# ANNAMALAI UNIVERSITY

**(Accredited with 'A' Grade by NAAC)**

## FACULTY OF AGRICULTURE

**(Accredited by ICAR)**

## DEPARTMENT OF AGRICULTURAL ECONOMICS

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# Academic Regulations and Syllabi

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### DOCTOR OF PHILOSOPHY IN AGRICULTURAL ECONOMICS
### &
### DOCTOR OF PHILOSOPHY IN AGRI BUSINESS MANAGEMENT

## Under Choice Based Credit System (CBCS) with Outcome Based Education

## 2022-2023 Onwards

# COMMON REGULATIONS FOR ALL Ph.D. PROGRAMMES OF FACULTY OF AGRICULTURE

**(*w.e.f. 2022-2023*)**

## 1. DEFINITIONS

1.1 An **"Academic year"** shall consist of two semesters.

1.2 **"Semester"** means an academic term consisting of 110 instructional days excluding final theory examinations.

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

1.4 **"Credit hour"** means, one hour lecture plus two hours of library or homework or two and half hours of library/field practical per week in a semester.

1.5 **"Credit load"** of a student during a semester is the total number of credits registered by that student during that particular semester.

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

1.7 **"Credit Point"** means the grade point multiplied by corresponding credit hours.

1.8 **"Grade Point Average (GPA)"** means the quotient of the total credit points obtained by a student in various courses at the end of each semester, divided by the total credit hours taken by the student in that semester. The grading is done on a 10 scale and the GPA has to be corrected to two decimals.

1.9 **"Overall Grade Point Average (OGPA)"** means the quotient of cumulative credit points obtained by a student in all the courses taken from the beginning of the first semester of the year divided by the total credit hours of all the subjects which he/she had completed up to the end of a specified semester and determines the overall performance of a student in all subjects during the period covering more than one semester. The OGPA has to be arrived at the second decimal place.

## 2. SYSTEM OF EDUCATION

2.1 These rules and regulations shall govern the Ph.D. programmes leading to the award of Degree of Doctor of Philosophy in the concerned subject in the Faculty of Agriculture, Annamalai University. They shall come into force with effect from the academic year 2022-2023.

2.2 The semester system shall be followed for all the Ph.D. degree programmes. The duration of doctoral programmes is as follows:

2.2.1 The duration of the programme and the time for admission of thesis are counted from the date of provisional registration.

2.2.2 The minimum duration of the programme is three years and the maximum duration of the programme shall be seven years.

2.2.3 Break of study shall be granted up to a maximum period of one year and it can be done only after completing the course work. Such request shall be made in advance by scholar in writing with the recommendation of Supervisor, Head of the Department (HoD) and Dean, Faculty of Agriculture and it should reach the Director, Directorate of Academic Research

(DARE). The orders for the break of study shall be issued by the Director, DARE after assessing the need.

2.2.4 If prior permission is not sought and obtained, it will be considered as a case of discontinuation and action will be taken to cancel the registration of such scholars.

2.2.5 The scholars should remit the yearly fees during the break of study also.

## 3. PROGRAMMES OFFERED

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

1. Agri Business Management
2. Agricultural Economics
3. Entomology
4. Agricultural Extension Education
5. Agricultural Microbiology
6. Agronomy
7. Genetics and Plant Breeding
8. Horticulture in Fruit Science
9. Horticulture in Vegetable Science
10. Horticulture in Floriculture and Landscaping
11. Horticulture in Plantation, Spices, Medicinal and Aromatic plants
12. Molecular Biology and Biotechnology
13. Plant Pathology
14. Seed Science and Technology
15. Soil Science

## 4. ELIGIBILITY FOR ADMISSION

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

4.1 Candidates with two year master's degree programmes from Universities recognized by Annamalai University are eligible to apply for Ph.D. programmes of the university (Table 1).

4.2 Candidates who have undergone the programme under conventional system should possess not less than a second class Master's degree. The candidates under trimester system should possess a minimum OGPA of 3.00 out of 4.00. For those under semester system 7.00 out of 10.00 is required for various Doctoral programmes.

