Theory Schedule

1. Role and importance of Agricultural Finance
2. Financial Institutions and credit flow to rural/priority sector
3. Agricultural lending - Direct and Indirect Financing
4. Financing through Co-operatives, NABARD, Commercial Banks and RRBs
5. District Credit Plan and lending to agriculture/priority sector
6. Micro Financing and Role of MFI's
7. NGOs, and SHGs
8. Financial literacy
9. Lending to farmers
10. The concept of 3 C's, 7 P's and 3 R's of credit
11. Credit counseling centers
12. Estimation of technical feasibility, economic viability and repaying capacity of borrowers and appraisal of credit proposals
13. Understanding lenders and developing better working relationship and supervisory credit system
14. Credit inclusions
15. Credit widening and credit deepening
16. Risk in borrowing – consequences
17. **Mid Semester Examination**
18. Risks in financing agriculture
19. Risk management strategies and coping mechanism.
20. Agencies of Agricultural insurance
21. Crop Insurance programmes – review of different crop insurance schemes
22. Yield loss and weather based insurance and their applications
23. Appraisal – claiming and repayment.
24. Principles of cooperation
25. Theories of cooperation
26. Genesis of co-operatives – cooperative movement in India
27. Organization, structure and practice of cooperation, Cooperative experience of developed countries
28. Present trend of cooperative institutions in India - NAFED – NDDDB – KRIBCO
29. Organization, structure and practice of cooperation
30. Non credit cooperatives and their performance, cooperative farming
31. Marketing cooperatives for input supply and product marketing
32. Integrated credit and marketing, - State aid and cooperative movement - legislations - role of Reserve Bank of India, NABARD and Commercial Banks
33. Management of cooperatives in rural / agricultural development problems and perspectives of cooperative institutions
34. Policy options

## Reference Books

1. Hajela, T.N., 1973, Principles, *Problems and Practice of Co-operation*, Shivalal Agarwala and Company, Agra
2. Kulkarni, P.V., and B.G. Sathya Prasad, 2000, *Financial Management*, Himalaya Publishing House, Mumbai
3. Madan, G.R., 1994, *Cooperative Movement in India*, Mittal Publications, New Delhi.
4. Muniraj R. 1987. *Farm Finance for Development*. Oxford & IBH Publication, New Delhi.
5. Subba Reddy, S., and P. Raghu Ram, 2000, *Agricultural Finance and Management*, Oxford and IBH, New Delhi.

## **AEC 722 AGRICULTURAL DEVELOPMENT AND POLICY (1+0)**

### **Objective**

To make the students understand the background of development economics, existing policies, their performance and guide them in framing meaningful and relevant policy models.

### **Theory**

#### **Unit-I Economic Development and Economic Growth**

Development economics – scope and importance - economic development and economic growth - divergence in concept and approach - indicators and measurement of economic development – GNP as a measure of economic growth – New Measures of Welfare – NEW and MEW – PQLI – HDI – Green GNP - criteria for under development – obstacles to economic development – economic and Non Economic factors of economic growth.

#### **Unit-II Theories of Economic Growth**

Economic development – meaning - stages of economic development - determinants of economic growth. Theories of economic growth – Ricardian growth model – The Harrod Domar Model – The Neo classical Model of Growth – The Kaldor Model – Optimal Economic Growth. Recent Experiences of developing country economies in transition – role of state in economic development – government measures to promote economic development - introduction to development planning.

#### **Unit-III Role of Agriculture in Economic Development**

Development issues - poverty – inequality - unemployment and environmental degradation – models of agricultural development – induced innovation model policy options for sustainable agricultural development.

#### **Unit-IV Rural Development**

Role of agriculture in economic / rural development – theories of agricultural development – population and food supply – population policies, monetary and fiscal policies – role of deficit financing – role of state in economic development – strategies and planning for rural development.

#### **Unit-V Policies for Agricultural Development**

Policy – definition – guidelines and framework for policy formulation – need for sound agricultural policies - proponents and opponents policies in vulnerable sectors like agriculture – lessons for developing countries. Resource policies – credit policies – input and product marketing policies – policies related to agricultural prices.

