# PONDICHERRY UNIVERSITY

## PUDUCHERRY – 605 014
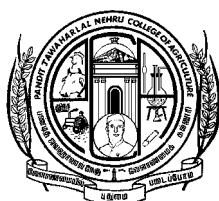


# 5ᵗʰ PG BOARD OF STUDIES
## IN
# AGRICULTURAL ECONOMICS

## M.Sc. Ag.  (Agricultural Economics)

## REGULATIONS AND CURRICULUM

### (Effective from 2021-2022)



# PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE
# AND RESEARCH INSTITUTE (PAJANCOA&RI)

(Government of Puducherry Institution)

## KARAIKAL – 609 603

# REGULATIONS

# PONDICHERRY UNIVERSITY

## POSTGRADUATE DEGREE PROGRAMME
## M.Sc. Ag. (Agricultural Economics)

### SEMESTER SYSTEM – REGULATIONS

**1.    SYSTEM OF EDUCATION**

1.1    The rules and regulations provided herein shall govern Master degree programme in M.Sc. Ag. (Agricultural Economics) offered by Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA & RI), Karaikal under Pondicherry University.

1.2    The duration of Master's programme is two academic years (4 semesters). The first year of study shall be the first and second semesters after admission. The second year of study shall be the third and fourth semesters.

**2.    COMMENCEMENT**

These regulations shall come into force from the academic year **2021-22**

**3.    DEFINITIONS**

3.1    **'PG Coordinator'** means a teacher of a department who has been nominated by the Head of the Department to coordinate the postgraduate programmes in the department. The coordinator looks after registration, time table preparation, regulation of credit load, maintenance of individual student's files, *etc*.,

3.2    **'Semester'** means a period consisting of 110 working days inclusive of the mid-semester and practical examinations but excluding the study holidays and final theory examinations.

3.3    **'Academic year'** means a period consisting of two consecutive semesters including the inter-semester break as announced by the Dean.

3.4    **'Curriculum'** is a group of courses and other specified requirements for the fulfillment of the postgraduate degree programme.

3.5    **'Curricula and syllabi'** refer to list of approved courses for postgraduate degree programmes wherein each course is identified with a three-letter code, a course number, outline of the syllabus, credit assigned and schedule of classes.

3.6    **'Course'** is a teaching unit of a discipline to be covered within a semester having a specific number and credits as detailed in the curricula and syllabi issued by the University.

3.7    **'Major Course'** means the subject of Department or discipline in which the student takes admission.

3.8    **'Minor Course'** means the course closely related to a student's major course.

3.9    **'Supporting Course'** means the course not related to the major course. It could be any course considered relevant for student's research work or necessary for building

his/her overall competence.

3.10 'Non-Credit course' means a course which is compulsorily registered by the postgraduate student for the completion of postgraduate degree programme. The non-credit course will be evaluated as Satisfactory or Not-satisfactory. The marks obtained by the student in a non-credit course will not be taken into account for calculating OGPA

3.11 'A credit' in theory means one hour of class room lecture and a credit in practical means two and half hours of laboratory or workshop or field work per week.
   *Explanation* : A 1+1 course (2 credits) means 1 hour theory and 2.5 hours practical per week.
      A 0+1 course (1 credit) means 2.5 hours practical per week
      A 1+0 course (1 credit) means 1 hour theory per week

3.12 'Credit Load' of a student during a semester is the total number of credits of all the courses including non-credit courses, that a student register during that particular semester.

3.13 'Grade Point' means the total marks in percentage obtained in a course divided by 10 and rounded to two decimals.

3.14 'Credit Point' means the grade point multiplied by the credit load of the course.

3.15 'Overall Grade Point Average (OGPA)' means the total credit point of the courses completed by the student divided by total credits of the courses studied. The OGPA is to be worked out by rounding to nearest two decimals.

3.16 'Arrear examination' is an examination written for the failed course by a student without undergoing regular classes in that course.

3.17 'Transcript Card' is the consolidated report of academic performance of a student issued by the University on completion of the curriculum fulfillment. The format of Transcript Card is furnished in *Annexure-1.*

## 4. POSTGRADUATE PROGRAMMES

The Postgraduate programmes offered in the Dicipline of Agricultural Economics is

**M.Sc. Ag. (Agricultural Economics)**

## 5. ADMISSION

5.1 **Eligibility for admission:**
   i. Candidates seeking admission to master degree programme in Agricultural Economics should have a four year bachelor's degree from State Agricultural Universities (SAU) or from other universities recognized by UGC/ICAR.
   ii. Candidate who has undergone the course credit system with an OGPA of 3.00 out of 4.00 or 7.00 out of 10.00 or 70 percent aggregate alone is eligible to apply for Master's degree programmes in this Institute. However, this will not apply to SC/ST candidates/State Department of Agriculture and Farmers Welfare nominees. Just a pass in the concerned degree is sufficient for them.

   iii. Prescribed minimum qualification from a recognized University for admission to

Master's degree programme in Agricultural Economics is as mentioned below.

| Discipline | Requirement for Master's Degree |
|---|---|
| M.Sc. Ag. (Agricultural Economics) | B.Sc.(Ag.) / B.Sc.(Hort.) / B.Sc.(Forestry) / B.Tech. (Hort.) / B.Tech. (Ag. Biotech.) / B.E.(Ag.)/ B.Tech. (Ag. Engg.) /B.F.Sc./ B.V.Sc. / B.Sc. Dairy Science / B.Sc. (Sericulture) / B.Sc.(Home Sci.) / B.Sc. (Ag. Maco.) / B.S.(ABM)/ B.Tech. (AIT) and B.S. (ABM) |

*5.2* **Method of selection**:

i. Candidates shall be required to be present on the specified date for a written test at their own expenses. If selected, they should come prepared to pay fees and get admitted immediately.

ii. The students will be ranked based on total marks scored by them in the categories mentioned below

| Category | Weightage of marks (%) |
|---|---|
| OGPA in Bachelor's degree programme | 60 |
| Entrance Exam | 30 |
| Excellence in Co-curricular activities | 5 |
| Awards/Medals obtained | 3 |
| Service Experience | 2 |
| **Total** | **100** |

iii. Written test with objective type (multiple choices) questions in the specific subject will be of one hour duration. A minimum of 50% (15 marks) is must for considering the candidate for admission. However, in case of SC/ST candidates, a minimum of 40% (12 marks) is must for considering the candidate for admission.

iv. Candidates applied for two subjects should write the examination for both subjects continuously for two hours.

v. Seats are reserved for candidates belonging to scheduled Castes/Scheduled Tribes/Other Backward Classes as per the norms of Government of Puducherry.

vi. Two seats of the total sanctioned strength, irrespective of the discipline, are reserved for the in-service candidates of Department of Agriculture and Farmers Welfare, Government of Puducherry.

## 6.    LANGUAGE REQUIREMENT

The medium of instruction is English. The postgraduate students should have adequate knowledge in English to read, write and speak in English and able to prepare high quality research papers in English.

## 7.    RESIDENTIAL REQUIREMENT

*7.1* The minimum residential requirement for Masters' degree shall be two academic years (four semesters) and the course should be completed within the maximum period of four academic years (eight semesters) from the date of admission.

*7.2*   **Extension of residential requirement:**   If any student fails to complete the programme within the maximum time limit, Pondicherry University can decide and give an extension for a period of one year (two semesters) over and above the maximum period of four years for Master's degree in exceptional cases.

**8.   REGISTRATION**

The list of courses offered to the student in each semester shall be sent by the Dean to the Controller of Examinations for Registration of examination as instructed by the University from time to time.

**9.   DISCONTINUANCE AND READMISSION**

As per University Regulations.

**10.   ADVISORY COMMITTEE**

*10.1*   Each Postgraduate student shall have an advisory committee to guide the student in carrying out the programme. Only recognized teachers are eligible for teaching PG courses and guiding thesis research.

*10.2*   **Chairman/Guide**:

   i.   The approved guides by the Dean of the college only can be the guide for the students.

   ii.   Every student shall have a Chairman of the Advisory Committee who will be from his/her major field of studies.

   iii.   The Head of the departments will allot the masters students among the recognized guides.

   iv.   A teacher should have a minimum of two years of service before retirement for allotment of Master's students.

   v.   Normally there should not be more than four Master's students at any one time under a guide.

   vi.   However, a guide operating externally funded schemes with student fellowship can supervise a maximum of five students with the approval of the Dean.

*10.3*   **Members** :

   i.   The advisory committee shall comprise a Chairman and two members. One member shall be from the concerned department and another member shall be from other department or discipline related to field of thesis research.

   ii.   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.

   iii.   External experts may be included as member/co-Chairman in the advisory committee based on the need and expertise of the member, without any financial commitment to the College 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 Dean.

*10.4*   **Formation of advisory committee:**

   i.   For Master's Programme the advisory Committee Chairman and members will

be in the cadre of Professors, Associate Professors and Assistant Professors having three years of experience.

ii. Only recognized teachers are eligible for teaching PG Courses and guiding thesis research.

iii. A proposal for the formation of the advisory committee (Form 1) of the student shall be forwarded by the Heads of the Department to the Dean for approval within one month from the commencement of the first semester.

**10.5    Changes in advisory committee:**

i. The proposal for changes in the advisory committee (Form 1a) is to be sent to the Dean for approval, if it is keenly felt that such changes are absolutely necessary. The reason for such change should be indicated.

ii. The changes may be effected immediately, when the existing members are transferred elsewhere or resigned or retired.

iii. If a guide goes abroad or within India for more than 6 months, to attend any training or on leave for more than six months, the Chairman of the Advisory Committee has to be changed immediately. The same conditions will apply to members also.

**10.6    Absence of member during qualifying/final viva-voce examination**:

i. Conducting qualifying and thesis final viva voce examination in the absence of members is not allowed.

ii. Under extra-ordinary circumstances if the qualifying/final viva-voce examination to postgraduate 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 Dean in advance.

iii. The co-opted member should be from the same department of the member who is not attending the examinations.

iv. In the absence of the Chairman of advisory committee, respective Heads of Departments should act as Co-Chairman with prior permission of Controller of Examinations.

**10.7    Duties and responsibilities of the advisory committee**:

i. Drawing the student's academic plan for postgraduate programme.

ii. Guidance throughout the programme of the student.

iii. Guiding the student in selecting a topic for thesis research and seminar.

iv. Evaluation of research and seminar credits.

v. Correction and finalization of thesis draft

vi. The members should meet together along with the student for all the above purposes and sign the appropriate documents.

**11.    PLAN OF COURSE WORK:**

The student's plan for postgraduate course work (Form 2) drawn up by advisory committee shall be sent for the approval of the Dean before the commencement of the mid semester examination during the first semester.

**12.** **PROGRAMME OF RESEARCH WORK**

The proposal for research programme of the student, in the prescribed format (Form 3) and approved by the advisory committee, shall be sent for approval of the Dean before the end of the semester in which the research credits are registered for the first time or before taking up of the research work whichever is earlier.

**13.** **CREDIT REQUIREMENTS**

*13.1* **Minimum credit requirement:** A postgraduate student should complete a minimum of 55 credits as detailed below for award of the Master's degree.

| Details | Minimum Credits |
|---|---|
| Major courses | 20 |
| Minor courses | 09 |
| Supporting courses | 05 |
| Seminar | 01 |
| Research | 20 |
| **TOTAL** | **55** |
| Non-credit compulsory courses* | 06 |

* Six courses (PGS 501 to PGS 506) are of general nature
and are compulsory for all Master's programme.

| Course code | Course Title | Credit hour |
|---|---|---|
| PGS 501 | Library and information services | 0+1 |
| PGS 502 | Technical writing and communication skills | 0+1 |
| PGS 503 | Intellectual property and its management in agriculture (e-course) | 1+0 |
| PGS 504 | Basic Concepts in Laboratory techniques | 0+1 |
| PGS 505 | Agricultural research, research ethics and rural development programmes (e-course) | 1+0 |
| PGS 506 | Disaster management (e-course) | 1+0 |

*13.2* **Maximum credit load:** A postgraduate student can register a maximum of 22 credits per semester including non-credit courses, seminar and research. However, research credits registered per semester should not exceed 10.

*13.3* **Comprehensive qualifying examination and thesis:** A postgraduate student should successfully complete a comprehensive qualifying examination and thesis in the major field of study and submission of thesis thereon.

*13.4* **Extra Credits:**

i. Over and above the prescribed minimum credit requirements, extra course credits up to a maximum of six can be registered for Master's programme.

ii. The extra credits registered will be accounted for calculation of OGPA.

**14.** **ATTENDANCE REQUIREMENTS**

*14.1* i. A minimum of 80 per cent attendance separately in theory and practical of the concerned course is a must, failing which the student shall not be permitted to appear for both final theory and final practical examinations in the course concerned and grade 'E' (incomplete) will be awarded.

ii. If a student falls short of the required attendance to an extent of 10 per cent or less, the shortage may be condoned by the Dean on the recommendation of the Advisory Committee and the concerned Head of the Department, on the condition that such shortage in attendance was due to unavoidable circumstances (on medical grounds) and such absence was continuous.

14.2    The student securing 'E' grade in a course must re-register the course when offered again with the permission of the University.

14.3    **Calculation of Attendance**
   **a) THEORY:**
   i. Number of classes conducted for a course from the first instructional day as per the time table to the last theory class of that semester is to be construed as the total number of theory classes conducted by the course teacher.
   ii. The mid-semester examinations are normally conducted during class hours.
   iii. The attendance for mid semester examination shall be counted as a theory class for calculating attendance.
   **b) PRACTICAL:**
   i. Number of practical classes conducted for a course from the first instructional day as per the time table to the last practical class of that semester is to be construed as the total number of practical classes conducted by the course teacher.
   ii. The final practical examination will be conducted after the completion of 96 working days as per the schedule.
   iii. The attendance for practical examination shall not be counted for calculating the attendance for practical.

14.4    For calculating 80 per cent attendance the number of instructional days may be calculated only from the date of joining of the student for first year first semester only.

14.5    The students failing to attend the classes / examinations on non-official ground will be treated as absent.

14.6    Students deputed for sports, cultural meets *etc*., with prior permission of the   Dean of the college shall be given attendance for the period of absence. However, students under this category must have attended a minimum of 50 per cent classes in the total theory and practical classes conducted.

