COMMON TO ALL PH.D. DEGREE PROGRAMMES (BY COURSE WORK)

(FULL-TIME / PART-TIME / EXTERNAL PROGRAMME)

(2010-2011)

DEPARTMENT OF AGRICULTURAL ECONOMICS

REGULATIONS AND SYLLABUS

REGULATIONS

1. SYSTEM OF EDUCATION

1.1 These rules and regulations shall govern the Ph. D Programmes leading to the award of Degree of Doctor of Philosophy in the concerned subject in the Faculty of Agriculture, Annamalai University. They shall come into force with effect from the academic year 2010-2011.

1.2 The semester system shall be followed for all the Ph. D degree programmes.

1.3 The duration of doctoral programmes is three (6 semesters) academic years. The first year of study shall be the first and second semesters following student's admission. The second year of study shall be the third and fourth semesters and third year means the fifth and sixth semesters. Every enrolled student will be required to undergo a specified load of course work in the chosen subject of specialization (Major, Minor and supporting courses) and complete seminars, research credits and submit thesis.

2. DEFINITIONS

2.1 An "Academic year" shall consists of two semesters.

2.2 "Semester" means an academic term consisting of 105 instructional days excluding final theory examinations.

2.3 "Course" means a unit of instruction to be covered in a semester having specific No., title and credits.

2.4 "Credit hour" means, one hour lecture plus two hours of library or home work or two and half hours of library/field practicals per week in a semester.

2.5 'Credit load' of a student during a semester is the total number of credits registered by that student during that particular semester.

2.6 'Grade Point' of a course means the value obtained by dividing the percentage of marks earned in a course by 10 and the Grade Point is expressed on a 10 point scale and rounded off to two decimal places.

2.7 'Credit Point' means the grade point multiplied by corresponding credit hours.

2.8 'Grade Point Average'(GPA) means the quotient of the total credit points obtained by a student in various courses 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 scale and the GPA has to be corrected to two decimals.

2.9 'Overall Grade Point Average' (OGPA) means the quotient of cumulative credit points obtained by a student in all the Courses 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 up to 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. PROGRAMMES OFFERED

The details of various Ph.D programmes offered in the Faculty of Agriculture are as follows:

Agri Business Management
Agrl. Economics
Agrl. Entomology
Agrl. Extension
Agrl. Microbiology
Agronomy
Genetics and Plant Breeding
Horticulture
Plant Pathology
Seed Science & Technology
Soil Science and Agrl. Chemistry

4. ELIGIBILITY FOR ADMISSION

Candidates seeking admission to Ph.D. programme should satisfy the following requirements.

4.1 Candidates with two year master degree programmes from Universities recognized by Annamalai University are eligible to apply for Ph.D programmes of the university.

4.2 Candidates who have undergone the programme under conventional system should posses not less than a second class Master degree. The candidates under trimester system should posses a minimum OGPA of 3.00 out of 4.00. For those under semester system 7.00 out of 10.00 is required for various Doctoral programmes. However, this will not apply to SC/ ST candidates, nominees of State Government / Annamalai university / ICAR / and Government of India for whom a pass in the concerned degree is sufficient.

Table – 1: Eligibility Criteria

Doctoral Degree Programmes	Eligibility
1. Agrl. Business Management	MBA in Agribusiness
2. Agrl. Economics	M.Sc.(Ag.) in Agrl. Economics/ Agrl. Marketing Management.
3. Agrl. Entomology	M.Sc.(Ag.) in Entomology
4. Agrl. Extension	M.Sc.(Ag.) in Agrl. Extension
5. Agrl. Microbiology	M.Sc.(Ag.) in Agrl. Microbiology
6. Agronomy	M.Sc.(Ag.) in Agronomy
7. Genetics and Plant Breeding	M.Sc.(Ag.) in Genetics and Plant Breeding
8. Horticulture	M.Sc (Ag.) Hort. / M.Sc. (Hort.)
9. Plant Pathology	M.Sc.(Ag.) in Plant Pathology
10. Seed Science & Technology	M.Sc.(Ag.) in Seed Science & Technology
11. Soil Science and Agrl. Chemistry	M.Sc.(Ag.) in Soil Science and Agrl. Chemistry

5. SELECTION PROCEDURE

A candidate who wishes to under take Ph.D. programme of this University either full time or part time or external registration should apply in the prescribed form on or before the due date.

Applications which fulfils the above conditions (mentioned in the Prospectus) will be scrutinized by a Doctoral Committee consisting of the proposed guide, the Head of the Department and two or three senior staff members (not more than five). The candidate will have to appear for a written test and an interview (75 marks + 25 marks). The marks and the evaluation report will be placed before the Vice-Chancellor who in consultation with the Dean of the Faculty and Head of the Department will select and admit the applicant to work under the guide proposed.

5.1. PART TIME PROGRAMME

The part time programme will be offered to the in-service candidates / Research Scholars of projects of Annamalai University. The candidates of this University should route their application through HOD and Dean, Faculty of Agriculture. The duration of the programme will be of 3 years. The in-service candidates / Research Scholars of projects of Annamalai University will be permitted to register the Ph.D. programme by course work and they have to undergo one year course work by utilizing any eligible leave for that period.

5.2. EXTERNAL REGISTRATION

Eligibility : Same as for regular candidates. In addition to that, the following are the additional conditions for registration for a Ph.D. programme.

1. The candidates must register under a guide who is a member of the Faculty of this University
2. The candidate should be working as Lecturer/Reader/Professor or on equivalent positions on permanent basis in a recognized college where facilities for carrying out research work are available and have post graduate departments for Agrl. subjects or working as research assistants in private or government institutions having research and development facilities and who fulfill the eligibility conditions.
3. However such colleges/ research institutes should be recognized by Annamalai University for this purpose. The colleges/ research institutes/ organization should apply for recognition to the University in the prescribed format with recognition fee as specified by the University in the relevant subjects or department from which they wish to depute candidates for the Ph.D. programme. At the discretion of the Vice chancellor, a committee may be appointed to visit the college/Institution to inspect the infrastructure facilities available for pursuing Ph.D. research. Based on the recommendations of the committee, the university may permit a candidate from the department to be sponsored by the institution. This clause is not applicable to those institutions/ organizations that have been recognized already for external registration.
4. The candidate should have a recognized co-guide in parent department of the organization. The co-guides may be from other colleges / organization located from the same place if such persons are not available in the parental organizations.
5. Other regulations relating to Ph.D research in the University shall be applicable to these candidates also, except the clause relating to the period of residence.

6. The candidate shall undergo the course and research of the required credits during I year of the programme. He / She shall carryout the research at his / her parental organization for the rest of period of the programme.
7. i. NOC (No Objection Certificate) is to be produced from the employer of the institution / Organization where he / she is working and attached along with the application.
   ii. Co-guide acceptance letter should be also be enclosed with the application form.

6. CREDIT GRADE POINT REQUIREMENTS

6.1. A student enrolled for Doctoral program to become eligible for the degree is required to complete 75 credits inclusive of 48 credits of research as detailed below

Details	Credit Hours
I. Major Courses	14
II. Minor Courses	6
III. Supporting Courses	5
IV. Seminar	2
V. Research	48
Total	75

6.2. In a semester, a full time Ph.D. student can register a maximum of 15 credits. However, the research credits registered should not exceed 12 per semester. The Ph.D. students (FT / PT / EX) should complete their course work within two semesters in the first year.

6.3. Requirements for Ph.D. programme shall also include successful completion of thesis research in the major field of study and submission of thesis thereon.

7. ATTENDANCE REQUIREMENT

7.1. "One hundred percent attendance is expected from each scholar. A student who fails to secure 80 per cent of attendance in each subject separately for theory and practical, shall not be permitted to appear for the final examination in that subject and shall be awarded 'E' (incomplete) and will be required to repeat the subject when ever offered.

7.2. In respect of the student who has absented himself / herself for classes with or without valid reasons, that period will be treated as absence only and not as leave. Also, no attendance will be given for writing make up tests.

7.3 In case of new admission, for calculating 80% attendance in the first semester, the number of working days will be calculated from the date of joining of the students 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 Advisory committee, HOD and Dean, Faculty of Agriculture on payment of condonation fee prescribed by the university.

7.4 Students absenting from the classes with prior permission of the HOD on official University business shall be given due consideration in computing attendance.

7.5. In respect of students who had absented for the mid-semester examination on University business with prior permission of the HOD and Dean, Faculty of

Agriculture the make up mid-semester examination should be conducted ordinarily within 15 working days from the date of conduct of the mid-semester examination.

7.6. The students who absent himself/herself for mid-semester examination in a subject on genuine reasons shall be permitted on the recommendation of the course teacher / Chairman and Head of the department concerned. Missing examination should be completed within 15 working days from the date of respective examination on payment of missing examination fee prescribed by the university.