## Theory Schedule

1. Development economics – scope and importance
2. Economic development and economic growth - divergence in concept and approach - Indicators and Measurement of Economic Development
3. GNP as a measure of economic growth – New Measures of Welfare – NEW and MEW – PQLI – HDI – Green GNP
4. Criteria for under development – Obstacles to economic development – Economic and Non-Economic factors of economic growth
5. Economic development – meaning, stages of economic development, determinants of economic growth
6. Theories of economic growth – Ricardian growth model – The Harrod Domar Model
7. The Neo classical Model of Growth – The Kaldor Model – Optimal Economic Growth
8. **Mid Semester Examination**
9. Recent Experiences of developing country economies in transition – Role of state in economic development
10. Government measures to promote economic development. Introduction to development planning - Development issues - Poverty – inequality - unemployment and environmental degradation
11. Models of agricultural development - Induced Innovation Model - Policy options for sustainable agricultural development
12. Role of agriculture in economic / rural development - Theories of agricultural development
13. Population and food supply - Population policies, monetary and fiscal policies
14. Role of deficit financing - role of state in economic development – strategies and planning for rural development
15. Policy – definition – guidelines and framework for policy formulation – Need for sound agricultural policies
16. Proponents and opponents policies in vulnerable sectors like agriculture – Lessons for developing countries
17. Resource policies – credit policies – input and product marketing policies – policies related to agricultural prices

## Reference Books

1. Diwett KK. 2002. *Modern Economic Theory*. S. Chand & Co.
2. Ellis Frank, 1992, *Agricultural Policies in Developing Countries*, Cambridge University Press, New York.
3. Jhingan, M.L., 1998, *The Economics of Development and Planning*, Vrinda Publication, New Delhi.
4. Naqvi Syed Nawab Haider, 2002, *Development Economics – Nature and Significance*, Sage Publications, New Delhi.
5. Vyas, V.S., 1998, *Policies for Agricultural Development*, Tamil Nadu Book House, Chennai.

## **NON CREDIT COMPULSORY COURSES**

### **PGS 612: RESEARCH DATA ANALYSIS (0+1)**

#### **Practical**

Data collection – editing and formatting data – data analysis through MS Excel – creation and usage of excel spread sheet. Analysis through SPSS and Limdep – operation basics – managing data – data input, export and transformation – tabulation and chi square analysis – other non parametric analyses – reliability analysis – multidimensional scaling – factor analysis – cluster analysis – discriminant analysis – simple and multiple regression analyses – logistic regression – hierarchical log linear model – general log linear model – interpretation of results – techniques, precautions & significance.

#### **Practical Schedule**

1. Data collection – editing and formatting data
2. Data analysis through MS Excel – creation and usage of excel spread sheet
3. Analysis through SPSS and Limdep – operation basics
4. Managing data – data input, export and transformation
5. Tabulation and chi square analysis
6. Other non parametric analyses
7. Reliability analysis – multidimensional scaling
8. Factor analysis
9. Cluster analysis
10. Discriminant analysis
11. Simple regression analysis
12. Multiple regression analysis
13. Logistic regression
14. Hierarchical log linear model



15. General log linear model
16. Interpretation of results
17. Techniques, precautions & significance.

## **References**

1. Norton, P.1998, Introduction to computers, second edition, Tata Mc Graw Hill, New Delhi.
2. Rajaraman,V.2006, Introduction to information technology, Prentice Hall of India, New Delhi.
3. Kothari,C.R., 2003, Research methodology – methods and techniques, Wiley Eastern Ltd., New Delhi.
4. Singh, Arun Kumar, 1993, Tests, measurements and research methods in behavioural sciences, Tata Mc Graw Hill Publishing Co Ltd., New Delhi.

## **PGS 622: TECHNICAL WRITING AND COMMUNICATION SKILLS (0+1)**

### **Objective**

To equip the students with skills *Viz.*, writing of dissertations, research papers, etc. and to communicate and articulate in English

### **Practical**

Grammar - Tenses, parts of speech, clauses, punctuation marks; Error analysis - Common errors; Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers. Proof reading.

Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Structure of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article.