**Table 1: Eligibility Criteria**

| Doctoral Degree Programmes | Eligibility |
|---|---|
| 1. Agri Business Management | MBA in Agribusiness / MBA Agri Business Management |
| 2. Agricultural Economics | M.Sc. (Ag.) in Agrl. Economics / Agricultural Marketing Management |
| 3. Entomology | M.Sc. (Ag.) in Entomology / Agricultural Entomology |
| 4. Agricultural Extension Education | M.Sc. (Ag.) in Agricultural Extension / Agricultural Extension and Communication / Agricultural Extension Education / Extension Education |

| | |
|---|---|
| 5. Agricultural Microbiology | M.Sc. (Ag.) in Agricultural Microbiology |
| 6. Agronomy | M.Sc. (Ag.) in Agronomy |
| 7. Genetics and Plant Breeding | M.Sc. (Ag.) in Genetics and Plant Breeding |
| 8. Horticulture | M. Sc (Ag.) Hort. / M.Sc. (Hort.) / M.Sc. (Hort.) in Fruit Science / Vegetable Science / Floriculture and Landscape Gardening or Architecture / Plantation, Spices, Medicinal and Aromatic Crops |
| 9. Plant Molecular Biology and Biotechnology | M.Sc. (Ag.) in Plant Molecular Biology / Agricultural Biotechnology |
| 10. Plant Pathology | M.Sc. (Ag.) in Plant Pathology |
| 11. Seed Science & Technology | M.Sc. (Ag.) in Seed Science & Technology |
| 12. Soil Science | M.Sc. (Ag.) in Soil Science |

4.3 All research scholars shall undergo course work for two semesters as prescribed by the Department. Duration of the programme will be for three years.

4.3.1 The Ph.D. scholars shall report in the Department and sign every day in the attendance register. In order to promote quality research and training in cutting edge areas, the University may permit the scholar to pursue his research work in Annamalai University or in other Universities/Research Institutes by entering with/without MOU between Annamalai University and the partner University/Institute after the completion of qualifying Viva voce examination.

4.3.2. Project staff/ fellow working in projects in the University, sponsored by Government of India/ Industries / Government of Tamil Nadu can also register.

4.3.3. Candidates in employment should be sponsored by their employer and should avail leave for the minimum duration of the programme and should be formally relieved from their duty to register.

4.3.4. Candidates who are selected under the national level fellowship programmes or by any recognized bodies and who satisfy the eligibility conditions as per the regulations shall apply in the respective discipline.

4.3.5. Admission to Foreign Students: Foreign students, who are selected under various scholarship schemes, either by the Ministry of Education and Culture or by the Ministry of External Affairs, will be given admission on the recommendation / sponsorship of the respective Ministry of Government of India. The other foreign students who seek admission should possess a research VISA issued by the Indian Embassies aboard and produce "No Objection Certificate" from the Ministry of Human Resource Development, Government of India, after clearance from the Ministry of External Affairs. They should also show proof for financial capability for staying, pursuing Ph.D. programme for three years.

## 5. MODE OF SELECTION

5.1. University shall issue notification for Ph.D. admission once in a year.

5.2. The candidates desirous of registering for Ph.D. programme shall apply by filling all the relevant details mentioned in the online application form posted in the University website and submit completed application online before the due date as indicated in the notification issued from time to time.

5.3 Incomplete applications and applications with false information in any respect shall be summarily rejected without any intimation to the candidate.

5.4. The Departmental Research Committee (hereafter referred to as DRC) of concerned Department shall screen the applications as per the eligibility norms and shall conduct the written test and interview only for eligible candidates.

5.5. The admission to Ph.D. students shall be based on the following criteria besides general eligibility.

5.5.1 An entrance test at post graduate level for 70 marks (70 multiple choice questions (MCQs), each question carrying one mark and duration of the test is 90 minutes followed by an interview that will have a weightage of 30 marks.

5.5.2 The candidates who secure 50% marks in entrance test and interview are eligible for admission.

5.5.3 A relaxation of 5 % marks (from 50 % to 45%) shall be allowed for the candidates belonging to SC/ST/OBC (non creamy layer)/ differentially able category.

5.5.4 Candidates with UGC- JRF / NET / ICAR/ICSSR qualified candidates and teacher fellowship holders are exempted from the Entrance test but they have to appear for the interview and evaluated for 100 marks.