## 15.    EVALUATION OF STUDENT'S PERFORMANCE
15.1    **Distribution of marks:**
   i. 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. The weightage of Theory and Practical shall be in the ratio of 80:20 respectively.

   ii. The student should secure a minimum of 50 per cent marks in theory as well as in practical with an aggregate of 70 per cent to secure a pass in a course.

   iii. The student should secure a minimum of 50 per cent marks in the final theory examination conducted by the University for securing a pass in a course.

   iv. In each course, examinations will be conducted for 100 marks as detailed below.

| Examination | Courses with theory and practical | Courses with only theory | Courses with only practical |
|---|---|---|---|
| Mid Semester (Internal) | 20 | 30 | 30 |
| Term paper (Internal) | 10 | 10 | 10 |
| Final Theory (External) | 50 | 60 | -- |
| Final Practical | 20 | -- | 60 |
| TOTAL | 100 | 100 | 100 |

15.2 **Mid Semester Examination (Internal Assessment):**

i. Writing the mid-semester examination is a pre-requisite for writing the final theory and final practical examinations.

ii. Student failing to write mid-semester examination(s), shall not be permitted to attend the classes further in the course(s) concerned and the student will be awarded 'E' grade.

iii. The mid-semester examinations shall be conducted for a duration of one hour and for 20 or 30 marks.

iv. The Head of the Department with the help of the concerned PG coordinator shall prepare and announce the schedule of mid-semester examinations.

v. The mid-semester examinations shall be conducted from the 56th working day of the semester.

vi. The mid-semester examination shall be conducted and evaluated internally by the concerned course teacher(s).

vii. The mid-semester examination mark list should be sent by the course teacher to the academic section of the college 10 days prior to the commencement of final practical examinations along with term paper mark.

15.3 **Missing Examination:**

i. Missing examination shall be permitted only for mid-semester examination in deserving cases on the recommendation of the course teacher/Chairman and Head of the department and on prior approval by the Dean.

ii. The missing tests are not allowed for final theory and final practical examinations.

iii. The student shall write, in advance, to the Dean through the Chairman, PG coordinator and Head of the Department stating the reason for missing the mid-semester examination(s). Based on the recommendation of the Chairman, PG coordinator and the Head of the Department, the Dean shall permit the student for missing the mid-semester examination(s).

iv. A student missing mid-semester examination(s) with the prior approval of the Dean shall be permitted to take up missing examination of the particular course, subject to payment of the prescribed missing examination fee for each missing mid-semester examination.

v. Students deputed for official programmes of the College/University are exempted from paying the fee for missing test.

vi. Such missing examinations should be completed outside the regular class hours within 15 working days after the respective examinations.

vii. Attendance will not be given for taking up missing examinations.

**15.4 Final Theory Examination:**

i. An examination schedule prepared by the Controller of Examination for the final theory examinations shall be the final. The schedule of examinations shall be adhered strictly.

ii. The duration of final theory examinations will be two and half hours for courses with theory and practical (50 marks) or three hours for courses with only theory (60 marks).

iii. The final theory examinations shall be conducted by the University. Evaluated by two examiner, one by internal and one by external. However, in case of Non-credit e-courses, the final theory examination shall be conducted internally by the course teacher.

iv. In the evaluation process, if deviation is more than 20 per cent between the first and second evaluator, the paper shall be referred to third examiner who shall also be an external examiner.

**15.5 Final Practical Examination:**

i. The Dean shall announce the commencement of final practical examinations. The Heads of the Departments shall prepare the schedule for practical examination.

ii. The final practical examinations shall be conducted after the completion of minimum of 96 working days.

iii. Submission of bonafide practical records certified by the Course Teacher is a pre-requisite for appearing in a practical examination failing which 'F' grade will be awarded.

iv. For conducting final practical examination in each course, an *external examiner* (faculty of the Department other than the course teacher) shall be nominated by the Dean and the course teacher will be the *internal examiner*.

v. In the event of external/internal examiner nominated for practical examination could not conduct the examination, then the Dean shall nominate an alternative examiner to conduct practical examination.

vi. The duration of final practical examination shall be two and half hours.

vii. The practical examinations shall be jointly conducted by the internal and external examiners with mutual co-operation.

viii. They shall evaluate the candidates appearing at the examination according to their performance and the Forms so prepared shall be signed by both the examiners.

ix. The practical examination marks should be communicated to the University/ uploaded in the university website within 10 days after conduct of examination duly signed by all the examiners and hard copy forwarded to the university thereon.

15.6 **Arrear examination:**

i. Arrear examination is permitted for the final theory and final practical examinations only.

ii. The students are permitted to write the arrear examinations as and when conducted by the University.

iii. A student is permitted to write the final theory and practical examinations only two times during 4 years duration excluding the regular final examination (Mid-semester marks and Term paper marks shall be retained as such).

iv. In the event of a student failing to secure pass in the two arrear examinations permitted, he/she has to re-register the course along with the juniors as and when the course(s) are offered with the permission of the University and on payment of the prescribed fees.

15.7 **Evaluation of course**:

i. Each course shall carry a maximum of 100 marks. The results of the course shall be indicated by the grade points ranging from 0 to 10.

ii. The total marks in percentage obtained by the student in a course shall be divided by 10 and rounded to two decimal places to get the grade point.

iii. The minimum Grade Point to be secured for the successful completion of a course shall be 7.00.

iv. In case of courses with theory and practical, minimum of 50 per cent mark separately in theory and practical with an aggregate of 70 per cent is essential.

v. Securing a grade point less than 7.00 in a course will be treated as 'F' (Failed) and the Grade Point will be 0.00 for calculating the GPA/OGPA. The following symbols may be used

E - INCOMPLETE (Lack of 80 per cent Attendance/other reasons)
F - FAILED

15.8 **Question paper pattern for theory examinations** :

15.8.1 The question paper pattern for mid semester (internal) examinations are indicated below:

| Part | Type of question | Number of questions | Number of questions to be answered | Mark per question | Total marks |
|------|------------------|---------------------|-----------------------------------|-------------------|-------------|
| Courses with theory and practical (1+1 or 2+1 courses) (20 Marks & 1 hour duration) | | | | | |
| A | Objective* | 20 | 20 | 0.5 | 10 |
| B | Definitions/Concepts | 12 | 10 | 1.0 | 10 |
| | TOTAL | | | | **20** |
| Courses with only theory (1+0 or 2+0 courses) (30 Marks & 1 hour duration) | | | | | |
| A | Objective* | 30 | 30 | 0.5 | 15 |
| B | Definitions/Concepts | 18 | 15 | 1.0 | 15 |
| | TOTAL | | | | **30** |

| | Courses with only practical (0+1 courses) (30 Marks & 1 hour duration) | | | | |
|---|---|---|---|---|---|
| A | Objective* | 30 | 30 | 0.5 | 15 |
| B | Definitions/Concepts | 18 | 15 | 1.0 | 15 |
| | TOTAL | | | | 30 |

* Questions should be Fill-up the blanks, Choose the best among four options, True / False or Match the following type with equal number of question in each type and one or two more questions in any one type if examination is conducted for 30 marks

15.8.2 The question paper pattern final theory (external) examinations are indicated below:

| Part | Type of question | Number of questions | Number of questions to be answered | Mark per question | Total marks |
|---|---|---|---|---|---|
| | Courses with theory and practical (1+1 or 2+1 courses) (50 Marks & 2.5 hours duration) | | | | |
| A | Objective (MCQ's only) | 20 | 20 | 0.5 | 10 |
| B | Definitions/Concepts | 12 | 10 | 1.0 | 10 |
| C | Paragraph answers | 7 | 5 | 2.0 | 10 |
| D | Essay type answers (EITHER OR type) - One main question from each unit shall have one choice | 5 | 5 | 4.0 | 20 |
| | TOTAL | | | | 50 |
| | Courses with only theory (1+0 or 2+0 courses) Final Theory Examination (60 Marks & 3.0 hours duration) | | | | |
| A | Objective (MCQ's only) | 20 | 20 | 0.5 | 10 |
| B | Definitions/Concepts | 18 | 15 | 1.0 | 15 |
| C | Paragraph answers | 7 | 5 | 2.0 | 10 |
| D | Essay type answers (EITHER OR type) - One main question from each unit shall have one choice. | 5 | 5 | 5.0 | 25 |
| | TOTAL | | | | 60 |

15.9 **Question paper pattern for final Practical Examination**: The following distribution of marks shall be adopted in conducting the final practical examinations.

| Details | Courses with Theory and Practical | Courses with only Practical |
|---|---|---|
| Practical Field work / Lab Work / Written exam | 20 | 60 |
| Total | 20 | 60 |

For conducting practical examinations, the type and number of questions can be decided by the concerned internal and external examiners. Choice may be given to the extent of 20 per cent under subjective type questions.

15.10 **Term Paper**:
   i. Submission of a term paper by the students is a must.

   ii. The term paper topics shall be assigned by the course teacher. Term papers should cover a wide range of subjects within the course limits.

   iii. The term paper shall be evaluated by the course teacher.

15.11 **Return of evaluated answer papers**:
   i. The evaluated 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.

   ii. The answer paper should be retained by the course teacher for 6 months or declaration of results by Pondicherry University, whichever is earlier and then disposed off.

**16. COMPREHENSIVE QUALIFYING EXAMINATION**

16.1   i.   Only those postgraduate students who successfully complete the comprehensive qualifying examination shall be admitted to candidacy of the degree.

   ii. The qualifying examination consists of written and oral examination in major subjects only and the students should be allowed after completion of 80 per cent of total course credit load including major and minor courses.

   iii. The qualifying examination shall be conducted only in the major courses as per the norms given below:

   | | | |
   |---|---|---|
   | Question paper setting | - | External |
   | Evaluation of answer book | - | External |
   | Qualifying marks | - | 60 per cent |
   | Viva Voce | - | External |
   | Grading | - | Satisfactory/Not Satisfactory |

16.2 **Selection of examiner**:

   i. The Head of the concerned PG Department shall send a panel of examiners for conducting the qualifying examination (Form 4). However, the University can draw its own panel of examiners.

   ii. The panel of examiners for qualifying examinations shall be given three months before the date of completion of the student's course work.

16.3 **Written examination**:

   i. Normally the qualifying examination shall be completed before the end of third semester of the postgraduate programme.

   ii. The controller of examination shall conduct the qualifying written examination

   iii. The written examination shall be conducted for major courses only.

   iv. The question paper for the written examination shall be of 3 hours duration and each question need not be restricted to any particular topic in a course but it

should be a comprehensive of the syllabus of each course.

v. The question paper pattern for the written examination is given below.

| Part | Type of question | Number of questions | Number of questions to be answered | Mark per question | Total marks |
|------|------------------|---------------------|-----------------------------------|-------------------|-------------|
| A | Paragraph answers | 7 | 5 | 5 | 25 |
| B | Essay type answers | 7 | 5 | 15 | 75 |
| | | | | **TOTAL** | **100** |

*16.4* **Oral examination:**
i. Only those students who secure 'SATISFACTORY' grade in written qualifying examination shall be permitted to attend the oral qualifying examination

ii. The advisory committee shall conduct the oral examination with one external examiner, who sets the question paper for the written qualifying examination.

iii. The performance of the student(s) in the qualifying viva-voce examination shall be graded as "Satisfactory" or "Not satisfactory".

iv. If the performance of the student is "Not Satisfactory" in the oral examination, he/she has to appear for the oral examination again.

*16.5* **Communication of results of qualifying examination**:
i. The Chairman of the advisory committee shall act as Chairman for the examination committee.

ii. The Chairman of the advisory committee shall be responsible for communicating the results of the examination to the Controller of Examinations in the prescribed format (Form 5).

*16.6* **Failure/absence in qualifying examination**:
i. A student is permitted to write the qualifying examination only three times including the regular attempt.
ii. A student who fails or absents in the comprehensive qualifying written/viva-voce examination shall apply to the University with the recommendation of the Chairman of the advisory committee, Head of the Department and the Dean for re-examination.
iii. A student who applies for re-examination should attend written examination and viva-voce after paying the prescribed re-examination fee.
iv. Re-examination shall not take place earlier than three months after the previous qualifying examination.
v. If a student fails even in the second re-examination (third attempt), he/she cannot continue as a student in the University for Award of Master's degree in the University.
vi. The research credits registered in the final semester shall not be evaluated unless he/she successfully completes the qualifying examination.

## 17. CREDIT SEMINAR
*17.1* Seminar is compulsory for all the postgraduate students and each postgraduate

student should register and present one seminar with 0+1 credit.

17.2    Registration of seminar credits is not allowed in the first semester.

17.3    **Seminar topic:**
   i. The seminar topic should be only from the major field and should not be related to the area of thesis title.

   ii. The seminar topics are to be assigned to the students by the Chairman at the beginning of the semester in which he/she registers seminar credits and the progress made by the student should be monitored.

17.4    **Evaluation of seminar:**
   i. The students should prepare a seminar paper after reviewing all the available literature and present the seminar after completion of 80 per cent attendance in the semester in the presence of the Advisory committee, staff and postgraduate students of the concerned department.

   ii. The circular on the presentation of the seminars by the postgraduate students may be sent to other departments to enable those interested to attend the same.

   iii. After carrying out the corrections/suggestions, the student should submit two copies of the seminar papers, one to the Chairman and the other to the department.

   iv. The performance of the student in the credit seminar has to be evaluated for 100 marks by the Advisory Committee. Grade Point may be given based on the following norms:

| Particulars | Marks |
|---|---|
| Coverage of literature | 40 |
| Presentation | 30 |
| Use of audio visual aids | 10 |
| Capacity to participate in discussion and answer the questions | 20 |
| TOTAL | 100 |

17.5    The students who fail to present the seminar must be awarded 'F' grade and the student should again register the seminar credits and present the seminar in the subsequent semester. The minimum of 80 per cent attendance requirement for presenting the seminar after re-registration need not be insisted.

17.6    Presenting a seminar is a must for the award of the degree.


**18.    THESIS RESEARCH**
18.1    **Selection of topic :**
   i. With the guidance of the advisory committee the students should identify the tentative area of research and include it in the plan of work.

   ii. The advisory committee should guide the students in selecting a specific topic in the identified research area and for 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.

   iii. The topic for thesis research for the students of Master's programme should be of

such a nature as to indicate a student's potentialities for conducting research and to train him in research.

iv. 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.

v. A certificate to this effect duly endorsed by the Chairman of the Advisory Committee shall accompany the thesis.