### **Practical schedule**

1. Grammar (Tenses, parts of speech)
2. Grammar (clauses, punctuation marks)
3. Error analysis (Common errors); Concord; Collocation;
4. Phonetic symbols and transcription;
5. Accentual pattern: Weak forms in connected speech
6. Participation in group discussion
7. Facing an interview; presentation of scientific papers.
8. Technical Writing- Various forms of scientific writings- theses, technical papers
9. Mid -semester
10. Technical Writing- reviews, manuals
11. Structure of thesis and research communications
12. Writing of abstracts, summaries, précis, citations etc
13. Commonly used abbreviations in the theses and research communications
14. Illustrations, photographs and drawings with suitable captions
15. Pagination, numbering of tables and illustration, numbers and dates in scientific write-ups

16. Editing and proof-reading
17. Writing of a review article.

### **References**

1. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East-West Press.
2. Mohan K. 2005. Speaking English Effectively. MacMillan India.
3. Richard WS. 1969. Technical Writing. Barnes & Noble.
4. Robert C. (Ed.). 2005. Spoken English: Flourish Your Language. Abhishek.
5. Wren PC & Martin H. 2006. High School English Grammar and Composition. S.Chand & Co.

## **PGS 623: Intellectual Property and its Management in Agriculture (1+0) (e-course)**

### **Objective**

The objective of the course is to create awareness about intellectual property rights in agriculture. The course deals with management of patterns, trade marks, geographical indication, copy rights, designs, plant variety protection and bio diversity protection. The students will be taught on the marketing and commercialization of intellectual properties.

### **Theory**

#### **Unit - I: World trade organization - introduction**

World Trade Organization - Agreement on Agriculture (AoA) and Intellectual Property Rights (IPR) - importance of intellectual property management - IPR and economic growth - IPR and bio diversity - major areas of concern in intellectual property management - technology transfer and commercialization - forms of different intellectual properties generated by agricultural research.

#### **Unit - II: Patent document**

Discovery *versus* invention - patentability of biological inventions - procedure for patent protection - preparatory work - record keeping, writing a patent document, filing the patent document - types of patent application - patent application under the Patent Cooperation Treaty (PCT).

#### **Unit - III: Plant genetic resources**

Plant genetic resources - importance and conservation - sui generic system - plant varieties protection and farmers' rights act - registration of extinct varieties - registration and protection of new varieties / hybrids / essentially derived varieties - dispute prevention and settlement - farmers' rights.

#### **Unit - IV: Trademark**

Trademark - geographical indications of goods and commodities - copy rights- designs - biodiversity protection.

#### **Unit - V: Benefit sharing**

Procedures for commercialization of technology - valuation, costs and pricing of technology - licensing and implementation of intellectual properties - procedures for commercialization - exclusive and non exclusive marketing rights - research exemption and benefit sharing.

### **Theory Schedule**

1. World Trade Organization - Agreement on Agriculture (AoA) and Intellectual Property Rights (IPR)
2. Importance of intellectual property management - IPR and economic growth - IPR and bio diversity
3. Major areas of concern in Intellectual property management - technology transfer and commercialization
4. Forms of different intellectual properties generated by agricultural research
5. Discovery versus invention patentability of biological inventions
6. Procedure for patent protection
7. Preparatory work - record keeping, writing a patent document, filing the patent document
8. Types of patent application - patent application under the Patent Cooperation Treaty (PCT)

### **9. Mid semester examination**

10. Plant genetic resources - importance and conservation
11. Sui generic system - plant varieties protection and farmers' rights act - registration of extant varieties
12. Registration and protection of new varieties / hybrids / essentially derived varieties - dispute prevention and settlement - farmers' rights
13. Trade mark - geographical indications of goods and commodities - copy rights - designs
14. Biodiversity protection
15. Procedures for commercialization of technology - valuation, costs and pricing of technology
16. Licensing and implementation of intellectual properties - procedures for commercialization
17. Exclusive and non exclusive marketing rights - research exemption and benefit sharing

### **References**

1. Arun Goyal and Moor Mohamed, 2001. *WTO in the New Millennium*, Academy of Business Studies, New Delhi.
2. BilekDebroj, 2004. *Intellectual Property Rights*, BR World of books, New Delhi.
3. Ganguli, P., 2001. *Intellectual Property Rights - Unleashing the Knowledge Economy*, Tata McGraw Hill, New Delhi.
4. Narayanan, R., 2006. *Patent Law*, Eastern Law House, New Delhi.
5. Ramappa, T., 2000. *Intellectual Property Rights under WTO - Tasks before India*, Wheeler Publishing, New Delhi.