8. ADVISORY COMMITTEE

8.1. Each Ph.D. scholar shall have an advisory committee to guide the student in carrying out his/her programme. A teacher having Ph.D with 5 years service and PG teaching is eligible for teaching and guiding Ph.D programme.

8.2. Major Adviser (Chairman)

Every student shall have a major adviser(among the recognized guides), who will be appointed as chairman by the Vice-Chancellor on the recommendation of the Head of the Department and the Dean, Faculty of Agriculture.
The approved chairman only can be the guide for the students. For external candidate, a Co-Guide from his/her parental organization will be the Co-Chairman of the Advisory Committee. A teacher should have a minimum of three years of service before retirement for allotment of doctoral candidates.
The chairman in consultation with the HOD will nominate the other three members.
In the event of the major adviser being away on other duty/leave for a period upto one year, the member of the advisory committee from the same department will officiate as the major advisor.

8.3. Members

The advisory committee for Ph.D. scholar shall comprise of a chairman and three members. One member will be from the respective department and two members will be from other related departments. In thesis topics involving more of inter-disciplinary approach, the number of advisory committee members from other disciplines may be increased by one with prior approval of the Dean. A Proposal for the formation of the advisory committee of the students shall be forwarded by the Heads of the Department to the Registrar for approval within one month from the commencement of the first semester.
External experts may be included as member in the advisory committee based on the need and expertise of the member, without any financial commitment to the university so as to improve the quality of the thesis. The external expert member proposed should meet the minimum qualification required and the proposal is to be approved by the Registrar.

8.4. Changes in advisory committee

The proposals for changes in the advisory committee is to be sent to the controller of examinations, through HOD and Dean for approval, if it is keenly felt that such changes are absolutely necessary.

8.5. Change of Guide and Topic

If a change of guide becomes necessary, the reason for such change should be indicated, which will be examined by a committee compressing of Head of the

Department, one senior faculty of the Department and Dean, to be approved by the Vice Chancellor. The research scholars will be permitted to continue to work and submit their thesis under the guidance of a retired person only up to a maximum period of six months from the date of retirement of the guide. On such occasions, the Head of the Department concerned will ascertain the progress of the scholar in consultation with the guide and find whether the scholar will be able to submit his / her thesis within six month from the date of retirement of his / her guide. If not, the Head of the Department will suggest the change of guide for the scholar in consultation with the guide (about-to- retire) through the concerned Dean. If a guide goes abroad/ within India to attend any training or on leave for more than one year, the Chairman of the Advisory Committee has to be changed immediately. The same conditions will apply to members also.

8.6. Absence of member during qualifying / final Viva-Voce examination

Under extra-ordinary circumstances if the qualifying/ final viva-voce examination to Ph.D. student has to be conducted in the absence of one or two advisory committee members, permission to conduct the examination by co-opting another member in such contingencies should be obtained from the Controller of Examinations in advance. Duties and responsibilities of the advisory committee

- Guiding students in drawing the academic plan of Ph.D programme
- Guidance throughout the programme of study of the student
- Guiding the student in selecting a topic for thesis research, and seminar
- Continuous monitoring of thesis research, and seminar and maintaining monitoring register for each student for research
- Evaluation of research and seminar credits
- Correction and finalization of thesis draft
- The members should meet together along with the student for all the above purposes and sign the appropriate documents.
- The proceedings of the Advisory committee will be sent to the HOD within 10 working days
- Periodical review of the Advisory committee proceedings will be made by the HOD

9. PROGRAMME OF STUDY

9.1. The student's plan for Ph.D work drawn up by advisory committee shall be sent to the HOD before the commencement of the mid semester examination during the first semester.

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

9.3. Programme of Research Work

The proposal for research program of the student, in the prescribed proforma and approved by the advisory committee, shall be forwarded to the HOD by the end of the first semester in which the research credits are registered for the first time or before taking up of the research work whichever is earlier.

10. EVALUATION OF STUDENT'S PERFORMANCE

All students shall abide by the rules for evaluating the course work under the semester system of education, as prescribed from time to time by the university.

10.1. Examinations

There will be two examinations viz. mid semester and final examination. Wherever the course has practical, there will be a final practical examination also.

10.2. Grading

- The duration of mid semester examination will be of one hour and final examinations in theory and practical will be conducted for three hours each.
- The mid semester examinations will be conducted by course teachers during the ninth week of the semester in common examination hall as per the scheme drawn by HOD, evaluate and send the marks obtained by the students to the Controller of Examinations through HOD within seven working days.
- There will be final theory examination separately for theory and practical which will be conducted by the University. Each final theory and practical examinations will be evaluated by two examiners (one will be the course teacher and another will be the senior faculty of the Department).

- The distribution of marks will be as indicated below:

Examination	Course with practical	Course without practical	Course without theory
Mid-semester	30	30	30
Final theory	40	70	-
Final practical	30	-	70
Total	**100**	**100**	**100**

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

Mid semester :

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	5 out of 7	(5 x 2)	10 marks
4	Essay type	2 out of 3	(2x5)	10 marks

FinalTheory:

Courses without practical (70 marks)

1.	Short notes	5 out of 7	(5 x 4)	20 marks
2	Essay type	5 out of 7	(5 x 10)	50 marks

Courses with practical (40 marks)

1.	Short notes	5 out of 7	(5 x2)	10 marks
2	Essay type	5 out of 7	(5 x 6)	30 marks

10.3. MINIMUM MARKS FOR PASS

a) The student should secure a minimum of 60 per cent marks separately in the theory and practical and an aggregate of 70% to secure a pass in the subject .

b) Each subject shall carry a maximum of 100 marks for purpose of grading. The grading will be done as grade point. i.e., the percentage of marks earned in a

subject is divided by 10. The grade point is expressed on a 10 point scale upto two decimals.

c) Students who secure marks below 70 per cent in a subject will be awarded 'F' grade and students without having the required minimum attendance of 80 per cent will not be allowed to write the final examination and they will be awarded 'E' grade. Students who secure 'F' should appear for re-examination in the subsequent semester.

d) If a student secured 'E' grade, he/she has to re-register and attend the course again during the next academic year.

10.4. MINIMUM GPA REQUIREMENT

A Ph.D student to continue his/her studies in the University, should maintain certain minimum Average Grade Point prescribed here under:

a) Earn a Grade Point of 7.00 for a pass in each subject.

b) For purpose of continuing as a student in the university, a candidate is required to earn an Overall Grade Point Average of not less than 7.50 at the end of each semester

c) A Ph.D. student may repeat the course(s) in which he/she gets a Grade point below 7.50 and above 7.0 to improve the OGPA.

10.5. RE-EXAMINATION

Re-examination is permitted only for the final theory and practical examinations. The students who secure 'F' are permitted to write the re-examinations along with juniors as and when conducted with the permission of university. The re-examination fee as prescribed by university per course is to be paid on or before the prescribed date. A student is permitted to write the final theory and practical examinations only two times during the course period of three years excluding the regular final examination. In event of a student fails to secure pass in the two re-examinations permitted, he/she has to re-register for the course along with juniors. The marks secured in mid semester examination will be retained and the student should produce the practical record during re-examination. The registration for the re-examination shall be done after mid-semester examination on the date specified by the Controller of Examinations. Each registration is considered as an attempt even if the student absents for the examination.

10.6. RETURN OF VALUED ANSWER PAPERS

The valued answer papers of mid-semester shall be shown to the students after the examination. Discrepancies if any, in awarding marks, the student can approach the teacher concerned immediately for rectification. The answer paper should be retained with the course teacher for six months and then disposed off. Evaluated final theory papers have to be retained up to six months by the Controller of Examinations after the conduct of examination and then disposed off. The same is applicable to improvement/re-examination also.

11. CREDIT SEMINAR

Seminar is compulsory for all students and each student should register and present two seminars each with 0+1 credits. A student can register only one seminar in a semester

and only after successful completion of the first seminar the student is permitted to register second seminar.

11.1. Credit Seminar

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

b) The seminar topics are to be assigned to the students by the Chairman in consultation with HOD within three weeks after commencement of the semester.

11.2. Under the guidance and supervision of the chairman of the Advisory committee, the student should prepare a seminar paper containing not less than 50 typed and printed pages with a minimum number of 75 references covering the recent 10 years time after reviewing all the available literature and present the seminar after completion of 80% attendance in the semester in the presence of the HOD, Advisory committee, staff and post-graduate students of the concerned department.

11.3. The circular on the presentation of the seminars may be sent to other departments to enable those interested to attend the same.

11.4. The Chairman will monitor the progress of the preparation of the seminar course and correct the manuscript. The student will submit 2 copies of the corrected manuscript to the HOD through chairman before presentation.