### 18.2  Research proposal:

i. The research proposal has to be presented by the student in a meeting organized by the Head of the department to get the opinion/suggestions of the teachers of the department for improving it.

ii. Three copies of the research proposal in the prescribed format (Form 3) should be sent to the Dean 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.

### 18.3  Evaluation of thesis research:

i. 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 (Proforma-1). After scrutiny and approval, a copy of the programme has to be given to the student for carrying out the work during the semester.

ii. Attendance register must be maintained in the department for all the PG students to monitor whether the student has 80 per cent of attendance in research.

iii. After completion of 80 per cent 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 award '**SATISFACTORY** or **NOT SATISFACTORY**' depending upon quantity and quality of work done by the student during the semester. The procedures of evaluating research credits under different situations are explained hereunder.

  a. **SITUATION I**: The student has completed the research credits as per the approved programme and awarded '**SATISFACTORY**' by the advisory committee. Under the said situation the student can be permitted to register fresh block of research credits in the subsequent semester. If the student is awarded '**NOT SATISFACTORY**' he/she has to reregister the same block of research credits in the subsequent semester.

  b. **SITUATION II**: If the student has not secured the minimum attendance of 80 percent, then the grade 'E' should be awarded. The student has to reregister the same block of research credits for which 'E' grade was awarded in the following semester with prior permission from the University. Until the completion of re-registered credits, the student should not be allowed to register for fresh block of research credits.

  c. **SITUATION III**: The student could not complete the research work as per the approved programme of work for reasons beyond his/her control such as,
    • Failure of crop.

- Non-incidence of pests or disease or lack of such necessary experimental conditions.
- Non-availability of treatment materials like planting materials chemicals, *etc*.
- Any other impeding/unfavorable situation for carrying out research.

Under the said situations III, Grade 'E' should be awarded. The student has to reregister the same block of research credits for which 'E' grade was awarded in the following semester with prior permission from the University. Until the completion of re-registered credits, the student should not be allowed to register for fresh block of research credits.

d.  **SITUATION IV:** When the student failed to complete the work even in the 'Second time' registration, the student will be awarded '**NOT SATISFACTORY**' and he/she has to reregister the same block of research credits in the subsequent semester with the prior permission from the University.

e.  **SITUATION V:** If a student secures 'F' grade in course work and/or cannot complete the qualifying examination till the end of final semester/grace period, the research credits registered in the final semester shall not be evaluated unless he/she successfully completes the qualifying examination. The research credits registered by the student during the final semester shall be evaluated within 15 days from the date of declaration of result of the course or the qualifying examination, as the case may be.

*18.4*  **Re-registration of research credits**: Students have to obtain prior permission of the University for re-registering the research credits. However, the University can permit the registration of research credit only three times. Permission to register for the fourth time shall be given only by the Academic Council.

**19.  SUBMISSION OF THESIS**

i.   The research credits registered in the last semester of postgraduate programmes 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 in *Annexure-2*.

ii.  If a postgraduate 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.

iii. Copy of the thesis to be sent for evaluation should be submitted in paper pack.

iv.  After incorporating the suggestions of the examiners and those received at the time of viva-voce, the thesis should be submitted to the College/university in hard bound copies (four copies) and soft copies (in pdf format) in CDs (two copies).

19.1  **Grace period:**

i.   Students can avail a grace period upto three months for submission of thesis after the closure of final semester by paying prescribed fine to the University.

ii.  If a student is not able to submit the thesis within three months grace period, the student has to re-register the credits in the forthcoming semester.

iii. The student who re-register the credits after availing the grace period will not be permitted to avail grace period for the second time.

iv. The Heads of the Departments 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.

19.2 **Re-registration and submission of thesis:** The minimum of 80 per cent 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 *i.e*. 2 years (4 semesters) and completed the minimum credit requirements with 80 per cent attendance.

19.3 **Publication of articles:** Part of thesis may also be published in advance with the permission of the Chairman. If any part is published, the fact should be indicated in the certificate given by the Chairman that the work had been published in part/ full in any referred scientific or popular journals, proceedings, *etc*.

## 20 EVALUATION OF THESIS

20.1 The thesis submitted in partial fulfillment of a Master's degree shall be evaluated by an external examiner nominated by the Controller of Examinations. However, the Dean can send panel of three examiners (Form 6).

20.2 An oral examination will be conducted by the Advisory Committee after the thesis is recommended by the external examiner and carrying out the corrections/suggestions made by the external examiner by the student.

20.3 The Chairman of the advisory committee shall communicate the date of final thesis viva-voce examination to the student and advisory committee members within one month and the thesis final viva-voce examination shall be completed within six months from the date of receipt of the report from the external examiner.

20.4 The Chairman shall send the recommendations of the advisory committee (Form 7) along with necessary certificate/documents in duplicate to the University.

20.5 i. In case, the External examiner does not recommend the thesis for the award of the degree, the advisory committee may send their recommendation for scrutiny of the thesis by another external examiner, through the Dean to Controller of Examinations within one month from the date of receipt of the thesis. The Controller of Examinations may, on the recommendation of the advisory committee and Dean, refer the thesis for scrutiny and independent judgment to a second external expert chosen by him.

ii. If the second external expert recommends the thesis for acceptance, this recommendation may be accepted.

iii. If the second examiner also does not recommend the thesis for acceptance, the degree shall not be awarded.

## 21 REVISION OF THESIS

21.1 If an examiner recommends for revision of thesis the following norms will be adopted.

i. For revision of draft, the thesis should be resubmitted after a minimum of one month from the date of communication from the Dean.

ii. If the revision is recommended for repeating lab experiments, field trial *etc*, resubmission must be after a minimum period of six months.

21.2 At the time of resubmission, the advisory committee should give a certificate for having carried out the corrections/recommendations. The resubmitted copies of thesis should have incorporated the necessary corrections as indicated by the external examiners.

## 22 FAILURE TO APPEAR FOR FINAL VIVA/NON SUBMISSION OF THESIS AFTER VIVA

If a candidate fails to appear before the examining committee for final thesis viva-voce, on the date fixed by the Chairman the following are the time-frame and penalty.

22.1 The thesis viva-voce must be completed within **four years from the date of** first registration for Master's programmes. The prescribed penalty/fine must be charged to the candidate.

22.2 After successful completion of thesis final viva voce, if a student fails to submit the corrected version of the thesis within 15 days he/she will be levied a fine at the time of sending the proposal for result declaration.

## 23 MALPRACTICES IN EXAMINATION AND MISCONDUCT OF STUDENTS

23.1 The Dean of the College shall be responsible for dealing all cases of unfair means by students in writing records, term papers and mid-semester examinations.

23.2 In case of final theory and final practical examination, the cases of malpractice will be dealt as per Chapter XV (A) of the Academic Ordinance of the University.

23.3 **Ragging rules:** Students found involved in ragging will be dealt as per the orders of the Supreme Court of India. The matter shall be reported to the University.

23.4 **Unlawful activities:** In case of students found involved in any unlawful activities either within or outside the Hostel/College Campus, besides, expulsion both from the Hostel and College at the discretion of the Dean, the matter will be reported to the Police of the jurisdiction to be dealt with, in accordance with the appropriate law in force. The matter shall be reported to the University.

24 The schedule for the important records to be sent to the Dean is furnished below and should be followed strictly so as to get back the above academic reports in time for maintenance in the students file.

| Sl. No. | Particulars | Time Schedule |
|---|---|---|
| 1 | Formation of advisory committee **(Form 1)** | Within one month of the commencement of first semester |
| 2 | Plan of course work **(Form 2)** | Before the commencement of mid semester examination in the first semester |
| 3 | Programme of research work **(Form 3)** | Before the end of the semester in which the student registers the research credit for the first time or the commencement of the research work whichever is earlier. |

| 4 | Proposal for qualifying examination **(Form 4)** | Two months before the completion of the course work. |
|---|---|---|
| 5 | Qualifying examination result **(Form 5)** | Immediately |
| 6 | Panel of external examiners for thesis evaluation **(Form 6)** | Three months before the probable date of submission of thesis |
| 7 | Final viva-voce result **(Form 7)** | Fifteen days from the examination |

## 25  AWARD OF DEGREE AND ISSUE OF TRANSCRIPT CARD

25.1 **Eligibility for the Award of the Degree:** The successful completion of all the prescribed courses included in the Curricula and Syllabi shall be minimum requirement for the award of the Degree.

25.2 **Class Ranking**: In calculation of Class equivalent for OGPA the following classification will be adopted. First class with Distinction and first class shall be awarded to those students who have completed the course without arrear and all others shall be awarded second class

| OGPA | Class |
|---|---|
| 9.00 and above | First class with Distinction |
| 8.00 to 8.99 | First class |
| 7.00 to 7.99 | Second Class |

25.3 **Percentage conversion**: For obtaining the percentage equivalent to the OGPA, the OGPA secured by the student shall be multiplied by 10.

25.4 **Transcript card:**

  i. The Transcript card shall contain entry of all the courses and the Grade Points and OGPA obtained by the candidates indicating the number of times appeared. This will have to be prepared for all the students by the Controller of Examinations.

  ii. For preparation of Transcript card, the Dean should send recent passport size photograph of the students along with filled in proforma and the prescribed fee.

## 26  REMOVAL OF DIFFICULTIES:

26.1 If any difficulty arises in giving effect to the provisions of these regulations, the Vice-Chancellor may issue necessary orders which appear to him to be necessary or expedient for removing the difficulty.

26.2 Every order issued by the Vice-Chancellor under this provision shall be laid before the Academic Council of the University in the next meeting after the issuance.

26.3 Not-withstanding anything contained in the regulations, the Board of Studies or Academic Council reserve the right to make changes whenever necessary.

## 27.  REGULATIONS GOVERNED BY PAJANCOA & RI

### 27.1  ADMISSION

#### 27.1.1  Application for admission:

i. Application for admission shall be made in the prescribed form to be downloaded from the website of the college (www.pajancoa.ac.in) after notification is issued to this effect.

ii. The admissions shall be regulated and made in accordance with the admission rules and regulations in force.

iii. Candidates seeking admission to the various Postgraduate degree courses are permitted to apply for only two subjects. Separate applications should be used for each course.

**27.1.2 Admission procedure:**

i. The admission is based on the merit category of the candidate and availability of vacancies at the time of counseling.

ii. All admissions made by this Institute are provisional and subject to the approval of the University.

iii. The candidates who have offered admission should report to the college on or before the due date mentioned failing which their right of admission is forfeited

**27.2 FEE STRUCTURE**

27.2.1 Fee structure is being revised every year with 10% fee hike. Lodging fees and charges for electricity, water and computer are revised based on the requirements and power tariff prevailing from time to time.

27.2.2 In the case of new admissions, the fees for the first semester should be paid at the time of admission.

27.2.3 For the remaining semesters, the fees should be paid on the date of registration of the semester.

27.2.4 Candidates who discontinue after admission are not eligible for refund of fees except caution money deposit.

27.2.5 In case of a student who re-registers with junior batch, he/she has to pay the semester fess applicable to the junior batch in which he/she registers, besides the re-registration fee.

**27.3 REGISTRATION**

27.3.1 All newly admitted candidates should register during the first semester of the programme. A candidate admitted to the Postgraduate programme should report to the Head of the Department concerned on the date of registration. It is the responsibility of the candidate to register the courses in person on the due date prescribed for the purpose.

27.3.2 **In ABSENTIA** registration will not be permitted on any circumstances.

27.3.3 The Head of the Department and the PG coordinator shall help the student in selecting the courses for registration.

27.3.4 Admitted candidates shall register with the respective Department at the beginning of each semester and this should be completed within two working days.

27.3.5 **Late registration**:

i. Late registration is permitted by the Dean of college within seven working days from the commencement of the semester provided the prescribed late registration fee is paid before registration.

ii. Registration beyond seven working days is not allowed except for new entrants who are admitted late due to administrative reasons in the first semester.

27.3.6 **Registration cards:**

i. A student shall register the courses offered in a semester by writing all the courses in registration card in quadruplicate. The format of registration card is given in *Annexure-4*.

ii. The Chairman, PG coordinator and Head of the Department are responsible to furnish the registration particulars of the students with their signature in the Registration card to the Dean.

iii. The Dean shall approve the registration cards.

iv. The approved registration cards shall be maintained by the Dean, PG coordinator, Chairman and the student concerned.

v. The list of courses registered by the students in each semester shall be sent by the Dean to the Controller of Examinations/University for preparation of Report Cards

27.3.7 The mess dues clearance certificate has to be produced by the student at the time of registration.

**27.4    ARREAR EXAMINATION:**

i. The prescribed arrear examination fee should be paid on or before the specified date.

ii. The Registration for the arrear examination shall be done on the date specified by the Dean. Each registration is considered as an attempt even if the student is absent for the examination.

**27.5    QUALIFYING EXAMINATION**

The Heads of departments will monitor and coordinate the conduct of both the written and oral qualifying examinations.

**27.6    SUBMISSION OF THESIS**

The research credits registered in the last semester of postgraduate programmes 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 in *Annexure-5*.

**27.7    REVISION OF THESIS**

The prescribed fine for late submission of revised thesis may be collected from the students submitting thesis beyond the due date with the recommendation of the Chairman. The Dean shall ensure that the delay is due to the fault of the student.

**27.8.    MERIT SCHOLARSHIP/RESEARCH ASSISTANTSHIP**

27.8.1 PAJANCOA & RI PG fellowship shall be awarded to all the students who are admitted into the Masters programme based on allotment of Government fund. The PG students should be a resident of PAJANCOA & RI hostels. The award of PG fellowship is governed

by the approved PG fellowship rules.

27.8.2 The Dean shall call for applications and sanction the scholarship every year.

27.8.3 The students availing any scholarship/fellowship are permitted to switch over to other fellowship/scholarship only one time during the course of study.

27.8.4 **Student SRF/JRF:**

    i. The selection of student SRF/JRF in external funded schemes will be made by the existing committee members for selection of regular SRF/JRF.

    ii. The PG coordinator of the concerned department will be an additional member of the committee.

    iii. The panel of names after the selection has to be sent to the Dean for approval in the prescribed Proforma.

    iv. If a student SRF/JRF discontinues before submitting the thesis or switch over to other fellowship/scholarship, the amount already paid has to be recovered in full in one lump sum with 6% penal interest.