5.6 Departmental Research Committee: The following is the constitution of the DRC. The members other than Head of the Department shall serve only for one academic year.

| **Designation** | **Members** |
|---|---|
| Head of the Department | Convener |
| Two professors/ Senior Faculty nominated by the Vice-Chancellor in rotation | Members |
| One Associate Professor (in rotation) | Member |
| One Assistant Professor (in rotation) | Member |

5.7. The DRC has the following functions

5.7.1 Selection of candidates for admission to the Ph.D. programme.

5.7.2 Facilitating research facilities in the Department.

5.7.3 Maintenance of research quality and quality of publications.

5.7.3 Sorting out any other research related issue of the Department.

5.8. If there is any dispute either in the constitution of functioning of the DRC, it shall be brought to the notice of the Director, DARE and the decision of the Vice-Chancellor shall be final.

5.9. The minutes of the DRC together with the list of selected candidates and their research supervisors along with recommendations of the Dean of the respective faculty will be placed before the Vice-Chancellor for approval.

**6. ADMISSION**

6.1. The selected candidates shall be issued admission cards and they will be admitted to Ph.D. programme in the respective Department based on his/her PG qualification, entrance and interview.

6.2. The provisional registration order for Ph.D. shall be issued to the candidates.

6.3. The scholar, supervisor, Research Advisor Committee members and examiners shall not be relatives to one another.

## 7. TUITION FEES AND OTHER FEES

7.1 The selected candidates shall pay the prescribed fees before the last date mentioned in the selection order, failing which they will forfeit the seats.

7.2. The yearly fees shall be paid by the scholars within the prescribed date till the scholar submits the thesis. The supervisors should monitor the regular payment of yearly fees by those scholars who are working under them.

7.3. The registration is liable for cancellation, if the research scholar has not paid the yearly fees within stipulated time.

7.4 Non-payment of yearly fees is a serious lapse on the part of the scholars. Explanation for non-payment of yearly fees shall be called for from the supervisors.

7.5 The various fees payable by the students will be decided by the university from time to time.

7.6 Admission to the hostel will be strictly restricted to the actual accommodation available and no associate will be allowed. A Ph.D. student may be allowed to stay in the hostel for a maximum of five years from the date of admission to the Ph.D. programme.

## 8. CREDIT GRADE POINT REQUIREMENTS

8.1. A student enrolled for Doctoral program is required to complete 100 credits inclusive of 75 credits of research to become eligible for the degree as detailed below:

| Sl. No. | Details | Credit Hours |
|---|---|---|
| 1 | Major Courses | 12 |
| 2 | Minor Courses | 6 |
| 3 | Supporting Courses | 5 |
| 4 | Seminar | 2 |
| 5 | Research | 75 |
| | Non credit Compulsory courses | |
| | Research and Publication Ethics (Contact hours: 2)<br>MOOC (Contact hours: 2) | |
| | **Total** | **100** |

8.2. In a semester, a Ph.D. scholar can register a maximum of 15 credits excluding research. However, the research credits registered should not exceed 16 per semester. Semester-wise distribution of credits is given in the respective Ph.D. programmes.

8.3. Registration Card: A student shall register the courses offered in a semester by writing all the courses in registration card in quadruplicate. The Supervisor, Ph.D. 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. The Dean shall approve the registration cards. The approved registration cards shall be maintained by the HoD, Supervisor and the student concerned. The list of courses registered by the students in each semester shall be sent by the Dean to the DARE for preparation of Report Cards.

8.4. The Ph.D. students should complete their course work within the first two semesters in Annamalai University campus.

8.5. Requirements for Ph.D. programme shall also include successful completion of Non-Credit Compulsory Courses, thesis research in the major field of study and submission of thesis thereon.

## 9. ATTENDANCE REQUIREMENT

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

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

9.3 In case of new admission, for calculating 80 percent attendance in the first semester, the number of working days will be calculated from the date of joining of the students who are permitted to join late due to administrative reasons. However, for genuine reasons, condonation of attendance deficiency may be considered by the Vice - Chancellor on the recommendation of the Research Advisory Committee, HoD and Dean, Faculty of Agriculture on payment of condonation fee prescribed by the university.

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

9.5 In respect of students who had absented for the mid-semester examination (MSE) on university business with prior permission of the HOD and Dean, Faculty of Agriculture, the makeup first test should be conducted ordinarily within 15 working days from the date of conduct of the first test.

9.6 The students who absent himself/herself for first test in a subject on genuine reasons shall be permitted on the recommendation of the course teacher / Research Supervisor and Head of the Department concerned. Missing examination should be completed within 15 working days from the date of respective examination on payment of missing examination fee prescribed by the university.