The student will incorporate the suggestions and carry out corrections made during the presentation and resubmit three fair copies to the HOD (one to Dept. library, the second to the chairman and the third for student) within 15 days after presentation.

11.5. The performance of the student in the credit seminar will be evaluated and grade point awarded by the HOD along with the Advisory committee for 100 marks. 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 to discussion and answer the questions:		20
Total :		100

12. QUALIFYING EXAMINATION

Only those students who successfully completed the qualifying examination will be admitted to candidacy of the degree. The qualifying examination consists of written and oral examination.

12.1. Minimum requirement for Qualifying Examination

The students who have completed all the courses and earned a grade point average of not less than 7.5 will be permitted to appear for the qualifying examination. Students who do not satisfy these requirements shall not be permitted to take up the qualifying examination. The qualifying examination will be conducted after the completion of course work.

12.2. Selection of Examiner

A panel of five external examiners for qualifying examinations shall be given by the Advisory committee in consultation with HOD before three months of the date of completion of the student's course work to the Controller of Examinations. One to them will be appointed as external examiner.

12.3. Written Examination

The written examination consists of two papers covering major and minor subjects only. The Controller of Examination will conduct the examination by getting the question paper from Head of Department to be prepared in consultation with the course teachers concerned. The external examiner will evaluate the answer papers during his visit to conduct the viva-voce examination.

The question paper for the written examination will be of 3 hours duration and each question (Essay type) need not be restricted to any particular topic in a course but it should be a comprehensive covering of each unit of the syllabus of each course. The written examinations will be conducted at the same time in all disciplines.

Qualifying marks for passing the examination will be 60.

12.4. Qualifying viva-voce Examination

The advisory committee shall conduct the qualifying viva-voce examination with one external member who shall be a specialist in the subject from outside the university

12.5. The Heads of departments will monitor and coordinate the conduct of the qualifying viva. The performance of the candidate will be Graded as Satisfactory / Unsatisfactory.

12.6. Communication of Results of Qualifying Examination

The chairman of the advisory committee shall act as chairman for the examination committee and shall be responsible for communicating the results of the examination to the Controller of Examination through HOD in the prescribed format.

12.7. Failure /Absence in Qualifying Examination

When a student fails or absents for the qualifying examination, he/she may apply again for permission to appear for re-examination to the Controller of Examination with the recommendation of the chairman of the advisory committee and Head of the Department. A student, who apply for re-examination should attend written examination and viva-voce. Re-examination shall not take place earlier than three months after the first examination and it will be conducted by the advisory committee as previously indicated. If a student fails in the re-examination further re-examination will be considered on the recommendation of the Advisory Committee, HOD and Dean, Faculty of Agriculture.

If the students fail in the qualifying examination, he / she is not permitted to register for further research credits.

13. THESIS RESEARCH

13.1. Selection of Topic

Once the student joined the programme, it is the responsibility of the Head of the department to organize a meeting of the students and PG teachers to make the students know about various activities of the department. The students should be

informed about the thrust areas of research of the department, research projects undertaken by the scientists in the department, research problems taken by the senior PG students, field of specialization of each scientist and infra-structural facilities available in the department so that the student will develop some preliminary knowledge about the research problems. With the guidance of the advisory committee the students should identify the tentative area of research and include it in the plan of work. The advisory committee should guide the students in selecting a specific topic in the identified area and preparing a detailed proposal. While selecting the topic for thesis research, the specialization and competency of teachers, thrust area identified by the department, external funded schemes operated in the department and also the aptitude of the student may be taken into consideration. The thesis research for the Ph.D. degree should be of the nature of a definite contribution to the subject and the results should be of sufficient importance to merit publication. The findings should have some practical utility or should lead to theoretical contribution. The thesis shall be on a topic falling within the field of the major specialization and shall be the result of the student's own work. A certificate to this effect duly endorsed by the major advisor shall accompany the thesis.

13.2. Research Proposal

The research proposal has to be presented by the student in a meeting organized by the Head of the department to get the opinion / suggestion of the scientists of the department for improving it. Three copies of the research proposal in the prescribed format should be sent to the Registrar through the Head of the department for approval before the end of the semester in which the student has registered research credits for the first time or before taking up the field / laboratory experiments whichever is earlier.

The distribution of research credit will be as follows

I Semester 0+01
II Semester 0+02
III Semester 0+12
IV Semester 0+12
V Semester 0+12
VI Semester 0+09
Total 0+48

13.3. Evaluation of Thesis Research

After assigning the research problem, for each semester the student has 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 has to be given to the student for carrying out the work during the semester.

13.3.1. Attendance register must be maintained in the department by HOD for all the students to monitor whether the student has 80% of attendance in research.

13.3.2. 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.

13.3.3. After completion of 80% attendance for research and on or before the last day of the semester, the advisory committee should evaluate the progress of research work as per the approved programme and monitoring register and award marks to secure a pass depending upon quantity and quality of work done by the student during the semester.

13.3.4. The procedure of evaluating research credits under different situations are explained hereunder.

SITUATION – I

The student has completed the research credits as per the approved programme and awarded 'Marks' by the advisory committee. Under the said situation the student can be permitted to register fresh research credits in the subsequent semester. If the student is not successful, he/she has to re-register the same block of research credits.

SITUATION – II

The student who has not secured the minimum attendance of 80 percent (i.e. absent for more than 21 working days) shall be awarded grade E. The student has to re-register the same block of research credits for which 'E' grade was awarded in the following semester with prior permission. Until the completion of reregistered credits, the student should not be allowed to register for fresh (first time) research credits.

SITUATION – III

The student could not complete the research as per the approved programme of work for reasons beyond his/her control such as,

a) Failure of crop
b) Non-incidence of pests or disease or lack of such necessary experimental conditions.
c) Non-availability of treatment materials like planting materials chemicals, etc.
d) Any other impeding / unfavourable situation for satisfying the advisory committee.

Under the said situations Grade 'EE' should be awarded.

In the mark list, it should be mentioned that 'EE' grade was awarded due to 'lack of attendance' or 'want for favourable experimental conditions'.

SITUATION – IV

When the student failed to complete the work even in the 'Second time' registration the student will be awarded EE and in the mrak list the 'second time' should be mentioned

For the registration of research credits for the third time, permission has to be obtained from the Dean based on the recommendation of the Advisory committee, and HOD. Permission for registration for the fourth time shall be given only by University based on the recommendation of the Advisory committee, HOD and Dean, Faculty of Agriculture.

14. SUBMISSION OF THESIS

The research credits registered in the last semester should be evaluated only at the time of the submission of thesis, by the advisory committee. Students can submit the

thesis at the end of the final semester. The list of enclosures to be submitted along with the thesis is furnished. If a student has completed the thesis before the closure of the final semester, the chairman can convene the advisory committee meeting and take decision on the submission of the thesis provided the student satisfies 80 per cent attendance requirement.

A minimum of one paper relevant to the topic of the thesis in each of National and International journals be published before submission of the Ph.D thesis and the copies of the same be enclosed in the thesis by all research scholars. After completing the minimum requirement period of research, the candidate will submit five copies of his / her thesis printed or typewritten, in paper back embodying the result of the research carried out by him / her, together with the submission fee as specified by the University. Three months before the submission of thesis, he / she has to submit three copies of the synopsis of the Controller of Examinations with the prescribed fee.

In case the candidate fails to submit the thesis (after submission of the synopsis) within the stipulated time, he / she has to resubmit the synopsis with a condonation fee as specified. Every candidate should also submit with the thesis a certificate from the guide / co-guide and the advisory committee members under whom the candidate worked, specifying that the thesis submitted is a record of research work done by the candidate during the period of study under him / her, and that the thesis has not previously formed the basis for the award of any Degree, Diploma, Associate ship, fellowship or similar title. A statement from the guide indicating the extent to which the thesis represents independent work on the part of the candidate should also be made. A candidate shall also attach to his / her thesis, in support of the quality of his / her research work, printed copies of any contributions he / she might have published in journals / periodicals along with names of such journals and periodicals.

After incorporating the suggestions of the examiners and those received at the time of viva-voce, four hard bound copies of the thesis and two copies in CDs should be submitted to the university. However, fellowship holder has to submit additional hard bound copy as per requirement.

15. VALUATION OF THE THESIS

The thesis submitted in partial fulfillment of the Ph.D. degree shall be evaluated by two external experts one from within the country and the other from outside the country appointed by the Vice-Chancellor on the recommendation of the Chairman of the Advisory committee, HOD and Dean. They shall be chosen from a panel of at least five names of specialists separately for within the country and outside the country in the particular field, suggested by the chairman. The external experts shall send their evaluation reports on the thesis directly to the Controller of examination along with the copy of the thesis evaluated. The controller of examinations on receipt of the reports from the two examiners will send them to the concerned guide who is the convener of viva-voce board. The guide will send the consolidated report with his remarks to the controller of examinations through the Head of the Department. On the satisfactory reports of the evaluation, viva-voce examination will be arranged.