## 27.9 RECOGNITION OF POSTGRADUATE TEACHERS

27.9.1 The Dean normally recognizes teachers for offering courses and guiding the students of Master's programme based on the request of teachers and the recommendation of Head of the department.

27.9.2 The recognized PG teachers shall offer courses to masters students as required by the concerned Heads of departments, normally, in their own field of specialization unless extra-ordinary circumstances demand for offering other courses.

27.9.3 All the recognized guides for Master's programme are competent to guide research work of Master's degree students in their own fields of specialization. The Heads of departments shall assign students to the recognized guides taking into account their specialization. The students should be uniformly distributed instead of all of them taking research topics in one or two specialized branches in the department.

27.9.4 **Teachers for Master's programme:** The following faculty shall be recognized as PG teachers for Master's programme

    i. Professors
    ii. Associate Professors
    iii. Assistant Professors: Persons having Ph.D. degree with one year of active experience in the concerned field (or) Persons having a Master's degree with three years of active experience in the field. In case of contingencies, like start of new PG programme, persons having Ph.D. degree in the concerned field may be recognized as PG Teacher.

27.9.5 **Guides for Masters programme:** PG Teachers after handling PG courses in two semesters are eligible to guide M. Sc. students. In case of contingencies, like start of new PG programme, persons having Ph.D. degree in the concerned field may be recognized as PG Guide.

27.9.6 The Heads of departments will forward the proposals based on the qualification and experience of the teacher as given above. The proposals can be sent when there is acute need for teachers/guide in the prescribed format, given in the *Annexure-6*.

27.9.7 While forwarding the application the Head of the Department should consider the seniority of the teacher, number of courses handled and number of research schemes operated.

**27.10    GUIDELINES FOR HEADS OF THE DEPARTMENTS IN MONITORING PROGRESS OF POSTGRADUATE STUDENTS**

27.10.1    **Student records:** The "Individual student" file (clip file) containing all the academic records of the student concerned with students bio-data shall be maintained by the PG coordinator on behalf of the Institution. In each file a sheet containing the following information has to be attached.

| | |
|---|---|
| Date of registration | : |
| Date of qualifying examination | : |
| Due date for thesis submission | : |
| Date of submission of thesis | : |
| Date of viva-voce | : |
| Remarks | : |

27.10.2    The activities listed out in the following table must be meticulously taken care by the Professor and Head of the Department concerned

| Sl.No. | Particulars | Time Schedule |
|---|---|---|
| 1 | List of courses to be offered along with time table | A week before the commencement of each semester |
| 2 | Course registration particulars | Within 10 working days from the date of commencement of each semester |
| 3 | Time table for mid-semester examinations | A week before the scheduled date for the examinations notified in the academic calendar |
| 4 | Mark lists after completing examinations | Within 10 days from the date of conduct of examinations |
| 5. | Class grade chart | Within 7 days from the date of closure of each semester |

27.10.3    The time table for various examinations and evaluations of research credits should be prepared in advance as indicated in the academic calendar of semester concerned and such dates already fixed should not be postponed or changed subsequently.

27.10.4    The Heads of the Departments should monitor the progress of the postgraduate students. Each department should maintain a list of thesis produced so far with the abstract of the same in both hard and soft copies.

Form – 1
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

### FORMATION OF ADVISORY COMMITTEE
(To be sent in triplicate within one month from the commencement of First semester)

1.   Name of the student            :

2.   Registration No.               :

3.   Degree                         :

4.   Subject                        :

5.   Advisory committee             :

| Sl. No. | Advisory Committee | Name, Designation and Department | Date of Retirement | Signature |
|---|---|---|---|---|
| 1 | Chairman | | | |
| 2 | Member 1 | | | |
| | Member 2 | | | |
| 3 | Additional Member | | | |

6.   Reason for additional member        :

**Signature of the student**

**PG coordinator**                    **Head of the Department**

**DEAN**

* Additional members may be included only in the allied faculty related to thesis research with full justification at the time of sending proposals (Programme of research) to the Dean for approval.

Form – 1a
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

## CHANGE IN ADVISORY COMMITTEE
**(To be sent in triplicate)**

1.  Name of the student          :
2.  Registration No.             :
3.  Degree                       :
4.  Subject                      :
5.  Proposed change              :

| | | Name and designation | Date of retirement | Signature |
|---|---|---|---|---|
| a. | Existing Chairman/ member | | | |
| b. | Proposed Chairman/ member | | | |

6.  Reasons for change    :


**Signature of the student**


**Chairman of the Advisory Committee**                    **PG coordinator**


**Head of the Department**                                **DEAN**

Form – 2
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

## PLAN OF COURSE WORK
(To be sent in triplicate before the commencement of mid semester examinations in the first semester)

1.   Name of the student                    :

2.   Registration No.                        :

3.   Degree                                  :

4.   Subject                                 :

5.   Course Programme                        :

| S. No | Course No | Course Title | Credit Hour |
|---|---|---|---|
|  |  | **MAJOR  COURSES** |  |
|  |  | **MINOR COURSES** |  |
|  |  | **SUPPORTING COURSES** |  |
|  |  | **NON-CREDIT COURSES** |  |
|  |  | **SEMINAR** |  |
|  |  | **RESEARCH** |  |
|  |  | **TOTAL** |  |

6.   Tentative area of research              :
     (indicate the major field of specialization)

**Signature of the student**

**APPROVAL OF THE ADVISORY COMMITTEE**

| Advisory committee | Name | Signature |
|---|---|---|
| Chairman |  |  |
| Members | 1. |  |
|  | 2. |  |
|  | 3. |  |

**PG coordinator**                                        **Head of the Department**

**DEAN**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

## PROGRAMME OF RESEARCH WORK
(To be sent in triplicate before the end of the semester in which the student registers research credit for the first time or the commencement of research work whichever is earlier)

| | | |
|---|---|---|
| 1. | Name | : |
| 2. | Registration No. | : |
| 3. | Degree | : |
| 4. | Subject | : |
| 5. | Date of joining | : |
| 6. | Title of the research project | : |
| 7. | Objective(s) | : |
| 8. | Duration | : |
| 9. | Location (campus/station) | : |
| 10. | Review of work done | : |
| 11. | Broad outline of work/methodology | : |
| 12. | Semester wise break up of work | : |

**Signature of the student**

**APPROVAL OF THE ADVISORY COMMITTEE**

| Advisory committee | Name | Signature |
|---|---|---|
| Chairman | | |
| Members | 1. | |
| | 2. | |
| | 3. | |

**PG coordinator**                                    **Head of the Department**

**DEAN**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

### CHANGE IN PROGRAMME OF RESEARCH
(To be sent in triplicate)

1.  Name                                                          :

2.  Registration No.                                        :

3.  Degree                                                        :

4.  Subject                                                       :

5.  Reason for change                                    :

6.  Proposed change in the approved
    : programme of research

7.  Number of credits completed so far
    : under the approved programme

8.  a) Whether already earned credits are

    : to be retained or to be deleted

    b)  If retained, justification                      :


                                                              **Signature of the student**


**APPROVAL OF THE ADVISORY COMMITTEE**

| Advisory committee | Name | Signature |
|---|---|---|
| Chairman | | |
| Members | 1. | |
| | 2. | |
| | 3. | |


**PG coordinator**                                      **Head of the Department**

**DEAN**

Form – 4
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

### PROPOSAL OF QUALIFYING EXAMINATION
(To be sent in triplicate)

1.  Name of the Department                          :

2.  Degree                                          :

3.  Subject                                         :

4.  Whether all the courses have been               :
    completed

5.  Number of credits completed                     :

6.  Whether the students have an OGPA of            :
    not less than 7.00/10.00

7.  List of PG students appearing for               :
    qualifying examination

| Sl. No. | Name | Registration No. | OGPA |
|---------|------|------------------|------|
|         |      |                  |      |
|         |      |                  |      |
|         |      |                  |      |
|         |      |                  |      |
|         |      |                  |      |

8.  Panel of External examiners                     :

| Sl. No. | Name and Designation | Address | Area of specialization |
|---------|---------------------|---------|------------------------|
| 1.      |                     |         |                        |
| 2.      |                     |         |                        |
| 3.      |                     |         |                        |

9.  Remarks                                         :


**PG coordinator**                                    **Head of the Department**

DEAN

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

## COMMUNICATION OF RESULT OF QUALIFYING EXAMINATION
(To be sent in triplicate)

1. Name of the student          :

2. Registration No.             :

3. Degree                       :

4. Subject                      :

5. Date of examination          :

6. Date of previous examination :
   (only in case of re-examination)

7. Result (Successful/ Not successful*)  :

   (*) to be written by the external examiner

**EXAMINATION  COMMITTEE**

| | Name in block letters | Signature |
|---|---|---|
| Chairman | | |
| Members | 1. | |
| | 2. | |
| | 3. | |
| External Examiner | | |

**Signature of Chairman with
name and designation**

**PG coordinator**                    **Head of the Department**

**DEAN**

Form – 6
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

### PROPOSAL OF EXTERNAL EXAMINERS FOR THESIS EVALUATION
(To be sent in duplicate in Confidential cover)

1. Name of the student        :

2. Registration No.            :

3. Degree                      :

4. Subject                     :

5. Thesis title                :

6. Name of the Chairman        :

7. Panel of external examiners*    :

| Sl. No. | Name and Designation | Address | Area of specialization |
|---------|----------------------|---------|------------------------|
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |

*Three external examiners should be given

8. Remarks                     :


**Signature of the Chairman of
the advisory committee**




**DEAN**


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Form – 7
# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

**RESULT OF FINAL THESIS VIVA-VOCE EXAMINATION**
(To be sent in duplicate)

1. Name of the student : 
2. Registration No. : 
3. Degree : 
4. Subject : 
5. Thesis title as in final copy of the thesis : 
6. Date and time of *viva-voce* : 
7. Particulars of the External examiner(s) : 
   who has/have evaluated the thesis

| Name and Designation of the External Examiner | Remarks of the External Examiner |
|---|---|
| | RECOMMENDED / RECOMMENDED FOR REVISION / NOT RECOMMENDED |

8. **Recommendation of the Examining committee present at the time of final *viva voce* examination:**
   a. Recommends/ does not recommend unanimously the award of degree
   b. The performance of the candidate in final *viva voce* is assessed as
      _____ (very good/ good/ satisfactory/ not satisfactory)

| Sl. No. | Capacity of examiner | Name in block letters | Signature |
|---|---|---|---|
| 1. | Chairman/Co-opted Chairman* | | |
| 2. | Member        1. | | |
| 3. |               2. | | |
| 4. | Additional member | | |
| 5. | Co-opted member* | | |

* If co-opted in the absence of Chairman/Member
The original report(s) from the external examiner(s) is/ are enclosed


**Head of the Department**

**Chairman of the Examining committee / Advisory committee with designation**

**Annexure – 1**

# DETAILS ON FEE TO BE PAID BY THE STUDENT

(Other than admission fee and semester fee)

| Sl. No. | Particulars | Amount (Rs.) |
|:---:|---|:---:|
| 1. | Late Registration fee | 1000 |
| 2. | Missing mid-semester examination fee (per course) | 1000 |
| 3. | Re-registration fee with juniors | 1000 |
| 4. | Duplicate Hall ticket | 200 |
| 5. | Fee for Transfer Certificate and Conduct Certificate | 200 |
| 6. | Re-examination fee for qualifying exam | 5000 |
| 7. | Fee for availing grace period for submission of thesis | |
| | a) Upto one month | 1000 |
| | b) Up to three months | 2500 |
| 8. | Penalty for re-viva voce examination for thesis | 5000 |
| 9. | Fee for late submission of thesis after final viva-voce | 5000 |
| 10. | Examination fee (per course) | * |
| 11. | Arrear Examination fee (per course) | * |
| 12. | Revaluation fee (per course) | * |
| 13. | Re-totaling fee (per course) | * |
| 14. | Fee for Provisional Degree Certificate | * |
| 15. | Fee for Transcript Card | * |
| 16. | Fee for Degree Certificate | * |
| 17. | Fee for Migration Certificate | * |

**\* As fixed by Pondicherry University from time to time**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARAIKAL – 609 603

# STUDENT REGISTRATION CARD - PG

Name of the student    _____      Academic Year    _____

Registration No.    _____      Semester    _____

Degree Programme    _____      Date of Registration    _____

Year of Admission    _____      Date of Commencement    _____

**COURSES REGISTERED**

| Sl. No. | Course Code | Course Title | Credit Hours | Remarks |
|---|---|---|---|---|
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| | | TOTAL CREDIT HOURS REGISTERED | | |

| | | | |
|---|---|---|---|
| **Signature of the Student** | **Signature of the Chairman** | **Signature of the Head of the Department** | **Coordinator of Examinations** |

APPROVED BY

DEAN
PAJANCOA&RI, KARAIKAL

**Annexure-3**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

## LIST OF ENCLOSURES TO BE SUBMITTED ALONG WITH THESIS

### A. At the time of sending thesis for External Evaluation:

To be submitted to the university
1. One copy of abstract of thesis
2. One copy of the summary of research finding in English (within one page)
3. One copy of the summary of research finding in Tamil (within one page)
4. One page abstract of thesis with key words
5. Result of comprehensive qualifying examination
6. Permission and fee receipt for availing grace period, if any.

To be submitted to the college along with above list
7. Clearance certificates from Hostel
8. Clearance certificates from Library
9. Clearance certificates from Department
10. Clearance certificates from Staff advisor
11. Clearance certificates from Physical Education
12. Approved registration cards (One set)
13. Report cards (one set)
14. Course completion certificate (signed by Chairman and HOD)
15. Attendance Certificate

### B. At the time of submission after final viva-voce:
1. Report of the final thesis viva voce examination (To be sent in duplicate)
2. External Examiners thesis evaluation report (Two copies – original + Xerox)
3. Certificate for having carried out the suggestions of the external examiner and advisory committee
4. Thesis in hard bound copy – One Number.
5. Soft copy the thesis in CD (cover to cover in PDF format) - Two Number.