## PGS 714: LIBRARY AND INFORMATION SERVICES (0+1)

### Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

### Practical

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary -Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services - (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing - information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized - library services; Use of Internet including search engines and its resources; e-resources access methods.

### Practical Schedule

1. Introduction to library and its services
2. Role of libraries in education, research and technology transfer;
3. Classification systems and organization of library
4. Sources of information- Primary –Sources
5. Sources of information -Secondary Sources and Tertiary Sources
6. Intricacies of abstracting and indexing services
7. Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.);
8. Tracing - information from reference sources; Literature survey
9. Mid- Semester
10. Citation techniques/Preparation of bibliography;
11. Use of CD-ROM Databases,
12. Online Public Access Catalogue and other computerized - library services
13. Online Public Access Catalogue and other computerized - library services
14. Use of Internet including search engines and its resources
15. Use of Internet including search engines and its resources
16. e-resources access methods.
17. e-resources access methods.

## **Objective**

To introduce learners to the key concept and practice of mitigation for natural disaster and calamities and to equip them to conduct thorough assessment of hazards, risks vulnerability and capacity building strategies.

## **Theory**

### **Unit I – Natural disaster**

Natural Disasters - meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves.

### **Unit II – Climate change**

Climatic change - Global warming, sea level rise, ozone depletion, Manmade disasters - Nuclear disasters, chemical disasters, biological disasters.

### **Unit III – Man – made disaster**

Building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, disaster management- efforts to mitigate natural disasters at national and global levels – India’s key hazards, vulnerabilities and disaster response mechanisms in India.

### **Unit IV – Disaster warning, response and preparedness**

Concept of disaster management, national disaster management framework; financial arrangements, role of NGOs, community-based organizations, and media - central, state, district and local administration. Dissemination of disaster warning, response to natural disasters, national, state, district level, relief – food and nutrition – water – health – mental health services.

### **Unit V – Rehabilitation**

Rehabilitation – tolerant and resistant crops – resilient farming concepts – bio shield livelihood options – insurance and compensation – clothing and utensils and fuel – shelter – relief camp – sanitation and hygiene. Preparedness – Emergency Operations Centres (EOCS)

## **Theory Schedule**

1. Natural Disaster - meaning and nature of natural disasters, their types and effects.
2. Flood, drought, cyclone, earthquakes landslides, avalanches, volcanic eruptions, Heat and cold waves.
3. Climatic change- Global warming, sea level rise, ozone depletion
4. Manmade disaster - Nuclear disasters, chemical disasters, biological disasters.

5. Building fire, coal fire, forest fire. oil fire.
6. Air pollution, water pollution, deforestation, industrial wastewater pollution.
7. Disaster management- efforts to mitigate natural disasters at national and global levels.
8. India's key hazards, vulnerabilities and disaster response mechanism in India.
9. **Mid-Semester examination**
10. Concept of disaster management, national disaster management framework.
11. Financial arrangements, role of NGOs, community-based organizations and media.
12. Central, state, district and local administration.
13. Dissemination of disaster warning - response to natural disasters, national, state, district level.
14. Relief – food and nutrition – water – health – mental health services.
15. Rehabilitation – tolerant and resistant crops- resilient farming concepts – bioshields - livelihood options – insurance and compensation.
16. Clothing and utensils and fuel – shelter – relief camp – sanitation and hygiene.
17. Preparedness – Emergency Operations Centers (EOCS).

## References

1. Gautam, D R. 2009. *Community based disaster risk reduction*. Mercy Corps, Lalitpur, Nepal.
2. Gupta, HK. 2003. *Disaster management*. Indian National Science Academy. Orient Blackswan.
3. Hodgkinson, PE and Stewart, M. 1991. *Coping with Catastrophe: A handbook of disaster management*. Routledge.
4. Ministry of Home Affairs. 2010. *Standard operating procedure for responding to natural disasters*, Ministry of Home Affairs – Disaster management Division, New Delhi.
5. Sharma, VK. 2001. *Disaster management*. National Centre for Disaster Management, India.