After a student's thesis for Ph.D. degree is evaluated as indicated above, the thesis shall be finally accepted for the award only after the student satisfactorily completes a

final viva-voce examination. The Viva-Voce board comprises the student's advisory committee with the addition of the external examiner who valued the thesis, and the HOD. If the HOD happens to be the guide, the Dean Faculty of Agriculture will nominate a senior member of the staff of the concerned Department as a member. In case of external candidates, the co-guide will also serve as a member of the viva-voce board. The candidate is expected to defend the thesis at the viva-voce examination. The degree shall be awarded on the unanimous recommendation of the examining committee as satisfactory in regard to the thesis itself and the performance of the student in the final oral examination. The recommendation of the committee shall be forwarded to the controller of examinations by the chairman through HOD and Dean which shall be signed by all members of the committee and the external examiner.

15.2. Revision and Resubmission of Thesis

i. If an examiner recommended change / further work, the thesis will be referred to the same examiner after compliance for his opinion. In case of rejection by any one of the examiners, the thesis will be sent to another examiner and his / her recommendation will be final.

ii. If the thesis is recommended to be revised by one or both examiners the points of revision will be indicated clearly in the report. The necessary correction should be carried out, and the revised version should be sent to the concerned examiner(s). If the examiner(s) is / are still not satisfied with the revised version, the thesis will be rejected. If the thesis is accepted by the examiners (Evaluation), Viva–Voce examination will be conducted by the viva-voce board.

iii. A candidate who is not successful (unsatisfactory) at the viva –voce examination will be permitted to undergo the viva voce examination again within a period of three months.

15.3. Grace Period

Students can avail of a grace period of upto three months for submission of thesis after the closure of final semester by paying necessary fine. For grace period upto one month and for period upto three months a fine as specified has to be paid separately. If a student is not able to submit the thesis within three months of grace period, the student has to re-register for the credits in the forthcoming semester. The student who re-registers the credits after availing of the grace period will not be permitted to avail of grace period for the second time. The Heads of the Department can sanction the grace period based on the recommendation of advisory committee and a copy of the permission letter along with the receipt for payment of fine should accompany the thesis while submission.

15.4. Re-registration and Submission of Thesis

The minimum of 80% attendance requirement for submitting the thesis after re-registration need not be insisted for those students who have fulfilled the minimum academic and residential requirement of 3 years (6 semesters) and completed the credit requirements with 80% attendance.

15.5. Extension of Time

a. The minimum residential requirement for Ph.D degree shall be three academic years (six semesters) within a maximum period of five academic years (10 semesters) from the date of admission.

b. Scholars who do not submit the thesis within the stipulated period of five years should apply for extension of time three months before the completion of five years. Extension of time and the fees to be paid will be considered by the Deans Committee, if the extension is duly recommended by the Advisory committee, Head of the department, and the Dean of the Faculty, such candidates will be eligible for extension of time for a maximum period of three years.

c. The scholar will have to enroll as fresh candidates if he/she fails to submit the thesis within the maximum extension period of three years when granted.

d. If a scholar requires a few more months after the expiry of the maximum extension period of three years for the submission of the thesis as per the evaluation of the Advisory committee, duly recommended by the Head of the Department and the Dean of the Faculty, as an exceptional case the Deans committee may consider for re-registration to enable the scholar to submit the thesis. In any case the time granted shall not exceed six/ twelve months.

15.6. Number of Chances

A candidate will not be permitted to submit a thesis for the degree on more than two occasions. However, it will be open to the syndicate, if the Board of Examiners so recommend, to permit the candidate to submit a thesis on a third occasion. Also, he will not be permitted to appear for the viva-voce examination on more than two occasions.

16. DISCONTINUANCE AND READMISSION

16.1. Students admitted to any of the PhD degree, discontinue their studies before completing the degree with written permission from the University may be re-admitted to the degree programme, provided that the student should have completed the course work before such discontinuance. However the period of such discontinuance should not exceed five years for Ph.D. Degree.

16.2. After completion of course work and qualifying examination a student is eligible to discontinue temporarily his research program only once within 5 years for PhD program. If the discontinuation period exceeds two semesters the student has to forego the research credits already registered and register afresh with revised program. In the case of field experiments or laboratory experiments in which continuity is essential for research and if a student temporarily discontinues in the middle without completing the experiments, then the entire experiment should be repeated even if the discontinuation period does not exceed two semesters.

16.3. A student joining the studies, after discontinuation should pay the fees of the existing semester.

17. PUBLICATION OF THE THESIS

The thesis, whether approved or not, should not be published in full or abridged form without the permission of the Syndicate, which may grant permission for the publication under such conditions as it may impose.

18. The Heads of the Departments should monitor the progress of the students. He has to arrange for a common meeting of the chairman and students of his department once in a semester. Each department should maintain a list of theses produced so far with the abstract of the same.

DEPARTMENT OF AGRICULTURAL ECONOMICS
Ph.D. AGRICULTURAL ECONOMICS (BY COURSE WORK)
(FULL TIME / PART TIME / EXTERNAL) (2010-2011)
Distribution of Courses

Course No.	Course Title	Credit Hours
Major Courses		
AEC 811	Micro and Macro Economic Analysis	2+1
AEC 812	Applied Econometrics	2+1
AEC 813	Agrl. Development and Policy Analysis	2+0
AEC 821	Advanced Production Economics	2+1
AEC 822	Advanced Agrl. Marketing and Price Analysis	2+1
	Sub Total	**10+4**
Minor Courses		
AEC 814	Natural Resource and Environmental Economics	2+1
AEC 823	International Trade and Intellectual Property Management	2+1
	Sub Total	**4+2**
Supportive Course		
COM 811	Advances in Computer Applications	1+1
STA 821	Advanced Statistical Methods for Social Sciences	2+1
	Sub Total	**3+2**
AEC 012	Seminar	0+1
AEC 022	Seminar	0+1
	Sub Total	**0+2**
AEC 011	Research	0+1
AEC 021	Research	0+2
AEC 031	Research	0+12
AEC 041	Research	0+12
AEC 051	Research	0+12
AEC 061	Research	0+9
	Sub Total	**0+48**
	Grand Total	**17+58=75**

Semester Wise Distribution

Semester – I		
Major		**Credit Hours**
AEC 811	Micro and Macro Economic Analysis	2+1
AEC 812	Applied Econometrics	2+1
AEC 813	Agrl. Development and Policy Analysis	2+0
Minor		
AEC 814	Natural Resource and Environmental Economics	2+1
COM 811	Advances in Computer Applications	1+1
AEC 012	Seminar	0+1
AEC 011	Research	0+1
	Sub Total	**9+6**
Semester – II		
Major		
AEC 821	Advanced Production Economics	2+1
AEC 822	Advanced Agrl. Marketing and Price Analysis	2+1
Minor		
AEC 823	International Trade and Intellectual Property Management	2+1
STA 821	Advanced Statistical Methods for Social Sciences	2+1
AEC 022	Seminar	0+1
AEC 021	Research	0+2
	Sub Total	**8+7**
Semester – III		
AEC 031	Research	0+12
Semester – IV		
AEC 041	Research	0+12
Semester – V		
AEC 051	Research	0+12
Semester – VI		
AEC 061	Research	0+9
	Grand Total	**17+58=75**

AEC 811: MICRO AND MACRO ECONOMICS ANALYSIS (2+1)

Objective

- To introduce the concepts of micro and macro economics to the students
- To teach their applications in agriculture

Theory

Unit-1 Micro Economics – Concepts

Theory of consumer behavior – composite of commodity theorem – expenditure function and indirect utility function – duality in consumer theory – recent developments in the theory of demand – dynamic versions of demand functions – elasticity – demand price – supply price elasticties – theory of firm- technological progress and production functions – joint products – duality theory.

Unit-II: Market Structure and Price Determination

Oligopoly and duopoly, the cournot solution, chamberlin model, stackleberg solution, theory of bilateral monopoly, monopsony, Duopsony and oligopsony – market failure – incomplete markets – asymmetric information – transaction cost economics – general equilibrium with production and consumption, market equilibrium – existence, uniqueness, stability the market equilibrium dynamic equilibrium, lagged adjustment. General competitive equilibrium – definitions, fixed point theorem, existence, uniqueness and stability of general competitive equilibrium.

Unit-III Welfare Economics

Welfare economics – concepts, problems – approaches and limitations of welfare economics, pareto conditions of maximum welfare – social welfare functions – social verus private costs and benefits – applications of theory of welfare economics in structuring taxes, prices, investment employment, international trade, optimal pricing – human development index.