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

### PROPOSAL FOR RECOGNITION OF TEACHERS FOR TEACHING/GUIDING PG STUDENTS

**1. Particulars of the teacher seeking recognition**

   a.   Name of the teacher    :

   b.   Date of birth of the teacher    :

   c.   Designation & present official address of the teacher    :

   d.   Date of joining service in the entry cadre    :

   e.   Academic qualifications

       Date of acquiring Bachelor's Degree    :

       Date of acquiring Master's Degree    :

       Date of acquiring Ph.D degree    :

   f.   Total service as on the date of this proposal (excluding extraordinary leave)    :

   g.   Date of retirement    :

**2.**   **Recognition proposal submitted for (tick any one)**

       a.   Recognition as teacher for Masters Programme

       b.   Recognition as Guide for Masters Programme

**3.**   **Teaching experience as on the date of Application**

   a. No. of UG courses offered    :

   c. No. of M.Sc courses offered    :

*Signature of the teacher with date*

**4.**   **Particulars to be furnished by Head of the Department**

   No. of existing recognized teachers/guides pertaining to this proposal in your department    :

   Justification for additional requirement of teachers/guide    :

**Signature of the Head of Department**

**Approval of the Dean**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

## PROFORMA FOR REGISTRATION OF RESEARCH CREDITS

### PART- A : PROGRAMME

Semester :  I /  II          Year :                          Date of registration :

1.  Name of the student                                    :

2.  Registration No.

3.  Total research credits completed so for               :

4.  Research credits registered during the semester       :

5.  Programme of work for this semester                   :
    (list out the items of research work to be
    undertaken during the semester)
    i)

    ii)

    iii)

    iv)

**APPROVAL OF THE ADVISORY COMMITTEE**

| Advisory committee | Name | Signature |
|---|---|---|
| Chairman | | |
| Members | 1. | |
| | 2. | |
| | 3. | |

(Approval may be accorded within 10 days of registration)

# PROFORMA FOR EVALUATION OF RESEARCH CREDITS

**PART - B EVALUATION**
(Evaluation to be done before the closure of semester)


Date of closure of semester                    :


Date of evaluation                             :


   1.    Whether the research work has been   :
       carried out as per the approved
       programme

   2.    If there is deviation specify the reasons   :

   3.    Performance *          :


**(*)** Performance may be indicated as **SATISFACTORY /NOT SATISFACTORY**



**APPROVAL OF THE ADVISORY COMMITTEE**

| Advisory committee | Name | Signature |
|---|---|---|
| Chairman | | |
| Members | 1. | |
| | 2. | |
| | 3. | |

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

## PERMISSION FOR LATE REGISTRATION

| | | |
|---|---|---|
| 1. | Name of the student | : |
| 2. | Registration No. | : |
| 3. | Degree | : |
| 4. | Department | : |
| 5. | Semester and Academic year | : |
| 6. | Date of commencement | : |
| 7. | Date of registration without fine | : |
| 8. | Last date for registration with fine | : |
| 9. | Date on which registration is sought | : |
| 10. | Reason | : |
| 11. | Signature of the student | : |
| 12. | Remarks and recommendation of the Chairman | : |

**Signature of the Chairman**

**PG Coordinator**                    **Head of the department**

**DEAN**

# PONDICHERRY UNIVERSITY
## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE
## AND RESEARCH INSTITUTE, KARIAKAL – 609 603

**WILLINGNESS TO BE GIVEN BY THE STUDENTS TO AVAIL FELLOWSHIP FROM
EXTERNALLY FUNDED SCHEMES**

1. Name of the student :
2. Registration No. :
3. Degree :
4. Subject :
5. OGPA of Bachelor degree :
6. Name of the Chairman :
7. Discipline/Department :
8. Thesis topic, if allotted :
9. Current semester and year in which :
   studying
10. Whether all the course works have been :
    completed , if not indicate the pending
    courses with credit loads

**Undertaking by the student:**
i. I am willing to avail the proposed fellowship under the scheme entitled_____
_____.
ii. If I leave in the middle of the tenure of the fellowship, I am willing to repay the fellowship availed with 6% penal interest or any levy/fine imposed by the College/University.
iii. I am fully aware that in case of campus transfer due the award of the fellowship that I have to loose the research credits already registered.
iv. I am fully aware that there is no guarantee for the continuation of the courses, which I currently undergo, in the other campus to which I am likely to be transferred.
v. I am willing to abide by all the rules and regulations laid down by the College/University in this regard.

**Date:**                                                    **Signature of Student**


**Chairman of the Advisory Committee**                **Head of the Department**



**DEAN**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

### ALLOTMENT OF STUDENTS UNDER JRF/SRF STUDENT FELLOWSHIP
(To be submitted to the Dean)

| | | | |
|---|---|---|---|
| 1. | Title of the scheme | : | |
| 2. | Location of the scheme (Department) | : | |
| 3. | Date of sanction of the scheme | : | |
| 4. | Period of the scheme | : | |
| 5. | Type of fellowship | : | JRF/SRF |
| 6. | Period of fellowship (only for the period of research credits registered) | : | |
| 7. | Amount of fellowship | : | Rs……………………p.m |
| 8. | Amount of contingent grant | : | Rs……………………p.a. |
| 9. | Amount of T.A. provided | : | Rs……………………p.a. |
| 10.a. | Whether the technical programme submitted by the student to Dean is the same as envisaged in the scheme proposal | : | Yes / No |
| b. | If not, whether the revised programme of research is submitted (If yes, date of approval by the Dean) | : | |
| 11. | No. of research credit(s) completed so far by the proposed fellowship awardees (student) | : | |
| 12. | Whether the credits earned earlier are to be retained or to be cancelled? | : | |
| 13. | Whether funds received | : | Yes / No |
| 14. | Name of the student(s) & ID.No. | : | |
| 15. | Number of semesters for which fellowship may be sanctioned | : | |
| 16. | Can the fellowship be sanctioned for grace period also. | : | Yes / No |

**Principal Investigator**          **Head of the Department**          **Dean**

**List of Enclosures**

1. Copy of concurrence of the sponsor of the sponsor to avail student fellowship
2. Copy of administrative sanction by Dean
3. Student's willingness and undertaking

**Profrma-5**

# PONDICHERRY UNIVERSITY
# PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE
# AND RESEARCH INSTITUTE, KARIAKAL – 609 603

### SPONSOR'S CONCURRENCE (PROFORMA)

1. Title of the scheme : 


2. Location of the scheme (Department) : 

3. a. Name & Designation of the PI : 

  b. Name and designation of the Co-PI : 

4. Type of fellowship : JRF/SRF

5. Period of fellowship : 

  a. Indicate the period of fellowship to be awarded : 

  b. Amount of fellowship : Rs………………p.m.

  c. Amount of contingent grant : Rs………………p.a.

  d. Amount of T.A. Provided : Rs………………p.a.

  e. Whether Institutional charges paid : Yes/No   Rs…………………


**Signature of the Sponsor**


To
The Dean
PAJANCOA&RI
Karaikal – 609 603

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

### DEPARTMENT OF _____

## COURSE COMPLETION CERTIFICATE

This is to certify that Thiru./Selvi/Tmt. _____

Registration No. _____ has completed all the course and research

credit requirements on _____ for the award of

_____ degree.

**Professor and Head**

**Signature of the Chairman
(with Name and designation)**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

**JUSTIFICATION FOR LATE SUBMISSION OF THESIS (if applicable)**

1.  Name of the student                                        :

2.  I.D. No.                                                   :

3.  Degree                                                     :

4.  Subject                                                    :

5.  Date of first registration for the degree                 :

6.  Number of semesters for which the candidate could not register : 

7.  Reason for not registering and continuing the study       :

8.  Period of delay in submission of thesis                   :

9.  Period lost due to transfer/ill health                    :

10. Date of submission of thesis                              :

**Signature of the student**

11. Specific remarks and recommendation of the Chairman       :

**Signature of the Chairman
with designation**

12. Specific remarks and recommendation of the Head of department : 

**Signature of the Head**

13. Approval of the Dean                                      :

**Signature of the Dean**

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

## PROFORMA FOR EVALUATION OF THESIS

Name of the degree programme: _____.

| | | | |
|---|---|---|---|
| 1. | Name and Designation of the examiner | : | |
| 2. | Address of the Examiner | : | |
| | Telephone/Mobile | : | |
| | Fax | : | |
| | e-mail | : | |
| 3. | Name of the candidate | : | |
| 4. | Registration No. | : | |
| 5. | Title of the thesis | : | |
| 6. | Date of receipt of the thesis copy | : | |
| 7. | Date of despatch of the detailed report and thesis by the examiner to the Dean | : | |
| 8. | Examiner's recommendations choosing one of the following based on quality of thesis | : | a.     Recommended for award<br><br>b.     Recommended for revision |
| 9. | Please state whether a list of questions if any to be asked at the viva-voce examination (Questions to be attached) | : | |

Date :                           Signature of the Examiner

Official Seal :

Note : Please enclose a detailed report in duplicate duly signed by you giving the merits and demerits of the thesis on the choice of problem, review of literature, methods followed, results and discussion etc.

# PONDICHERRY UNIVERSITY

## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

### DEPARTMENT OF _____

## CERTIFICATE FOR HAVING CARRIED OUT THE SUGGESTIONS OF THE EXTERNAL EXAMINER AND ADVISORY COMMITTEE
(To be enclosed along with result of the final viva voce examination)

Certified that Thiru/Selvi/Tmt _____

Registration No. _____ has carried out all the corrections and suggestions

as pointed out by the external examiners(s) and the advisory committee and has

submitted **FOUR** copies of his/her M.Sc. thesis in hard bound cover and **TWO** soft copies

of thesis in PDF format in CDs.

**Head of the department**

**Signature of the Chairman
with Name and designation**

# PONDICHERRY UNIVERSITY
## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE AND RESEARCH INSTITUTE, KARIAKAL – 609 603

**PROFORMA FOR OBTAINING PERMISSION TO PRESENT PAPERS IN SEMINAR/SYMPOSIA/TRAINING**
(To be sent in triplicate)

| | | | |
|---|---|---|---|
| 1. | Name of the student | : | |
| 2. | Registration No. | | |
| 3. | Department & College | : | |
| 4. | Name of the Chairman with designation | : | |
| 5. | Whether course work has been completed? | | |
| 6. | Title of paper/poster to be presented (enclose copy) | : | |
| 7. a. | Name of the seminar/symposium | : | |
| b. | Venue | : | |
| c. | Dates(From-To) | : | |
| 8. | Period of absence (in days) inclusive of travel time | : | |
| 9. | Whether the paper was sent through proper channel (copy to be enclosed) | : | |
| 10. | Cost of travel & registration fee borne by the student himself (or) supported by the scheme in which he is drawing fellowship? | : | |

Date:                                                              Signature of the Student

**Specific Recommendations:**


**Chairman**                                                                                    **Professor and Head**

_____

### PERMISSION TO ATTEND THE SEMINAR/SYMPOSIA
(to be issued by the Dean)

1. Permitted without any financial commitment to the College/ University / **Not permitted**
2. Period of absence from_____ to _____(_____ days) is to be treated as duty and can be counted for attendance.
3. Period of absence from _____to _____(_____days) **is not treated as duty and cannot be counted for attendance.**
4. The student should submit a report to the Dean, within 3 days after his return.


**DEAN**

# PONDICHERRY UNIVERSITY
## PANDIT JAWAHARLAL NEHRU COLLEGE OF AGRICULTURE
## AND RESEARCH INSTITUTE, KARIAKAL – 609 603

**APPLICATION FOR ISSUE OF CONDUCT AND TRANSFER CERTIFICATES**

(To be submitted by the student with the recommendation of the Chairman/Head)

1. Name of the student            :

2. Registration No.            :

3. Name of the Chairman            :

4. Designation of the Chairman            :

5. Name of the course undergone            :

6. Year of joining course            :

7. Year of leaving the course            :

8. Whether copy of the PC enclosed            :

9. Whether original clearance            :
   certificate from warden enclosed

**Date:**                                           **Signature of the Student**

**Recommendations:**

Certified that the conduct and characters of Mr/Ms. _____

were _____ during the period of his/her studies. The certificates may be issued accordingly.

**Chairman**                      **PG Co-ordinator**           **Professor & Head**

# CURRICULUM

# LIST OF COURSES

| Code | Course Title | Credits |
|---|---|---|
| | **Major Courses  (20 Credits)** | |
| AEC 501* | Micro Economic Theory and Applications | 2+1 |
| AEC 502* | Macro Economics and Policy | 2+0 |
| AEC 503* | Evolution of Economic Thought | 1+0 |
| AEC 504* | Agricultural Production Economics | 1+1 |
| AEC 505* | Agricultural Marketing and Price Analysis | 2+1 |
| AEC 506* | Research Methodology for Social Sciences | 1+1 |
| AEC 507* | Econometrics | 2+1 |
| AEC 508* | Agricultural Finance and Project Management | 1+1 |
| AEC 509* | Agricultural Development Policy Analysis | 2+0 |
| | | |
| | **Minor Courses  (9 Credits)** | |
| AEC 510 | International Economics | 1+1 |
| AEC 511 | Institutional Economics | 1+0 |
| AEC 512 | Natural Resource and Environmental Economics | 1+1 |
| AEC 513 | Rural Marketing | 2+0 |
| AEC 514 | Commodity Futures Trading | 2+0 |
| COM 501** | Computer Applications for Agricultural Economics | 0+1 |
| MAT 502 | Operation Research | 1+1 |
| | | |
| | **Supporting Courses  (5 Credits)** | |
| MAT 501 | Mathematics for Agricultural Economics | 2+1 |
| STA 501 | Statistical Methods | 1+1 |
| | | |
| | **Seminar and Research  (21 Credits)** | |
| AEC 591 | Seminar | 0+1 |
| AEC 599 | Research | 0+20 |
| | | |
| | **Non-Credit Compulsory Courses (6 Credits)** | |
| PGS 501* | Library And Information Services | 0+1 |
| PGS 502* | Technical Writing and Communication Skills | 0+1 |
| PGS 503 * | Intellectual Property and Its Management In Agriculture *(e-Course)* | 1+0 |
| PGS 504* | Basic Concepts In Laboratory Techniques | 0+1 |
| PGS 505* | Agricultural Research, Research Ethics and Rural Development Programmes *(e-Course)* | 1+0 |
| PGS 506* | Disaster Management *(e-Course)* | 1+0 |

* Courses to be compulsorily registered by the students

** Cross listed with STA503-Data Analysis Using Statistical Packages – I   (0+1)

# MAJOR COURSES

## AEC 501     MICRO ECONOMIC THEORY AND APPLICATIONS     2+1

### Theory

**Unit I**

Theory of Consumer Behaviour - Cardinal Utility Approach - Ordinal Utility Approach – Income effect and substitution effect – Applications of Indifference curve approach - Revealed Preference Hypothesis.