## 10. RESEARCH ADVISORY COMMITTEE

10.1 Each Ph.D. scholar shall have a Research Advisory Committee (RAC) to guide the scholar in carrying out his/her programme.

10.2 A Research Advisory Committee shall be constituted with the approval of the University for each candidate separately, immediately after his/her admission. The purpose of the RAC is to provide expert opinion on frontline research.

10.3 There shall be a Research Advisory Committee for every student consisting of not fewer than four members with the Supervisor as Chairperson. The Research Advisory Committee should have representatives from the major and minor fields. The major **Advisor/Research Advisor** will be from Annamalai University and Co-Research Supervisor will be from the partner institutes (Research Scholars pursuing in other institutes/universities) besides RAC members.

The Research Supervisor should convene a meeting of the Research Advisory Committee at least once in a semester. The research credit evaluation form should be communicated to the Head of Department and the Director, DARE for information.

10.4 **Research Supervisor**

10.4.1 Every scholar shall have a Research Supervisor (among the recognized guides), who will be appointed by the Vice-Chancellor on the recommendation of the DRC, Head of the Department and the Dean, Faculty of Agriculture. Research supervisors approved by the Vice-Chancellor only can be the guide for the students.

10.4.2 A teacher having Ph.D. with 5 years of service and PG teaching is eligible for teaching and guiding Ph. D. scholars. A teacher should have a minimum of three years of service before retirement for allotment of doctoral candidates.

10.4.3 The research supervisors who wish to avail leave/lien/deputation beyond a period of six months shall propose a Co-supervisor in the concerned subject for the candidates registered with them and it may be intimated to the University well in advance. The final approval of the proposal rests with the Vice-Chancellor.

10.5 **Functions of the RAC**:

10.5.1 Discuss, advice and recommend on all matters connected with the scholar's research from admission till the completion of the programme.

10.5.2 Approve the topic of research and the synopsis.

10.5.3 Assess and approve the progress reports of Ph.D. scholars in the prescribed format and to report to the University on the fitness or otherwise of the candidate to proceed with his/her research work for the Ph.D.

10.5.4 If necessary, recommend and approve change of title of dissertation / thesis and change of Research Supervisor.

10.5.5. Conduct the pre-submission presentation (before the submission of synopsis) and to give a certificate to this effect to be submitted along with the synopsis.

10.6 The Research Advisory Committee will meet every semester

10.6.1 To scrutinize the research proposal / progress report submitted by the research scholar.

10.6.2 To assess the conduct of experiments / field work, peruse laboratory notebooks, data recording, analysis, and publication.

10.6.3 To review and endorse the annual progress report of the research scholar.

10.6.4 To approve the synopsis of the thesis.

10.6.4 The Chairperson will convene the Research Advisory Committee meetings with intimation to the Director, DARE through the Head of the Department.

10.7 **Changes in RAC**

The proposals for changes in the RAC are to be sent to the Director, DARE, through HOD and Dean for approval, if it is keenly felt that such changes are absolutely necessary.

10.8 **Change of Research Supervisor**

10.8.1 Change of Research Supervisor shall not be permitted as a routine. In exceptional cases, such change may be permitted, if valid reasons are provided by the candidates. The Committee headed by the Vice-Chancellor shall look into the request of the petitioner, if there is any conflict between the scholar and the research supervisor.

10.8.2 The Research Supervisor under whom the scholar has originally registered shall give a "No Objection Certificate" and the new proposed Research Supervisor should give a "Certificate of Willingness" to guide the candidate. The final decision will rest with the University. However, the Vice-Chancellor, on the recommendation of the RAC and Dean's Committee, has the right to assign a new research supervisor to the research scholar.

10.8.3 When the change of Research Supervisor is approved, the candidate shall work for a minimum of one year with the new Research Supervisor, if the topic of his/her research is different under the new supervisor, provided he/she fulfils the attendance requirements.

10.9 **Change of Topic of Research**

10.9.1 Change of the specific area of research may be permitted within one year from the date of admission and request must be submitted with the recommendations of the RAC. In such cases, the minutes of the RAC meeting must include whether the course work undertaken by the research scholar is relevant to the new research area and the competence of the research supervisor in this field.