Unit IV: Macro Economics – Concepts

Introduction to dynamic macro – economic models – inflation and unemployment. The supply side tax effects – theory and application and rational expectation – business cycle and its alterative equilibrium model – stability analysis – fiscal policy as an instrument of development –incidence of tax and fiscal policies.

Unit V: Public Finance and Macro Economic Policy

Public – internal and external aid – deficit financing. Developing financing the international general equilibrium system – impediments to global efficiency – international macro economic policies.

International institutions – IMF _ IBRD _ WTO.

Practical

Theory of consumer behavior – discussion and exercise 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 economics rent – pareto optimality concept – models on partial and general equilibrium.

Theory lecture schedule

1. Theory of consumer behavior – composite of commodity theorem – expenditure function and indirect utility function
2. Duality in consumer theory, recent developments in the theory of demand
3. Dynamic version of demand functions – elasticity – demand price – supply price elasticies.
4. Theory of firm – technological progress and production functions – joint products – duality theory
5. Theory of firm – technological progress and production functions – joint products – duality theory.
6. Oligopoly and duopoly
7. The court solution, chamberlin model, stackleberg solution
8. Theory of bilateral monopoly, monopsony, duopsony and oligopsony
9. Market failure – incomplete markets – asymmetric information – transaction cost economics
10. General equilibrium theory – conditions and concepts, general equilibrium with production and consumption.
11. Market equilibrium – existence, uniqueness, stability of the market equilibrium, dynamic equilibrium, lagged adjustment
12. General competitive equilibrium – definitions, fixed point theorem, Existence, Uniqueness and stability of general competitive equilibrium
13. General competitive equilibrium - definitions, fixed point theorem, existence, Uniqueness and stability of general competitive equilibrium.
14. General competitive equilibrium - definitions, fixed point theorem, existence, Uniqueness and stability of general competitive equilibrium.
15. Social versus private costs and benefits

16. Applications of theory of welfare economics in structuring taxes, prices, investment, employment, international trade, optimal pricing.
17. Mid semester examination
18. Introduction to dynamic macro economic model
19. Introduction to dynamic macro economic model
20. Inflation, theories of inflation – stagflation
21. Unemployment, policy issues
22. Fiscal policy as an instrument of taxation
23. Supply side of tax effects
24. Theory and application and rational expectation
25. Internal and external aid
26. Deficit financing
27. Development financing
28. Internal genera equilibrium system
29. Interaction of macro economic and fiscal policies
30. Review of past macroeconomic policies, recent changes and implications
31. Role of WTO in emerging macroeconomic policies
32. IMF, IBRD
33. International macro economic policies

Practical schedule

1. Theory of consumer behavior
2. Demand analysis – elasticity of demand – demand functions
3. Equilibrium price analysis
4. Production function analysis
5. Analysis of short run and long run costs
6. Price determination under imperfect market situation
7. Cost function
8. Economics of size and scale
9. Exercise on monopolistic competition and price discrimination
10. Factor pricing analysis
11. Income distribution analysis
12. Partial and general equilibrium theory
13. Pareto optimality criterion

14. Inflation and unemployment
15. Tax and fiscal policy
16. Business cycle
17. Review of past macro economic polices, recent changes and implication

References

1. Gergory Mankiw. N., 2007, *Principles of Economics*, Sanat printers, Kundli, Hariyana.
2. Hal R. Varian., 1992, *Micro economic Analysis*, W.W. Norton and Company, New York.
3. Richard T. Frogen, 1999, *Macroeconomic Theory and Policies*, prentice Hall International Inc., New Jersey.
4. Koustyiannis, A., 2003, *Modern Microeconomics*, London: The MacMillan Press Ltd.,
5. Branson, W.H., 2004, *Macro Economic Theory and Policy*, London Honper and Row Publications.

AEC 812: APPLIED ECONOMETRICS

Objective:

- To teach the students the basic concepts of econometrics
- To explain various econometric methods that are applicable in agri. research

Theory

Unit –I: Basic Econometrics

Review of classical regression model- generalized least squares – maximum likelihood method – function form.

Unit –II: problems in estimation

Non-linearity and specification text –biased estimators and pre test estimators – data problems

Unit- III: Econometrics Model

Qualitative and truncated dependent variables – limited dependent variables and sample selectivity models – switching regression models.

Unit –IV: simultaneous equation methods

Errors in variables and non normal errors –simultaneous equation methods – endogentiy testing covariance analysis

Unit –V:Time Series Analysis

Pooling of time series and cross selection – variance components model – seemingly unrelated regression model – autoregressive and distributed lag models – varying parameter models –Bayesian method in Econometrics

Practical

Estimation of multiple regression model – GLS estimation methods – estimation in the presence of multicollinearity , heteroscedasticity and autocorrelation – testing misspecification errors –estimation of LPM, logit, Probit and Tobit models – comparing two regressions – chow test – estimation of distributed lag models –estimation of simultaneous equation models – method of indirect least squares – method of 2 SLS – estimation of SURE model –estimation of variance components models –estimation of switching regression , adoptive regression , stochastically convergent parameter and pure random , co efficient models –computer packages used in econometrics – estimation of econometrics equation using pc.

Theory Lecture schedule

1. Review of classical regression model
2. Generalized least square
3. Maximum likelihood method
4. ML functional form
5. Non –linearity and specification test
6. Biased estimators and pretest estimators
7. Data problems –qualitative and truncated dependent variables –I
8. Data problems –qualitative and truncated dependent variables –II
9. Limited dependent variables and samples selectively models
10. Switching regression models -I
11. Switching regression models -II
12. **Errors** in variables and non normal errors
13. Simultaneous equation models –I
14. Simultaneous equation models -II
15. Simultaneous equation models -III
16. Endogenity testing
17. **Mid –semester examination**
18. Covariance analysis
19. Pooling of time series and cross section data -I
20. Pooling of time series and cross section data -II
21. Variance components model
22. Seemingly unrelated regression model – I
23. Seemingly unrelated regression model – II
24. Autoregressive models –I
25. Autoregressive models –II
26. Distributed lad models –I
27. Distributed lad models –II
28. Varying parameters models
29. Varying parameters models
30. Bayesian method in econometrics –I

31. Bayesian method in econometrics –II
32. Bayesian method in econometrics –III
33. Bayesian method in econometrics –IV
34. Discussion

Practical schedule

1. Estimation of multiple regression model
2. GLS estimation methods
3. Estimation in the presence of multicollinearity , heteroscedasticity and autocorrelation
4. Testing misspecification errors –
5. Estimation of LPM,
6. Logit, Probit and Tobit models
7. Comparing two regressions – chow test
8. Estimation of distributed lag models
9. Estimation of simultaneous equation models
10. Method of indirect least squares – method of 2 SLS
11. Estimation of SURE model
12. Estimation of variance components models
13. Estimation of switching regression
14. Adoptive regression
15. Stochastically convergent parameter and pure random , co efficient models
16. Computer packages used in econometrics –
17. Estimation of econometrics equation using pc.

References

1. Damodar N. Gujarati., 2005, *Basic Econometrics*, Tata McGraw hill book Company, New York.
2. Koustsoyiannis, A., 1994, *Theory of Econometrics*, Macmillan, London .
3. Pinyck , R.S., and D.L., Rubinfeld , 1990, *Econometrics Models and Econometrics Forecasts,* McGraw hill book, New York.
4. Sancheti , D.C., V.K. Kapoor , and L. Metha, 1998*, Quantitative methods*, Sultan Chand & sons ,New Delhi.
5. Maddala G.S.,1990*, Econometrics* New York: McGraw hill book Co.

AEC 813 AGRL. DEVELOPMENT AND POLICY ANALYSIS (2+0)

Objective

- To impart an indepth knowledge and analytical thinking and various development in agriculture
- To understand recent trends in agriculture related policy analysis

Theory

Unit-I: Theories of Growth

Policy framework - goals, values and beliefs - welfare maximization - characteristics of under development - theories of growth and Agrl. Development.

Unit-II: Agriculture Policy

Sector allocation policies – economic and Agrl. Situation during plan periods and policy implications – policies related to major Agrl. Commodities – policies on resource development conservation and exploitation – energy needs for Agrl. / rural development - subsidies to expand farm output and income distribution – labour, labour mobility, social status and Agrl. Wage policy – infrastructural support for agriculture – transport, storage and markets.

Unit-III: Policy Modeling

Price, trade and international assistance – technology – research, education and extension needs – Agrl. Taxation – trade – off between Agrl. Development and environmental quality – policy modeling for Agrl. Support – concepts o growth and development – structural transformation.

Unit-IV: Theories of Growth and Development

Introduction to theories of growth – Harrod – Domar model – Solow model – Cass – Yarn model – Cambridge school of thought – Tobin – Modigilaini model – Ranners – Fei model and Schultz model – Introduction to theories of development – Classical and conservation theories – Rostow theory – Marx theory – Schumpeter theory – urban industrial model and lead sector.