**Unit II**

Consumer surplus - Derivation of Demand curve – Elasticity of demand. Compensatory and equivalent variations.

**Unit III**

Theory of Production - Production functions – Returns to scale and economies of scale – Technical progress – Theory of Costs – Cost curves– Profit maximization and cost minimization – Derivation of supply curve – Law of Supply – Producers' surplus.

**Unit IV**

Market Equilibrium - Behavior of Firms in Competitive Markets - Perfect Competition- Effect of Taxation and Subsidies on market equilibrium - Monopoly- Monopolistic - Oligopoly- Theory of Factor Markets.

**Unit V**

General Equilibrium Theory - Welfare Economics - Pareto Optimality – Social welfare criteria - Social Welfare functions.

### Practical

Utility maximization problem under indifference curve approach – Mathematical and graphical approaches. Demand Analysis – Demand functions - Estimation of elasticity of demand under different demand functions. Problems in profit maximization and cost minimization – Problems in cost functions - Derivation of Various Cost Functions – Derivation of Equilibrium under different market Structure - Analysis of Consumer's Surplus and Producer's Surplus - Analysis of Impact of Subsidies and Taxation on Producer and Consumer.

### References

1. David M Kreps 1990. A Course in Microeconomic Theory. Princeton University. Press.
2. Dewitt KK. 2002. Modern Economic Theory. Sultan Chand & Co.
3. Henderson JM & Quandt RE. 2000. Microeconomic Theory: A Mathematical Approach. McGraw-Hill.
4. Koutsoyiannis A. 2003. Modern Microeconomics. The Macmillan Press.
5. Silberberg E & Suen W. 2001. The Structure of Economics – A Mathematical Analysis. McGraw-Hill.
6. Varian Hal R. 1999. Intermediate Microeconomics. Affiliated East-West Press.

## AEC 502    MACRO ECONOMICS AND POLICY    2+0

**Theory**

**Unit I**

Nature and Scope of Macro Economics- Methodology and Keynesian Concepts National Income - Concepts and measurement- Classical theory of Employment and Say's Law- Modern theory of Employment and Effective Demand.

**Unit II**

Consumption function- Investment and savings - Concept of Multiplier and Accelerator - Output and Employment – Rate of interest - Classical, Neo classical and Keynesian version- Classical theory Vs Keynesian theory - Unemployment and Full employment.

**Unit III**

Money and classical theories of Money and Price - Keynesian theory of money and Friedman Restatement theory of money - Supply of Money - Demand for Money -Inflation: Nature, Effects and control.

**Unit IV**

IS & LM frame work - General Equilibrium of product and money markets -Monetary policy - Fiscal policy- Effectiveness of Monetary and Fiscal policy - Central banking.

**Unit V**

Business cycles - Balance of Payment - Foreign Exchange Rate determination.

### References

1. Ahuja HL. 2007. Macroeconomics: Theory and Policy. S. Chand & Co.
2. Eugene A Diulio 2006. Macroeconomics. 4th Ed. Schaums' Outlines.
3. Gardner Ackely 1987. Macro Economic: Theory and Policy. Collier Macmillan.
4. Dornbusch. 2006. Macroeconomics. McGraw Hill Publication


## AEC 503    EVOLUTION OF ECONOMIC THOUGHT    1+0

**Theory**

**Unit I**

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**

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

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

### Unit IV

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.

### Unit V

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.

## References

1. Blaug M. 1964. *Economic Theory in Retrospect*. Heineman.
2. Blaug M. 1986. *Economic History and the History of Economic Thought*. Wheatsheaf Books, Brighton.
3. Ekelund RB & Hebert RF. 1975. *A History of Economic Theory and Methods*. McGraw-Hill.
4. John Mills A. 2002. *Critical History of Economics: Missed Opportunities*. Palgrave Macmillan.
5. Screpanti E & Zamagni S. 1995. *An Outline of the History of Economic Thought*. Clarendon Press, Oxford.

## AEC 504     AGRICULTURAL PRODUCTION ECONOMICS     1+1

### Theory

### Unit I

Nature, scope and significance of agricultural production economics - Agricultural Production processes, character and dimensions-spatial, temporal - Centrality of production functions, assumptions of production functions, commonly used forms - Properties, limitations, specification, estimation and interpretation of commonly used production functions.

### Unit II

Factors of production, classification, interdependence, and factor substitution - Determination of optimal levels of production and factor application - Optimal factor combination and least cost combination of production - Theory of product choice; selection of optimal product combination.

### Unit III

Cost functions and cost curves, components, and cost minimization -Duality theory – cost and production functions and its applications -Derivation of firm's input demand and output supply functions -Economies and diseconomies of scale.

**Unit IV**

Technology in agricultural production, nature and effects and measurement - Measuring efficiency in agricultural production; technical, allocative and economic efficiencies.

**Unit V**

Yield gap analysis-concepts-types and measurement - Nature and sources of risk, modeling and coping strategies.

## Practical

Different forms of production functions - specification, estimation and interpretation of production functions – returns to scale, factor shares, elasticity of production - physical optima -economic optima-least cost combination- optimal product choice- cost function estimation, interpretation-estimation of yield gap - incorporation of technology in production functions- measuring returns to scale-risk analysis through linear programming

## References
1. Beattie BR & Taylor CR. 1985. *The Economics of Production*. John Wiley & Sons.
2. Doll JP & Frank O. 1978. *Production Economics - Theory and Applications*. John Wiley & Sons.
3. Gardner BL & Rausser GC. 2001. *Handbook of Agricultural Economics*. Vol. I. *Agricultural Production*. Elsevier.
4. Heady EO. *Economics of Agricultural Production and Resource Use*. Prentice-Hall.
5. Sankayan PL. 1983. *Introduction to Farm Management*. Tata Mc Graw Hill.

## AEC 505       AGRICULTURAL MARKETING AND PRICE ANALYSIS       2+1

## Theory
### Unit I
Review of Concepts in Agricultural Marketing - Characteristic of Agricultural product and Production – Problems in Agricultural Marketing from Demand and Supply and Institutions sides. Market intermediaries and their role - Need for regulation in the present context - Marketable & Marketed surplus estimation. Marketing Efficiency - Structure Conduct and Performance analysis - Vertical and Horizontal integration - Integration over space, time and form-Vertical co-ordination.

### Unit II
Marketing Co-operatives – APMC Regulated Markets - Direct marketing, Contract farming and Retailing - Supply Chain Management - State trading, Warehousing and other Government agencies -Performance and Strategies - Market infrastructure needs, performance and Government role - Value Chain Finance.

### Unit III
Role of Information Technology and telecommunication in marketing of agricultural commodities - Market research-Market information service - electronic auctions (e-bay), e-Chaupals, Agmarket and Domestic and Export market Intelligence Cell (DEMIC) – Market extension.

**Unit IV**

Spatial and temporal price relationship – price forecasting – time series analysis – time series models – spectral analysis. Price policy and economic development – non-price instruments.

**Unit V**

Theory of storage - Introduction to Commodities markets and future trading - Basics of commodity futures - Operation Mechanism of Commodity markets – Price discovery - Hedging and Basis - Fundamental analysis - Technical Analysis - Role of Government in promoting commodity trading and regulatory measures.

## Practical

Supply and demand elasticities in relation to problems in agricultural marketing. Price spread and marketing efficiency analysis. Marketing structure analysis through concentration ratios. Performance analysis of Regulated market and marketing societies. Analysis on contract farming and supply chain management of different agricultural commodities, milk and poultry products. Chain Analysis - quantitative estimation of supply chain efficiency - Market Intelligence – Characters, Accessibility, and Availability Price forecasting. Online searches for market information sources and interpretation of market intelligence reports – commodity outlook - Technical Analysis for important agricultural commodities - Fundamental Analysis for important agricultural commodities - Presentation of the survey results and wrap-up discussion.

## References

1.  Purecell WD & Koontz SR. 1999. *Agricultural Futures and Options: Principles and Strategies*. 2nd Ed. Prentice-Hall.
2.  Rhodes VJ. 1978. *The Agricultural Marketing System*. Grid Publ., Ohio.
3.  Shepherd SG & Gene AF. 1982. *Marketing Farm Products*. Iowa State Univ. Press.
4.  Singhal AK. 1986. *Agricultural Marketing in India*. Annual Publ., New Delhi.

## AEC 506    RESEARCH METHODOLOGY FOR SOCIAL SCIENCES    1+1

## Theory

**Unit I**

Importance and scope of research in agricultural economics. Types of research - Fundamental vs. Applied. Concept of researchable problem – research prioritization – selection of research problem. Approach to research – research process.

**Unit II**

Hypothesis – meaning - characteristics - types of hypothesis – review of literature – setting of Course Objective and hypotheses - testing of hypothesis.

**Unit III**

Sampling theory and sampling design – sampling error - methods of sampling – probability and non-probability sampling methods - criteria to choose. Project proposals – contents and scope – different types of projects to meet different needs – trade-off between scope and cost of the study. Research design and techniques – Types of research design.

**Unit IV**

Data collection – assessment of data needs – sources of data collection – discussion of different situations. Mailed questionnaire and interview schedule – structured, unstructured, open ended and closed-ended questions. Scaling Techniques. Preparation of schedule – problems in measurement of variables in agriculture. Interviewing techniques and field problems - methods of conducting survey – Reconnaissance survey and Pre testing.

**Unit V**

Coding editing – tabulation – validation of data. Tools of analysis – data processing. Interpretation of results – Preparing research report / thesis – Universal procedures for preparation of bibliography – writing of research articles.

## Practical

Exercises in problem identification. Project proposals – contents and scope. Formulation of Objective and hypotheses. Assessment of data needs – sources of data – methods of collection of data. Methods of sampling – criteria to choose – discussion on sampling under different situations. Scaling Techniques – measurement of scales. Preparation of interview schedule - Field testing. Method of conducting survey. Exercise on coding, editing, tabulation and validation of data. Preparing for data entry into computer. Hypothesis testing – Parametric and Non-Parametric Tests. Exercises on format for Thesis / Report writing. Presentation of the results.

## References

1. Black TR. 1993. *Evaluating Social Science Research - An Introduction.* SAGE Publ.
2. Creswell JW. 1999. *Research Design - Qualitative and Quantitative Approaches.* SAGE Publ.
3. Dhondyal SP. 1997. *Research Methodology in Social Sciences and Essentials of Thesis Writing*. Amman Publ. House, New Delhi.
4. Kothari CR. 2004. *Research Methodology - Methods and Techniques.* Wishwa Prakashan, Chennai.
5. Rao KV. 1993. *Research Methodology in Commerce and Management.* Sterling Publ., New Delhi.
6. Singh AK. 1993. *Tests, Measurements and Research Methods in Behavioural Sciences.* Tata McGraw-Hill.
7. Venkatasubramanian V. 1999. *Introduction to Research Methodology in Agricultural and Biological Sciences*. SAGE Publ.

# AEC 507    ECONOMETRICS    2+1

## Theory

### Unit I
Introduction – relationship between economic theory, mathematical economics, models and econometrics - centrality of hypothesis testing-methodology of econometrics-regression analysis

### Unit II
Basic two variable regression model – assumptions, estimation and interpretation-approaches to estimation - OLS methods and its properties - extensions to multi variable models-multiple regression estimation and interpretation.

### Unit III
Violation of regression assumptions – Testing for the presence of multicollinearity - Zero-order correlation matrix - Auxiliary regressions - Eigen values, condition index and Variance inflation factor. Consequences and remedial measures for Multicollinearity. Heteroscedasticity problem - Diagnostic techniques to identify heteroscedasticity - Graphical method - Park test -Goldfeld-Quandt test and White's test. Consequences and remedial measures for heteroscedasticity -Weighted least Squares and transformation of original model - The problem of autocorrelation – Diagnostic techniques for autocorrelation - Graphical method, Durbin-Watson 'd' test - Breusch - Godfrey Test - Consequences and remedial measures for autocorrelation.

### Unit IV
Dummy variable regression models - intercept and slope dummy - estimation and interpretation - Dummy dependent variable models - Linear probability models, logit and probit models - estimation and interpretation

### Unit V
Simultaneous equation models – structural equations - reduced form equations -identification and approaches to estimation.

## Practical
Single equation two variable model specification and estimation - hypothesis testing-restrictions on parameters - transformations of functional forms and OLS application-estimation of multiple regression model - hypothesis testing - testing and correcting specification errors - testing and managing Multicollinearity - testing and managing heteroscedasticity - testing and managing autocorrelation - estimation of regressions with dummy explanatory variables –Intercept and slope dummy variable models. Estimation of regression with limited dependent variable – Logit and probit models. Identification of equations in simultaneous equation systems.

## References
1. Johnson AG Jr., Johnson MB & Buse RC. 1990. Econometrics - Basic and Applied. MacMillan.
2. Pindyck, R.S. and D.L. Rubinfeld, Econometrics Models and Econometric Forecasts, (New York: McGraw Hill), 1990.
3. Maddala G.S. 1992.  Introduction to Econometrics, MacMillan,  NewYork.
4. Harry. H. Kelejian, and Walace E. Oates. 1994.  Introduction to Econometrics Principles  and Applications, Harper and Row Pub., NewYork
5. Maddala GS. 1997. Econometrics. McGraw Hill.
6. Koutsoyianis, A. 1997. Theory of Econometrics, Barner and Noble, NewYork.
7. Gujarati, D.N. 2003.  Basic Econometrics, McGraw Hill Book Co., New Delhi.

## AEC 508    AGRICULTURAL FINANCE AND PROJECT MANAGEMENT    1+1

### Theory

**Unit I**

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 MFI's - NGO's, and SHG's.

**Unit II**

Lending to farmers – The concept of 3 C's, 7 P's and 3 R's of credit. 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.