10.9.2 If the RAC is of the view that there is a major change in the specific area of research and is not relevant to the course work undertaken, the research scholar will have to go through the process of fresh examination pertaining to the area of research.

10.10 Absence of Member during Qualifying / Final Viva-Voce Examination

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

## 11. EVALUATION OF STUDENT'S PERFORMANCE

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

## 12. EXAMINATIONS

12.1 There will be two examinations *viz.,* first test and final examination. Wherever the course has practical, there will be a final practical examination also.

12.2 The duration of first test will be of one and half an hour and final examinations in theory and practical will be conducted for three hours each.

12.2.1 The first test will be conducted by course teachers during the ninth week of the semester as per the scheme drawn by HOD, evaluate and send the marks obtained by the students to the Director, DARE through HOD within seven working days.

12.2.2. The question paper for the final examination will be set as per Bloom's taxonomy by the concerned course teacher in consultation with the Head of the Department.

12.2.3 There will be final examination separately for theory and practical which will be conducted by the University. Each final theory and practical examinations will be evaluated by two examiners (one will be the course teacher and another will be the senior faculty of the Department).

The distribution of marks will be as indicated below:

| S. No | Examination | Course with practical | Course without practical | Course without theory |
|---|---|---|---|---|
| 1 | First Test | 30 | 30 | 30 |
| 2 | Final theory | 40 | 70 | - |
| 3 | Final practical | 30 | - | 70 |
| | **Total** | **100** | **100** | **100** |

The question paper model and distribution of marks for first test and final theory examinations are as follows:

**First Test (30 marks) (1.5 hours duration)**

| | | | | |
|---|---|---|---|---|
| 1 | Definitions/concepts | 5 out of 7 | (5 x 1) | 5 marks |
| 2. | Short notes | 5 out of 7 | (5 x 3) | 15 marks |
| 3 | Essay type | 2 out of 3 | (2 x 5) | 10 marks |

**Final Theory: Course without practical (70 marks) (3 hours duration)**

| | | | | |
|---|---|---|---|---|
| 1. | Short notes | 5 out of 7 | (5 x 4) | 20 marks |
| 2 | Essay type | 5 out of 7<br>(four questions must represent K6 level of Bloom's taxonomy) | (5 x 10) | 50 marks |

**Final Theory: Course with Practical (40 marks) (3 hours duration)**

| | | | | |
|---|---|---|---|---|
| 1. | Short notes | 5 out of 7 | (5 x 2) | 10 marks |
| 2 | Essay type | 5 out of 7<br>(four questions must represent K6 level of Bloom's taxonomy) | (5 x 6) | 30 marks |

12.3 **Minimum Marks for Pass**

12.3.1 The student should secure a minimum of 60 per cent marks separately in the theory and practical and an aggregate of 70 per cent to secure a pass in the subject. Each subject shall carry a maximum of 100 marks for purpose of grading. The grading will be done as grade point, i.e., the percentage of marks earned in a subject is divided by 10. The grade point is expressed on a 10 point scale upto two decimals.

12.3.2 Students who secure marks below 70 per cent in a subject will be awarded 'RA' grade and students without having the required minimum attendance of 80 per cent will not be allowed to write the final examination and they will be awarded 'E' grade. Students who secure 'RA' grade should appear for re-examination in the subsequent semester. If a student secured 'E' grade, he/she has to re-register and attend the course again during the next academic year.

12.4 **Minimum GPA Requirement**

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

a) Earn a Grade Point of 7.00 for a pass in each subject.
b) For purpose of continuing as a student in the university, a candidate is required to earn a Grade Point Average of not less than 7.50 at the end of each semester.
c) A Ph.D. student may repeat the course (s) in which he/she gets a Grade Point below 7.50 and above 7.0 to improve the OGPA.

12.5 Re-Examination

12.5.1 Re-examination is permitted only for the final theory and practical examinations. The students who secure 'RA' grade are permitted to write the re-examinations as and when conducted with the permission of university.

12.5.2 The re-examination fee as prescribed by university per course is to be paid on or before the prescribed date. A student is permitted to write the final theory and practical examinations only two times during the course period of three years excluding the regular final examination.

12.5.3 In the event of a student who fails to secure a pass in the two re-examinations permitted, he/she has to re-register for the course along with juniors. The marks secured in first test will be retained and the student should produce the practical record during re-examination. The registration for the re-examination shall be done after first test on the date specified by the Director, DARE. Each registration is considered as an attempt even if the student absents for the examination.