Unit-V: Growth Model

Induced innovation model – high – pay off inputs model and multi sector Mahalanobis – economics growth and international trade – growth – sources of growth and trade and welfare related growth – international factor movements – international trade and developing countries –

international institutions on trade and concepts of instability – trade cycle and Neo – classical model.

Theory Lecture Schedule

1. Policy framework – goals, values and beliefs
2. Welfare maximization
3. Characteristics of under development
4. Theories of growth and Agrl. Development
5. Sectoral allocation policies
6. Economic and Agrl. Situation during plan periods and policy implications
7. Policies related to major Agrl. Commodities
8. Policies on resource development conservation and exploitation
9. Energy needs for Agrl. / rural development
10. Subsidies to expand farm output and income distribution
11. Labour, labour mobility, social status and Agrl. Wage policy
12. Infrastructural support for agriculture – transport, storage and markets
13. Price, trade and international assistance
14. Technology – research, education and extension needs
15. Agrl. Taxation
16. Trade – off between Agrl. Development and environmental quality
17. **Mid Semester Examination**
18. Policy modeling for Agrl. Support
19. Concepts of growth and development
20. Structural transformation
21. Introduction to theories of growth
22. Harrod Domar model, Solow model, and Cass and Yarn model
23. Cambridge school of thought, Torbin – Modigilaini model, Ranners and Fei model and Schultz model
24. Introduction to theories of development
25. Classical and conservation theories
26. Rostow theory, Marx theory and Schumpeter theory
27. Urban industrial model and lead sector - induced innovation model

28. High – pay off input model and Multi sector Mahalanobis model
29. Economic growth and international trade
30. Growth – sources of growth and Trade and welfare related growth
31. International factor movements and foreign investment
32. International trade and developing countries
33. International institutions on trade and concepts of instability
34. Trade cycle and Neo – classical model

References

1. M. Maria John Kennady, 1997, "*Advanced Microeconomic Theory*" Himalaya Publishing House, New Delhi.
2. Jhingan, M.L, 2008, "*The Economics of Development and Planning*", Konark Publication, New Delhi.
3. Chakaravarthi, R.M, 1996, "*Under Development and Choices in Agriculture*", Heritage Publishers, New Delhi.
4. M.L Jhingan, 2006, "*Advanced Economic Theory*" Konark Publication, New Delhi.
5. Dennis R. Appleyaerd and Alfred J. Field. J.R, 1995, "*International Economics: Trade theory and Policy*" IRWIN Publication, Chicago.

AEC 814 Natural Resource and Environmental Economics (2+1)

Objective

- To teach the students about optimal utilization of natural resources
- To explain methods of assessment of environment impact
- To formulate policies and strategies for environment protection

Theory

Unit–1: Natural Resources – Concepts

Natural resources – definition – characteristics – problems of fixed supply and scarcity – factors influencing use of natural resources – ownership and control special problems of common property management – optimization of natural resource use.

Unit–2: Conservation, Exploration and Optimal Utilization of Natural Resources

Objectives of social welfare – equity and efficiency methods of resource management – conservation, discovery and rejuvenation dynamics of resource use planning for economic growth and sustainability – technology for resource mapping and resource development (qualitative improvement) – policy support – institutions programmes and incentives.

Unit–3: Economics of resource use and planning

Economic growth and its impact on natural resource use – conflict between exploitation and ecological balance – problems of over exploitation dynamic optimization of resource use – contribution of technology for ecological protection concept of sustainability – strategies for prospective resource use planning.

Unit–4: Environmental Economics – concepts

Concept of externalities – public good and internalization of externalities to maximize social welfare – environmental degradation problems of deforestation, soil erosion, fall in productivity , pollution and their effects down stream (transboundry) such as floods, drought, scarcity of fuel and loss of employment potentials to unskilled workers and rural women need to protect environmental qualities.

Unit –5: Role of Government and other Institutions in Environmental Management

Institutions, incentives and policies to support environmental management – need for building awareness motivation and collective social action to plan and implement strategies for environmental management – concept of social benefit social cost and socially optimal decision – use of benefit – cost ratio – a review of programmes and polices.

Practical

Assessment of India's natural resource situation forecasting future natural resources Time series analysis on natural resources interpretation at global and national level – identifying resource problems assessment of land, water and forest degradation through visit to case areas-marginal analysis of Agrl production – analysis of space and market with illustration Public and Private investments-Review of mathematical models and simulation models in analyzing natural resource problems – treating problems of open access resource in India – programming natural resource management – externalities – public good and internalization of externalities to maximize social welfare case studies on environmental degradation problems-institutions incentives and policies to support environmental management evaluation of cost and benefits at individual level – social cost benefit analysis and socially optimal decision.

Theory Lecture Schedule

1. Natural resource –definition – characteristics
2. Problems of fixed supply and scarcity
3. Factors influencing use of natural resources
4. Ownership and control mechanisms
5. Optimization of natural resource use
6. Objectives of social welfare
7. Measures of equity and efficiency
8. Methods of resource management
9. Conservation, discovery and rejuvenation
10. Dynamics of resource use planning
11. Resource use planning for economic growth
12. Planning for sustainability
13. Technology for resource mapping
14. Economic growth and its impact on land
15. Impact on water & fisheries resources
16. Impact on human resources
17. Mid semester examination
18. Exploitation and ecological balances
19. Problems of over exploitation of water resources

20. Problems of over exploitation of fishery resources
21. Dynamic optimization of resource use
22. Contribution of technology for ecological protection
23. Concept of sustainability
24. Strategies for prospective resource use planning
25. Concept of externalities
26. Public good and internalization of externalities to maximize social welfare
27. Environmental degradation problems
28. Need to protect environmental qualities
29. Institutions, incentives and policies to support environmental management
30. Need for building awareness, motivation and collective social action to plan and implement
31. Strategies for environmental management
32. Concept of social benefit , social cost and socially optimal decision
33. Use of benefit cost ratio
34. A review of programmes and policies

Practical Schedule

1. Assessment of India's natural resource situation
2. Forecasting future natural resources
3. Time series analysis on natural resources
4. Interpretation at global and national level
5. Identifying resource problems
6. Assessment of land , water and forest degradation through visit to case areas
7. Marginal analysis of Agrl .production
8. Analysis of space and market with illustration
9. Public and private investments
10. Review of mathematical models and simulation models in analyzing natural resource problems
11. Treating problems of open access resources in India
12. Programming natural resource management
13. Externalities – public good and internalization of externalities to maximize social welfare

14. Case studies on environmental degradation problems
15. Institutions , incentives and policies to support environmental management
16. Evaluation of cost and benefits at individual level
17. Social cost – benefits analysis and socially optimal decision

Reference

1. Padmaja Mishrs., 2006 , Natural Resources economic development , Deep & Deep publications , New Delhi.
2. Kumar Ratnesh., 2006 , environmental economics theory and practices , Deep & Deep publications , New Delhi.
3. Jiwitesh Kumar Singh , Debendra kumar das, 2006 , environmental economic development , Deep & Deep publications , New Delhi.
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5. Mahajan ,V.S., Environment protection: challenges and issues , , Deep & Deep publications , New Delhi.

AEC: 821 ADVANCED PRODUCTION ECONOMICS (2+1)

Objective

- To provide applied and practical understanding of production economics
- To explain farm management techniques with emphasis on its economic analysis

Theory

Unit I: Production economics – Basic concepts

Technical aspects of production and productivity functions – optimum resource allocation – homogeneous production functions

Unit II: Factor demand functions

Geometric interpretation of concavity quasi- concavity- discussion on functional forms and empherical studies- demand functions.

Unit III; Cost and Profit Functions

Comparative statics of profit maximization – cost functions – revenue functions product supply functions – comparative statics and symmetry multi product production.

Unit IV: Factor Share and Productivity Analysis

Economic efficiency – Estimation methods – factor shares – Total factor productivity analysis – optimal control theory.

Unit V: Risk Management

Decision theory – expected utility hypothesis – estimation of risk preferences – estimation of price, production and income variably- estimation of econometric and programming models to quantity risk and uncertainty.

Practical

Production function analysis with perfect and imperfect knowledge, estimation of production function with farm and experimental data, optimum input use estimation- optimal control Theory – model estimation, production and income variability, estimation of utility functions, Total factor products – model estimation. Functions with stochastic dominance, second degree stochastic dominance. Distribution of risk, estimation of risk preference, risk programming models – MOTAD, quadratic programming, simulation models.