**Unit III**

Financial Decisions – Investment, Financing, Liquidity and Solvency. Preparation of financial statements - Balance Sheet, Cash Flow Statement and Profit and Loss Account. Ratio Analysis and Assessing the performance of farm/firm efficiency and break even analysis.

**Unit IV**

Project Approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques – Undiscounted measures. Time value of money – Use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Net work Techniques – PERT and CPM.

**Unit V**

Risks in financing agriculture. Risk management strategies and coping mechanism. Crop Insurance programmes – review of different crop insurance schemes - yield loss and weather based insurance and their applications.

### Practical

Development of Rural Institutional Lending - Branch Expansion, Demand and Supply of Institutional Agricultural Credit. Financial Inclusion, Overdues and Loan Waiving: An Overview. Rural Lending Programmes of Co-operative Lending Institutions. Rural Lending Programmes of Commercial Banks and RRBs. Lead Bank Scheme - Preparation of District Credit Plan. NABARD – Functions. Policies for Revamping the Rural Institutional Credit System. Financial Instruments and Methods – E - banking, Kisan Credit Cards and Core Banking. Performance of Micro Financing Institutions - NGO's and Self-Help Groups. Identification and Formulation of Investment Projects. Project Appraisal Techniques – Undiscounted and Discounted Measures and their Limitations. Preparation of Financial Statements using Farm / Firm Level Data. Farm Credit Appraisal Techniques. Monitoring and Evaluation of Agricultural Projects. Farm Financial Analysis through Financial Statements. Network Techniques – PERT and CPM for Project Management. Case Study Analysis of an Agricultural Project. Financial Risk and Risk Management Strategies – Crop Insurance Schemes.

**References**
1. Dhubashi PR. 1986. *Policy and Performance - Agricultural and Rural Development in Post Independent India*. Sage Publ.
2. Gittinger JP 1982. *Economic Analysis of Agricultural Projects*. The Johns Hopkins Univ. Press.
3. Gupta SC. 1987. *Development Banking for Rural Development*. Deep & Deep Publ.
4. Little IMD & Mirlees JA. 1974. *Project Appraisal and Planning for Developing Countries*. Oxford & IBH Publ.
5. Muniraj R. 1987. *Farm Finance for Development*. Oxford & IBH Publ.
6. Gupta, S.C. 1987. Development Banking for Rural Development. Deep & Deep Publications.
7. Subba Reddy, S., 2008. Agriculture Finance & Management, Oxford & IBH, New Delhi

## AEC 509      AGRICULTURAL DEVELOPMENT POLICY ANALYSIS      2+0

## Theory
### Unit I
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
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 / rural development – theories of agricultural development – Population and food supply - need for sound agricultural policies – resource policies – credit policies – input and product marketing policies – price policies.

### Unit IV
Development issues, poverty, inequality, unemployment and environmental degradation – Models of Agricultural Development – Induced Innovation Model - policy options for sustainable agricultural development.

### Unit V
Globalization and the relevance of development policy analysis – The dilemma of free trade? – Free trade versus Protectionism- Arguments for protection. Arguments against protection. Role of protection in Developing Countries. WTO – Agreement on Agriculture - Contradictions of free trade - proponents and opponents policies in vulnerable sectors like agriculture – Lessons for developing countries.

## References

1. Chakaravathi RM. 1986. *Under Development and Choices in Agriculture*. Heritage Publ., New Delhi.
2. Diwett KK. 2002. *Modern Economic Theory*. S. Chand & Co.
3. Eicher KC & Staatz JM. 1998. *International Agricultural Development*. Johns Hopkins Univ. Press.
4. Frank E. 1992. *Agricultural Polices in Developing Countries*. Cambridge Univ. Press.
5. Ghatak S & Ingersent K. 1984. *Agriculture and Economic Development*. Select Book Service Syndicate, New Delhi.
6. Jhingan ML. 1998. *The Economics of Development and Planning*. Vrinda Publ.
7. Jules PN. 1995. *Regenerating Agriculture – Polices and Practice for Sustainability and Self Reliance*. Vikas Publ. House.
8. Naqvi SNH. 2002. *Development Economics – Nature and Significance*. Sage Publ.

# MINOR COURSES

### AEC 510     INTERNATIONAL ECONOMICS     1+1

## Theory
### Unit I
Scope and Significance of International Economics - The role of trade- General Equilibrium in a Closed Economy (Autarky Equilibrium) – Equilibrium in a Simple Open Economy - Possibility of World Trade - Trade gains and Trade Equilibrium.

### Unit II
Tariff, Producer Subsidy, Export Subsidy, Import Quota and Export Voluntary Restraints-The Case of Small Country and Large Country Case.

### Unit III
Ricardian Model of Trade- Specific Factors Model- Heckscher - Ohlin Model - Trade Creation and Trade Diversion – Offer Curve - Export Supply Elasticity and Import Demand Elasticity - Comparative Advantage and Absolute Advantage.

### Unit IV
Official Exchange Rate and Shadow Exchange Rate - Walra's Law and Terms of Trade – Trade Blocks.

### Unit V
IMF, World Bank, IDA, IFC, ADB – International Trade agreements – Uruguay Round – GATT – WTO.

## Practical
Producer's Surplus, Consumer's Surplus, National Welfare under Autarky and Free Trade Equilibrium with small and large country assumption- Estimation of Trade Gains- Estimation of competitive and comparative measures like NPC, EPC, ERP and DRC- Estimation of Offer Curve Elasticity- Estimation of Effect of Tariff, Export Subsidy, Producer Subsidy, Import Quota and Export Voluntary Restraints on National Welfare- Estimation of Ricardian Model - Estimation of Effect of Trade under Specific Factor Model- Estimation of trade Equilibrium under Heckscher -Ohlin model - Trade Creation and Diversion.

## References
1. Apple Yard DR & Field AJ Jr. 1995. *International Economics - Trade, Theory and Policy*. Irwin, Chicago.
2. Cherunilam F. 1998. *International Economics*. Tata McGraw Hill.
3. Krugman PR & Obstfeld M. 2000. *International Economics – Theory and Policy*. Addison-Wesley.

# AEC 511    INSTITUTIONAL ECONOMICS    1+0

## Theory
### Unit I
Old and New Institutional Economics - Institutional Economics Vs Neo- classical Economics. Definition of institutions – Distinction between institutions and organizations - Institutional evolution

### Unit II
Institutional change and economic performance - national and international economic institutions. Transaction cost economics – Transaction costs and the allocation of resources. Transaction costs and efficiency. Asymmetric information - Moral hazard and Principal-Agent problem.

### Unit III
Free rider problem – path dependency – Interlinked transactions. Collective action and the elimination of free -rider problem - The logic of collective action and its role in reducing free rider problem – theory of Groups. Rent seeking – interest groups and policy formulation.

### Unit IV
Economic analysis of property rights- property rights regimes – private property – State Property - Common property Resources (CPRs) – public goods and club goods.

### Unit V
Special features of institutional arrangements in agriculture – Transaction costs in agriculture - Case Studies - Theories of agrarian institutions - tenancy institutions.

## References
1. Barzel, Y. 1990. *Economic Analysis of Property Rights*. Cambridge Univ. Press.
2. Bhardhan P. (Ed.). 1989. *The Economic Theory of Agrarian Institutions*. Clarendon Press, Oxford.
3. Bromley DW. 1989. *Economic Interests and Institutions: The Conceptual Foundations of Public Policy*. Basil Blackwell, Cambridge.
4. Eggertsson T. 1990. *Economic Behaviour and Institutions*. Cambridge Univ. Press.
5. Greif A. 2006. *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade (Political Economy of Institutions & Decisions).* Cambridge Univ. Press.
6. Neelakandan S. 1992. *New Institutional Economics and Agrarian Change – A Primer*. Indian Economic Association Trust for Research and Development, New Delhi.
7. North DC. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge Univ. Press.
8. Ostrom E. 1990. *Governing the Commons: The Evolutions of Institutions for Collective Actions.* Cambridge Univ. Press.

## AEC 512    NATURAL RESOURCE AND ENVIRONMENTAL ECONOMICS

## 1+1

### Theory

**Unit I**

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**

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**

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**

Environmental perspectives - biocentrism, sustainability, anthropocentrism - Environmental problems and quality of environment - Sources and types of pollution -air, water, solid waste, land degradation – environmental and economic impacts - Economics of pollution control-demand for environmental quality-efficient reduction in environmental pollution.

**Unit V**

Environmental regulation – economic instruments - pollution charges - Pigovian tax - tradable permits – indirect instruments - environmental legislations in India. 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 - mitigation efforts and 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- Contingent Ranking-Discount rate in natural resource management. Environment impact assessment Visit to Pollution Control Board.

### References

1. Ahmad Y, El Serafy S & Lutz E. (Eds.). 1989. Environmental Accounting for Sustainable Development. World Bank.
2. Freeman AM. 1993. *The Measurement of Environmental and Resource Values*. Resources for the Future Press, Baltimore.

3. Hackett SC. 2001. *Environmental and Natural Resource Economics: Theory, Policy, and the Sustainable Society*. M. E. Sharpe, Armonk, NY.
4. Hartwick JM & Olewiler ND. 1998. *The Economics of Natural Resource Use*. 2nd Ed. Addison-Wesley Educational Publ.
5. Kerr JM, Marothia DK, Katar Singh, Ramasamy C & Bentley WR. 1997. *Natural Resource Economics: Theory and Applications in India.* Oxford & IBH.
6. Kolstad CD. 2000. Environmental Economics. Oxford Univ. Press.
7. Pearce DW & Turner K. 1990. *Economics of Natural Resources and the Environment*. John Hopkins Univ. Press.
8. Prato T. 1998. *Natural Resource and Environmental Economics*. Iowa State Univ. Press.
9. Sankar U. 2001. Environmental Economics. Oxford Univ. Press.
10. Sengupta R. 2000. *Ecology and Economy, an Indian Perspective*. Oxford Univ. Press.
11. Tietenberg T. 2003. *Environmental and Natural Resource Economics*. 6th Ed. Addison Wesley.

# AEC 513      RURAL MARKETING      2+0

## Theory

### Unit I
Concept and scope of rural marketing, nature and characteristics of rural markets, potential of rural markets in India.

### Unit II
Environmental factors - socio-cultural, economic and other environmental factors affecting rural marketing.

### Unit III
Rural consumer's behaviour - behavior of rural consumers and farmers; buyer characteristics and buying behaviour; Rural v/s urban markets.

### Unit IV
Rural marketing strategy - Marketing of consumer durable and non-durable goods and services in the rural markets with special reference to product planning; product mix, pricing Course Objective, pricing policy and pricing strategy.

### Unit V
Product promotion - Media planning, planning of distribution channels, and organizing personal selling in rural market in India.

## References
1. Krishnamacharyulu CSG & Ramakrishan L. 2002. *Rural Marketing.* Pearson Edu.
2. Ramaswamy VS & Nanakumari S. 2006. *Marketing Management.* 3rd Ed. MacMillan.
3. Singh AK & Pandey S. 2005. *Rural Marketing*. New Age.
4. Singh Sukhpal. 2004. *Rural Marketing*. Vikas Publ. House.

## AEC 514       COMMODITY FUTURES TRADING       2+0

**Theory**

**Unit I**

History and Evolution of commodity markets – Terms and concepts: spot, forward and futures Markets – factors influencing spot and future markets. Speculatory mechanism in commodity futures.

**Unit II**

Transaction and settlement – delivery mechanism - role of different agents - trading strategies - potential impact of interest rate, Foreign Exchange, FDI in Commodity Markets.

**Unit III**

Risk in commodity trading, importance and need for risk management measures - managing market price risk: hedging, speculation, arbitrage, swaps - pricing and their features.

**Unit IV**

Important global and Indian commodity exchanges - contracts traded – special features -Regulation of Indian commodity exchanges - FMC and its role.

**Unit V**

Fundamental Vs Technical analysis – construction and interpretation of charts and chart patterns for analyzing the market trend – Market indicators – back testing. Introduction to technical analysis software – analyzing trading pattern of different commodity groups.

**References**

1. Kaufman PJ. 1986. *The Concise Handbook of Futures Markets*. John Wiley & Sons.
2. Leuthold RM, Junkus JC & Cordier JE. 1989. *The Theory and Practice of Futures Markets*. Lexington Books.
3. Lofton T. 1993. *Getting Started in Futures*. 3rd Ed. John Wiley & Sons, 1993. Purcell WD. 1991. *Agricultural Futures and Options: Principles and Strategies*. Macmillan Publ.
4. Wasendorf RR & McCafferty 1993. *All about Commodities from the Inside Out*. McGraw-Hill.


## COM 501   COMPUTER APPLICATIONS FOR AGRICULTURAL ECONOMICS  0+1

**[Cross listed with STA 503 Data Analysis Using Statistical Packages - I     0+1]**

**Practical**

Website creation using HTML and DHTML . Introduction to R / SPSS / equivalent. Use of R / SPSS / equivalent for- Descriptive  statistics, data transformations, mean, median, range, variance, standard deviation, skewness, kurtosis. Use of R / SPSS / equivalent for - Covariance, Correlation coefficient, Simple and Multiple Linear regression, Independent sample t test, Paired t test, Z-test.  Use of R / SPSS / equivalent for - ANOVA, Completely Randomized Design (One way ANOVA), Randomized Block Design (Two way ANOVA), Factorial Designs Split-Plot Design, Split-Block (Strip-Plot) Design, Split-Split-Plot Design, Chi-square goodness of fit test and Chi-square test of independence, Plots

## References

1. Fazreil Amreen, GIMP Starter, 2013, Packt Publishing
2. Bethany Hiitola, Inkscape 0.48 Essentials for Web Designers, 2010, Packt Publishing
3. John Paul Mueller, HTML5 Programming with JavaScript for Dummies, 2013, John Wiley and Sons, Inc.
4. J.M. Gustafson, HTML5 Web Application Development By Example, 2013, Packt Publishing
5. Sarah Stowell, Using R for Statistics, 2014, APress
6. Joaquim.P. Marques de Sa, Applied Statistics using SPSS, STATISTICA, MATLAB and R, Springer
7. Elementary Statistics with R - http://www.r-tutor.com/elementary-statistics
8. Design Resources Server, IASRI(ICAR), India - www.iasri.res.in/design
9. Rajender Parsad, R. Srivastava, V.K. Gupta, Design and Analysis of Agricultural Experiments, IASRI(ICAR), India - http://www.iasri.res.in/design/Electronic-Book/index.htm
10. Rajender Parsad, V.K. Gupta, Lal Mohan Bhar, V.K. Bhatia, Advances in Data Analytical Techniques, IASRI(ICAR), India - http://www.iasri.res.in/ebook/EBADAT/index.htm
11. PSPP Manual - http://www.gnu.org/software/pspp/manual/pspp.pdf
12. Gnumeric Manual - https://help.gnome.org/users/gnumeric/stable/gnumeric.html

# MAT 502     OPERATION RESEARCH   1+1

**THEORY:**

**UNIT I-** Operation Research models-deterministic and probabilistic models-uses and limitations of operation research-Problem formulation for programming, preparation of input -output matrix, objective functions and constraint equations. Assumption of L.P. basic and non-basic solutions. Feasible and infeasible solutions.