Theory Lecture Schedule

1. Technical aspects of production and productivity functions
2. Optimum resource allocation

3. Homogeneous production functions
4. Geometric interpretation of concavity and quasi – concavity
5. Discussion on functional forms and empherical studies – I
6. Discussion on functional forms and empherical studies – II
7. Discussion on functional forms and empherical studies – III
8. Factor demand functions
9. Comparative statics of profit maximization
10. Cost functions
11. Revenue functions
12. Product supply functions
13. Comparative statics
14. Symmetry in multi product production
15. Economic efficiency
16. Estimation methods of economic efficiency
17. Mid – semester examination
18. Factor shares
19. Total factor productivity analysis
20. Optimal control theory
21. Decision theory – I
22. Decision theory – II
23. Decision theory – III
24. Expected utility hypothesis
25. Estimation of risk preferences
26. Estimation of price variability
27. Estimation of production variability
28. Estimation of income variability
29. Estimation of econometric models to quantify risk and uncertainty – I
30. Estimation of econometric models to quantify risk and uncertainty – II
31. Discussion on programming models in risk and uncertainty - I
32. Discussion on programming models in risk and uncertainty – II
33. Case study

34. Discussion on CAP

Practical schedule

1. Production function analysis with perfect and imperfect knowledge
2. Estimation of production functions with farm and experimental data – I
3. Estimation of production functions with farm and experimental data – II
4. Estimation of production functions with farm and experimental data – III
5. Optimum input use estimation – optimal control theory – model estimation
6. Production and income variability
7. Estimation of utility functions
8. Total factor products – model estimation
9. Functions with stochastic dominance
10. Second degree stochastic dominance
11. Distribution of risk
12. Estimation of risk preference
13. Risk programming models
14. MOTAD
15. Quadratic programming
16. Simulation models

References

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2. 2.Panad S. C., 2007, Farm Management and Agrl. Marketing, Kalyani Publishers, New Delhi.
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4. Chambers, Robert G., 1988, Applied production Analysis, Cambridge; Cambridge University Press.
5. Raju V.T., Vishnu Shankar Rao D., 1996, Economics of Farm Production and Management, Oxford and IBH Publishing Co Pvt Ltd., New Delhi.

AEC 822: ADVANCED AGRL. MARKETING AND PRICE ANALYSIS

Objective

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

Theory

Unit-1: Agri. Marketing – Concepts

Micro - economic theory and the industrial organization theory in agrl. marketing - the S. C.P- Paradigm

Unit—II: Market Structure Analysis

Analysis of market structure market behavioural analysis advances in market performance measurements

Unit-Ill: Market Integration

Market vertical integration and Vertical coordination mechanisms - incomplete and interlinked markets

Unit-IV: Consumer Behaviour Analysis

Consumer behavioural analyses and models - market failures frame work an measures of recuperation - Role of prices in the economy - spatial equilibrium - cob web model - price indices

Unit-V: Time Series Analysis

Time series analysis - price forecasting price support and input subsidies - Agri, supply response - supply response models.

Practical

Exercises on Performance measurements - identification of market structural variables - market behavioural variables performance measures application - vertical coordination mechanisms - estimation of cobweb models - time series analysis - ARMA - ARIMA distributed lag models - estimation of effect of input subsidy on national economy - commodity models.

Theory Lecture Schedule

1. Micro-economic theory and the industrial organization theory in agri. marketing-I
2. Micro-economic theory and the industrial organization theory in agri.marketing II

3. S.C.P. Paradigm
4. Analysis of market structure
5. Market behavioural analysis
6. Advances in market performance measurements
7. Market horizontal integration
8. Market vertical integration
9. Vertical coordination mechanisms
10. Incomplete and interlinked markets
11. Consumer behavioural analyses and models
12. Market failures frame work
13. Market failure - measures of recuperation
14. Role of prices in the economy
15. Spatial equilibrium
16. Cob web model 1
17. Mid-semester examination
18. Price indices
19. Time series analysis I
20. Time series analysis II
21. Time series analysis III
22. Price forecasting – I
23. Price forecasting II
24. Price support policies I
25. Price support policies – II
26. Input subsidies
27. Effect of input subsidies and its removal on the national economy
28. Agri, supply response - in food grains
29. Agri, supply response - in non food grains
30. Supply response models
31. Commodity marketing systems
32. Future markets in agriculture
33. Effect of new economic policies on Agrl., export market

34. Discussion

Practical Schedule

1. Exercises on performance measurements
2. Identification of market structural variables
3. Identification of market behavioural variables
4. Performance measures application
5. Vertical coordination mechanisms
6. Estimation of cobweb models – I
7. Estimation of Cobweb models – II
8. Time series analysis ARMA
9. Time series analysis – ARIMA
10. Estimation of demand forecasting
11. Estimation of supply forecasting
12. Distributed lag models
13. Estimation of supply response models
14. Estimation of effect of input subsidy on national economy
15. Estimation of commodity models – I
16. Estimation of commodity models – II Discussion

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AEC 823: INTERNATIONAL TRADE AND INTELLECTUAL PROPERTY MANAGEMENT (2+1)

Objective

- To inculcate the students a thorough knowledge on various aspects of international trade and intellectual property rights
- To prepare them to meet the challenges of agrl. sector in the present WTO regime

Theory

Unit-I: International Trade – Concepts

Basic concepts – Classical trade theory – introduction to neo-classical trade theory – supply side analysis – opportunity cost: trade under increasing opportunity costs – factor endowments; trade and factor prices – Factor price equalization – demand side analysis; community indifference curves – demand and international trade – integration of demand and supply – offer curve analysis – general equilibrium – equilibrium in product and factor markets.

Unit-II: Theories in International Trade

Application of trade theory – terms of trade – supply and demand shifts – technological change – factor supplies and trade; factor intensities, transport costs, location – trade with many goods and countries; Leontief paradox; human skills; technological gaps - product cycle – scale economies. Trade policies – instruments, impacts of trade policies – economic integration and regional groupings – introduction to international finance – balance of trade and balance of payments – foreign exchange market – transactions, determination of foreign exchange rates.

Unit-III: International Trade Organizations

International economic organizations – IMF, World Bank, IDA, IFC, ADB – their role in international trade and terms of trade – international trade agreements Uruguay round – GATT, WTO – their role in promotion of trade – Agrl. Export and Import Policies of India – role of State Trading Corporation (STO) – export promotion organizations – Export Promotion Zones (EPZ) – Agrl. Export Zones (AEZ) – EXIM bank.

Unit-IV: Intellectual Property Rights – Meaning and Concepts

Introduction to IPR – benefits of IPR – environmental implications of IPR – status of India's IPR registration – TRIPS – WIPO – laws and acts related to IPR – Indian patent act – trademark act – geographical indications of goods act – designs act – international intellectual property law – registration of plant varieties and essentially derived variety – license – tribunal -

patent office – role of department of industrial policy and promotion – protection of plant varieties and farmers rights act.

Unit-V: IPR in Agriculture

IPR in Agriculture - patents and copyrights – patents – patent system in India – designs – copyrights – trademark – geographical indications – India's plant variety bill – patent disputes – complete specification – bio piracy – patenting of microbiological inventions – bio safety protocol – economic implications of genetically modified organisms.

Theory Lecture Schedule

1. Basic concepts, classical trade theory
2. Introduction to neo-classical trade theory
3. Supply side analysis
4. Opportunity cost: trade under increasing opportunity costs
5. Factor endowments; trade and factor prices
6. Factor price equalization
7. Demand side analysis; community indifference curves
8. Integration of demand and supply
9. Offer curve analysis – general equilibrium
10. Equilibrium in product and factor markets
11. Application of trade theory
12. Terms of trade – supply and demand shifts
13. Technological change – factor supplies and trade; factor intensities; transport costs, location
14. Trade with many goods and countries; Leontief paradox, human skills; technological gaps
15. Product cycle – scale economies. Trade policies - instruments, impacts of trade policies – economic integration and regional groupings
16. Introduction to international finance, balance of trade and balance of payments
17. Mid semester examination
18. Foreign exchange market – transactions, determination of foreign exchange rates
19. International economic organizations – IMF, World Bank, IDA, IFC, ADB – their role in international trade and terms of trade

20. International trade agreements Uruguay round – GATT, WTO – their role in promotion of trade.
21. Agrl. export and import policies of India - role of State Trading Corporation (STO) – Export promotion organizations.
22. Export Promotion Zones (EPZ) – Agrl. Export Zones (AEZ) – EXIM bank
23. Introduction to IPR – benefits of IPR – environmental implications of IPR
24. Status of India's IPR registration – TRIPS - WIPO
25. Laws and acts related to IPR – Indian patent act – trademark act – geographical indications of goods act – designs act
26. International intellectual property law – registration of plant varieties and essentially derived variety – license – tribunal
27. Patent office – role of department of industrial policy and promotion – protection of plant varieties and farmers rights act
28. IPR in Agriculture
29. Patents and copyrights – designs – copyrights – trademark – geographical indications
30. Patent system in India – patent disputes
31. India's plant variety bill
32. Complete specification
33. Bio piracy – bio safety protocol
34. Patenting of microbiological inventions – genetically modified organisms

Practical Schedule

1. Assessing the performance and export marketing strategies for fruits and vegetables, cut flowers, tea, coffee and medicinal and aromatic plants
2. Market composition of commodity export – major destination and export instability
3. Export competitiveness – prices and non-price factors
4. Import restraint and their impact on export
5. Visiting a manufacturing center and observe production, packaging, quality control, labelling, method of pricing etc.
6. Visiting a export house and learn the procedures for export
7. Visiting customs house and observe the method of getting custom clearance
8. Visiting an export production council and the activities carried out by them etc.

9. Visiting APEDA
10. Visiting horticultural development board
11. Procedures for applying the patent application
12. Complete specification and document preparation
13. Preparation and filing of patent application
14. Getting a patent in foreign countries
15. Case studies on basmati rice
16. Case studies on Bt cotton and others
17. Case studies on Darjeeling tea, Kondapalli toys, etc.,

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COM 811 – ADVANCES IN COMPUTER APPLICATIONS (1+1)

Objectives

- To understand the concepts of computer and their peripheral, to get knowledge in office like MS Word and MS Excel.
- To make them acquire sound knowledge in various Agricultural statistical software ;and their analysis.
- To improve knowledge to get exposed to the current trends in Internet and their usage.

Theory

Unit I: Data Processing

Introduction to MS Office – MS Word and MS Access – Data analysis using MS Word and MS Access – Introduction to various statistical packages – Preparation of data for computer analysis – data feeding.

Unit II: Data Analysis through MS Excel

Computer programme for Agrl. Science – Applied analyses – EXCEL – Measures of central tendency – mean, median, mode – measures of dispersion – standard deviation, variance – correlation – inferential tests for difference of mean – Z test inferential parametric test for significance – F-test, t-test, ANOVA, regression – inferential non parametric tests for significance – chi-square, Mann-whitney – optimization using MS-EXCEL solver.

Unit-III: SPSS Bases System Modules

SPSS basics – creating, editing data file – descriptive statistics – cross tabulation – chi-square analyses – bivariate correlation – ANOVA procedures – simple and multiple regression analysis – non parametric procedure – factor analysis – cluster analysis – discriminative analysis.

Unit IV: Agriculture Statistical Software

SAS, MSTST, IRRISTAT, AGRES, AGRISTAT, STATISTICA, MANOVA and MANCOVA.

Unit V: World Wide Web (WWW)

World Wide Web (WWW) – definition, getting the connectivity, service provider working with Internet and Intranet – Web pages, web sites, web servers – Web application.

Practical

Using EXCEL for Inferential tests for difference of mean – inferential parametric test for significance – chi-square, mann-whitney – optimization using MS-Excel solver – multiple regression analysis using SPSS – factor analysis – cluster analysis – discriminate analysis – MANOVA and MANCOVA – logistics regression – SAS, MSTAT, IRRISTAT – AGRES, AGRISTAT – STATISTICA – Exposure to Internet and their for research analysis.

Theory Lecture Schedule

1. Introduction to MS Office – MS Word and MS Access.
2. Data analysis using MS Word and MS Access – Introduction to various statistical packages.
3. Preparation of data for computer analysis – data feeding.
4. Computer programme for Agrl. Science – Applied analyses.
5. EXCEL – Measures of central tendency – mean, median, mode – measures of dispersion – standard deviation, variance – correlation – inferential tests for difference of mean.
6. Z test inferential parametric test for significance – F-test, t-test, ANOVA
7. Regression – inferential non parametric tests for significance
8. Chi-square, Mann-whitney – optimization using MS-EXCEL solver.
9. Mid Semester Examination
10. SPSS basics – creating, editing data file – descriptive statistics – cross tabulation – chi-square analyses – bivariate correlation
11. ANOVA procedures – simple and multiple regression analysis – non parametric procedure –
12. Factor analysis – cluster analysis – discriminative analysis.
13. SAS, MSTST, IRRISTAT
14. AGRES, AGRISTAT
15. STATISTICA, MANOVA AND MANCOVA.
16. World Wide Web (WWW) – definition, getting the connectivity, service provider working with Internet and Intranet
17. Web pages, web sites, web servers – Web application.

Practical Schedule

1. Using EXCEL for Inferential tests for difference of mean

2. Inferential parametric test for significance
3. Chi-square, mann-whitney
4. Optimization using MS-Excel solver
5. Multiple regression analysis using SPSS
6. Factor analysis
7. Cluster analysis
8. Discriminate analysis
9. MANOVA and MANCOVA
10. Logistics regression
11. SAS
12. MSTAT
13. IRRISTAT
14. AGRES
15. AGRISTAT
16. STATISTICA
17. Exposure to Internet and their for research analysis.

References

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STA 821: ADVANCED STATISTICAL METHODS FOR SOCIAL SCIENCES (2+1)

Objectives

- This course is aimed for students to get an exposure to concepts of statistical methods, probability distribution and statistical inference.

Theory

Unit I: Probability

Theory of probability, Random variable, mathematical expectation. Discrete and continuous probability distributions. Binomial, passion, negative binomial, normal distribution and their applications.

Unit II: Sampling Methods

Concept of sampling; SRS stratified sampling, cluster sampling, PPS sampling, multistage sampling. Concept of sampling distribution chi-square, t, F. Tests of significance based on normal, t, Y^2 and F.

Unit III: Correlation and Regression

Correlation and Regression: Simple and multiple linear regression model, estimation of parameters, predicted values and residuals. Partial correlation and multiple correlations, rank correlation, test of significance of correlation coefficients and regression coefficients.

Unit IV: Non-Parametric Tests

Non-parametric tests – single and two sample problems. Friedman two-way ANOVA. Distribution free tests – advantages – disadvantages – run test – test for randomness – Median test – Sign test – Mann Whitney U test for two samples – Kolmogrov Smimov one sample test, Kruskal – Walli's test – chi-square – correlation coefficients – regression coefficients – Standard error – Significance tests – Students t and F distribution.

Unit V: Discrimination Function

Hotelling's T^2, classification problems, discrimination function. D^2 statistics and its applications. Principal component analysis, canonical correlations. Cluster analysis and factor analysis. Simulation methods: Resampling methods jack knife and the bootstrap. MCMC methods and Gibbs sampler.

Practical

Estimation – Determination of sample seize in simple random sampling – stratified random sampling – Cluster sample – selection – Estimation – Multistage sampling – Selection – Estimation of parameters in two stage sampling – Determination of sample seize in two stage sampling – Application of double sampling – Method of least squares – Moving averages – Kolmogrov – Smirnov test – Rank correlation coefficient – Forecasting using regression technique – Construction of index numbers of Agrl. Production.

Theory Lecture Schedule

1. Theory of probability
2. Random variable
3. Mathematical expectation.
4. Discrete and continuous probability distributions.
5. Binomial
6. Passion
7. Negative binomial
8. Normal distribution and their applications.
9. Concept of sampling
10. SRS stratified sampling, cluster sampling, PPS sampling, multistage sampling.
11. Concept of sampling distribution chi-square, t, F.
12. Tests of significance based on normal, t, Y^2 and F.
13. Correlation and Regression
14. Simple and multiple linear regression model
15. Estimation of parameters
16. Predicted values and residuals.
17. Mid Semester Examination
18. Partial correlation
19. Multiple correlations
20. Rank correlation
21. Test of significance of correlation coefficients
22. Regression coefficients.
23. LS method

24. MLE method
25. Friedman two-way ANOVA.
26. Hotelling's T^2
27. Discrimination function.
28. D^2 statistics and its applications.
29. Principal component analysis
30. Canonical correlations.
31. Cluster analysis and factor analysis.
32. Resampling methods jack knife and the bootstrap.
33. Simulations method
34. MCMC methods and Gibbs sampler.

Practical Schedule

1. Sampling techniques – Simple random sampling – Estimation of mean and variance.
2. Cluster sampling, quota sampling, population proportionate to size sampling.
3. Estimation of mean and variance in cluster sampling.
4. Stratified sampling.
5. Estimation of total and variance of total in two stage sampling with SRS at both stages.
6. Estimation of moving trend by moving average method and least square method.
7. Estimation of seasonal variation by simple average method.
8. Seasonal variation by ratio to trend method, seasonal indices by link relative method.
9. Non-parametric statistics an introduction.
10. Run test and sign test.
11. Kolmogrov smirnov one sample test and two sample test.
12. Mann-Whitney U test and Kruskal Walli's test.
13. Correlation coefficients of tests of significance.
14. Regression coefficients of tests of significance.
15. Construction of different wighted index numbers-Reversal test.
16. Principal Component Analysis (PCA)
17. Cluster Analysis.

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