**UNIT II-** Simplex method and its application for solving agricultural problems. Problems of degeneracy, inconsistency, infeasible and unbounded solutions. The generalized simplex method. The dual method; the dual simplex method. Application of linear programming for solving practical problems in farming.

**UNIT III** – Risk programming (MOTAD), sensitivity Analysis, Multi-criterion decision making models in agriculture. Transportation models. Farm level/state level/regional level/sector level modelling of agriculture. Application of Computer software's for solving practical optimization problems.

**UNIT IV** – Decision Analysis-Decision making under certainty -Decision making under risk- decision tree Analysis-Expected value of perfect information- Sensitivity Analysis – Multi –Criterion decision Making models.

**UNIT V-** Game theory –Two person zero sum games- Games with saddle points- mixed strategies – Linear programming solution of Games. Markov chain and its applications.

**PRACTICAL  :**
Formulation of a linear programming models; working out simplex solution; Working out duality ; Sensitivity analysis; Multi – criteria decision making; Transportation type problems; Markov Chain and its applications; Formulation of game theory problems ; Use of software package for solving LP problems.

**LECTURE SCHEDULE :**
**Lecture:**
1. Operation research models-limitation
2. Linear programming -formulation and solution
3. Assumption of L.P basic and non-basic Solution
4. Simplex method –Application for solving Agricultural Problems
5. Dual Method – Dual Simplex Method
6. Risk Programming – Sensitivity Analysis – Multi –Criterion decision Making models
7. Transportation problem – Farm /State/Regional/Sector level modelling of Agriculture.
8. Solving optimization problems – Using Software package.
9. MID SEMESTER EXAMINATION
10. Decision making under certainty
11. Decision making under Risk and Decision Tree analysis
12. Expected value of perfect information
13. Game theory- Introduction- Two person zero sum Games
14. Games with saddle points  -  mixed strategies
15. Linear Programming solution of games
16. Markov chain and its applications
17. Data  Envelopment  Analysis

**Practical**
1. Formulation of linear programming problems (LPP)
2. Solution of LPP using graphical method
3. Solution of LPP using simplex method
4. Problems of degeneracy, inconsistency, infeasible and unbounded solutions
5. Generalized Simplex Method – Dual Method
6. Dual Simplex Method – Solving Practical Problems in agriculture.
7. Problems in balanced  transportation model
8. Problems in  unbalanced transportation model
9. Solution of balanced and unbalanced assignment models
10. Decision making under certainty
11. Decision making under Risk
12. Decision Tree analysis
13. Game theory Problems
14. Game theory Problems
15. Markov Analysis and application
16. Data  Envelopment  Analysis
17. PRACTICAL EXAMINATION

**References**

1. Hamdy A. Taha . 2002. Operation research (Seventh edition) Prentice Hall of India (P) Ltd., New delhi.
2. Kanti swarup, P.K.Gupta, Manmohan. 2008. Operation research, Sultan Chand & Sons Educational publishers, New Delhi.
3. Everitt, B.S. 2007. Introduction to Optimization method and their applications in statistics, Chat Man Hall, London.
4. Dorfman R. 1996. Linear Programming & Economic Analysis. McGraw Hill.
5. Loomba NP.2006. Linear Programming. Tata McGraw Hill.
6. Shenoy G. 1989. Linear Programming-Principles & Applications. Wiley Eastern Publ
7. Vaserstein. 2006. Introduction to Linear Programming. Pearson Education Publication
8. Hamdy.A Taha.  2003. Operations research- An Introduction, Prentice hall of Indian private limited, New delhi.

# SUPPORTING COURSES

**MAT 501          MATHEMATICS FOR AGRICULTURAL ECONOMICS          2+1**

## Theory
### Unit I
Matrices-types-algebra of matrices. Determinants – properties-solution of simultaneous equations. Inverse of a matrix.  Caylay Hamilton theorem- Eigen values and eigen vectors.

### Unit II
Definition and examples of variables and functions- basic theorems on limits and continuity(without proof). Revision of methods of  Differentiation. Maxima  and minima of single and several variables with  and  without  constraints. Application   of differentiation-Elasticity of demand in terms of differentiation. Average and marginal functions. Cost and Revenue  curves- relationship. Conditions  for  profit maximization, Effects of taxation and subsidy.

### Unit III
Revision of Partial differentiation - Marginal demands, partial elasticitics  and utility analysis. Theory of consumer behavior- Rate of commodity substitution, Maximization of utility - slutsky equation (Income and substitution effects). Production  functions and their mathematical properties- Isoquants and Ridge lines- Least cost combination – Constrained profit Maximization- Properties of linear homogenous functions- Euler's theorem.Production function Analysis.

### Unit IV
Definite integrals,  methods of integration definite integral; - Capital formation. Present value of continuous equal income stream. Consumer's and producer's surplus.

### Unit V
Differential equations-meaning-types of differential equations-order and degree of the differential equations-formation and solution of first order and first degree linear differential equations . Solution of linear homogeneous equations. Applications- Harood Domor model, basic neo classic models, Solow models Domar debit models and some further applications**.**

## Practical
        Problems in algebra of matrices and determinants, simultaneous equation, eigen values and eigen vectors, simple differentiation, maxima and minima for single variables. Application of differentiation in agriculture economics. Simple problems in partial differentiation & Maxima and minima for several variables, Maxima and minima for several  variables  with  constraints-Lagrange's  method,  Application  of  partial differentiation in agricultural economics, simple integral, calculation of consumer's and producer's surplus, formation of differential equation, solution of first order and first degree linear differential, solution of linear homogeneous equations.

## References
1. Harville DA. 1997. Matrix Algebra from a Statistician's Perspective. Springer.
2. Hohn FE. 1973. Elementary Matrix Algebra. Macmillan.
3. Searle SR. 1982. Matrix Algebra Useful for Statistics. John Wiley.
4. Stewart J. 2007. Calculus. Thompson.
5. Thomas GB. Jr. & Finney RL. 1996. Calculus. 9th Ed. Pearson Edu.
6. Metha, B. C and Madani, G. M. K, Mathematics for Economists, Sultan Chand & Sons Educatiional Publishers, New Delhi.

# STA 501      STATISTICAL METHODS      1+1

## Theory
### Unit I
Theory of probability. Random variable and mathematical expectation.

### Unit II
Discrete and continuous probability distributions: binomial, poisson, normal distribution, concept of sampling distribution: chi-square, t and f distributions. Introduction to theory of estimation and confidence -intervals. Tests of significance based on normal, chi-square, t and f distributions.

### Unit III
Introduction to sampling techniques- simple random sampling, stratified random sampling and systematic sampling.

### Unit IV
Correlation and regression: Types of correlation. Pearsons correlation, rank correlation; Regression: Simple regression- assumptions, fitting of simple linear regression, Properties. Testing the significance of correlation coefficient. Testing and interpretation of regression coefficient

### Unit V
Multiple regression, testing the regression coefficients, coefficient of determination.

## Practical
Problems based on Binomial, Poisson, Normal Distributions; Large sample tests, testing of hypothesis based on exact sampling distributions — chi square, t and F; Correlation and regression analysis.

## References
1. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, 2006, Sultan Chand and Sons, New Delhi.
2. Chandel, S.R.S., 1999, A hand book of Agricultural Statistics, Achal Prakashan Mandhir, Kanpur.
3. Gomez, K.A. and Gomez, A.A., 1984, Statistical Procedures for Agricultural Research, John Wiley and Sons, New York.
4. Sahu P.K, 2009, Agriculture and Applied Statistics-I and II, Kalyani Publishers, Ludhiana.
5. K.P. Dhamu and K. Ramamoorthy, 2007, Statistical Methods, Agrobios (India), Jodhpur.

6. G. Nageshwara Rao , 2007, Statistics for Agricultural Sciences, BS Publications, Andhra Pradesh
7. Rangaswamy, R. 2009, A Text book of Agricultural Statistics, Wiley Eastern Limited, New Delhi

# NON-CREDIT COMPULSORY COURSES

## PGS 501      LIBRARY AND INFORMATION SERVICES      0+1

### 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.

## PGS 502      TECHNICAL WRITING AND COMMUNICATION SKILLS      0+1

### Practical

Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts 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.

Communication Skills - 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.

### Suggested Readings
1. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India. Collins' Cobuild English Dictionary. 1995. Harper Collins.
2. Gordon HM and Walter JA. 1970. Technical Writing. 3rd Ed. Holt, Rinehart and Winston.
3. Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
4. James HS. 1994. Handbook for Technical Writing. NTC Business Books.
5. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East-West Press.

6. Mohan K. 2005.  Speaking English Effectively. MacMillan India.
7. Richard WS. 1969. Technical Writing. Barnes and Noble.
8. Robert C. (Ed.). 2005. Spoken English: Flourish Your Language. Abhishek.
9. Sethi J and Dhamija PV. 2004. Course in Phonetics and Spoken English. 2nd Ed. Prentice Hall of India.
10. Wren PC and Martin H. 2006. High School English Grammar and Composition. S.Chand and Co.

## PGS 503     INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE     1+0 (e-Course)

### Theory

Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and bio-diversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.

### Suggested Readings

1. Erbisch FH and Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
2. Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill. Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC and Aesthetic Technologies.
3. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V. Technology Generation and IPR Issues. Academic Foundation.
4. Rothschild M and Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
5. Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.
6. The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.

**PGS 504      BASIC CONCEPTS IN LABORATORY TECHNIQUES      0+1**

## Practical

Use of R / SPSS / equivalent for Frequency distribution, Summarization and tabulation of data,F test, Correlation, Pearson Correlation, Spearman Correlation, ANOVA, ANCOVA

Use of R / SPSS / equivalent for Regression: Simple, Multiple Linear regression, Estimation of regression by OLS & MLE method, Logit, Probit, Stepwise regression, Coefficient of determination

Use of R / SPSS / equivalent for Kolmogorov-Smirnov test, Wilcoxon signed rank test, Mann-Whitney U, Kruskal-Wallis, McNemar's test

Use of R / SPSS / equivalent for Discriminant analysis - fitting of discriminant functions, identification of important variables, Factor analysis. Principal component analysis - obtaining principal component.

Use of R / SPSS / equivalent for Analysis of time series data - AR, MA, ARIMA models

## Suggested Readings

1. Anderson CW & Loynes RM. 1987. The Teaching of Practical Statistics. John Wiley.
2. Atkinson AC. 1985. Plots Transformations and Regression. Oxford University Press.
3. Chambers JM, Cleveland WS, Kleiner B & Tukey PA. 1983. Graphical Methods for Data Analysis. Wadsworth, Belmount, California.
4. Chatfield C & Collins AJ. 1980. Introduction to Multivariate Analysis. Chapman & Hall.
5. Chatfield C. 1983. Statistics for Technology. 3 rd Ed. Chapman & Hall.
6. Chatfield C. 1995. Problem Solving: A Statistician's Guide. Chapman & Hall.
7. Cleveland WS. 1985. The Elements of Graphing Data. Wadsworth, Belmont, California.
8. Ehrenberg ASC. 1982. A Primer in Data Reduction. John Wiley.
9. Erickson BH & Nosanchuk TA. 1992. Understanding Data. 2 nd Ed. Open University Press, Milton Keynes.
10. Snell EJ & Simpson HR. 1991. Applied Statistics: A Handbook of GENSTAT Analyses. Chapman & Hall
11. Sprent P. 1993. Applied Non-parametric Statistical Methods. 2 nd Ed. Chapman & Hall.
12. Tufte ER. 1983. The Visual Display of Quantitative Information. Graphics Press, Cheshire, Conn.
13. Velleman PF & Hoaglin DC. 1981. Application, Basics and Computing of Exploratory Data Analysis. Duxbury Press.
14. Weisberg S. 1985. Applied Linear Regression. John Wiley.
15. Wetherill GB. 1982. Elementary Statistical Methods. Chapman & Hall.
16. Wetherill GB.1986. Regression Analysis with Applications. Chapman & Hall.
17. Learning Statistics: http://freestatistics.altervista.org/en/learning.php.
18. Free Statistical Softwares: http://freestatistics.altervista.org/en/stat.php.
19. Statistics Glossary http://www.cas.lancs.ac.uk/glossary_v1.1/main.html.

# PGS 505   AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES   1 +0   (e-Course)

## Theory

History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centers (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.

Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme. Integrated Rural Development Programme (IRDP) Panchayat Raj Institutions, Co-operatives, Voluntary Agencies/Non-Governmental Organizations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

## Suggested Readings

1. Bhalla GS and Singh G. 2001. Indian Agriculture - Four Decades of Development. Sage Publication. Punia MS. Manual on International Research and Research Ethics. CCS, Haryana Agricultural University, Hisar.
2. Rao BSV. 2007. Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives. Mittal Publication.
3. Singh K.. 1998. Rural Development - Principles, Policies and Management. Sage Publication.

# PG5 506   DISASTER MANAGEMENT   1+0
## (e-Course)

## Theory

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion.  Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

## Suggested Readings

1. Gupta HK. 2003. Disaster Management. Indian National Science Academy. Orient Blackswan.
2. Hodgkinson PE and Stewart M. 1991. Coping with Catastrophe: A Handbook of Disaster Management. Routledge.
3. Sharma VK. 2001. Disaster Management. National Centre for Disaster Management, India.