12.6 Return of Valued Answer Papers

12.6.1 The valued answer papers of first test 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.

12.6.2 The answer paper should be retained with the course teacher for six months and then disposed off. Evaluated final theory papers have to be retained up to six months by the Director, DARE after the conduct of examination and then disposed off.

## 13. SEMINAR

Seminar is compulsory for all students and each student should register and present two seminars each with 0+1 credits. A student can register only one seminar in a semester and only after successful completion of the first seminar, the student is permitted to register for the second seminar.

13.1 Seminar Topic

13.1.1 The seminar topic should be only from the major field and should not be related to the area of thesis research. The seminar topics are to be assigned to the students by the Research Supervisor in consultation with HOD within three weeks after commencement of the semester.

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

13.1.3 The circular on the presentation of the seminars may be sent to other Departments to enable those interested to attend the same. The Research Supervisor will monitor the progress of the preparation of the seminar and correct the manuscript.

13.1.4 The student will submit two copies of the corrected manuscript to the HOD through Research Supervisor before presentation. The student will incorporate the suggestions and carry out corrections made during the presentation and resubmit three fair copies to the HOD (one to Dept. library, the second to the Research Supervisor and the third for student) within 15 days after presentation.

13.1.5 The performance of the student in the credit seminar will be evaluated and grade point awarded by the HOD along with the RAC for 100 marks. Grade Point may be given based on the following norms

| **Details** | **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** |

## 14. QUALIFYING EXAMINATION

Only those students who successfully complete the qualifying examination will be admitted to candidacy of the degree. The qualifying examination consists of only Viva-voce examination.

14.1 Minimum requirement for qualifying Viva-voce Examination

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

14.2 Selection of Examiner

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

14.3 Qualifying Viva-Voce Examination

14.3.1 The evaluation should cover both the research problem and theoretical background to execute the project. This shall assess the aptitude of the student and suitability of the student for the given research topic.

14.3.2 The RAC shall conduct the qualifying viva-voce examination with one external member, who shall be a specialist in the subject from outside the university.

14.3.3 The Head of the Department will monitor and coordinate the conduct of the qualifying viva. The performance of the candidate will be graded as Satisfactory / Unsatisfactory.

14.4 Communication of Results of Qualifying Examination

The Research Supervisor shall act as chairman for the examination committee and shall be responsible for communicating the results of the examination to the Director, DARE through HOD in the prescribed format.

14.5 **Failure /Absence in Qualifying Examination**

14.5.1 When a student fails or absents for the qualifying examination, he/she may apply again for permission to appear for re-examination to the Director, DARE with the recommendation of the RAC and Head of the Department.

14.5.2 A student, who applies for re-examination should attend viva-voce. Re-examination shall not take place earlier than one month after the first examination. It will be conducted by the RAC as previously indicated.

14.5.3 If a student fails in the re-examination, further re-examination will be considered on the recommendation of the RAC, HoD and Dean, Faculty of Agriculture. If the student fails in the qualifying examination, he/she is not permitted to register for further research credits in the next semester.

## 15. THESIS RESEARCH

15.1 **Selection of Topic**

15.1.1 The thesis research for the Ph.D. degree should be of the nature of a definite contribution to the subject and the results should be of sufficient importance to merit publication. The findings should have some practical utility or should lead to theoretical contribution.

15.1.2 The thesis shall be on a topic falling within the field of the major specialization and shall be the result of the student's own work. A certificate to this effect duly endorsed by the major advisor shall accompany the thesis

15.2 Research Proposal

15.2.1 The research scholars shall present their broad area of research and submit a proposal to the Research Advisory Committee at the end of the first semester.

15.2.2 The research proposal has to be presented by the student in a meeting organized by the Head of the Department to get the opinion / suggestion of the faculties of the Department for improving it. Three copies of the research proposal in the prescribed format should be sent to the Director (DARE) through the Head of the Department for approval.

15.2.3 The distribution of research credit will be as follows:

| Semester | Credit Hours |
|---|---|
| I Semester | 0+2 |
| II Semester | 0+10 |

| | |
|---|---|
| III Semester | 0+16 |
| IV Semester | 0+16 |
| V Semester | 0+16 |
| VI Semester | 0+15 |
| **Total** | **0+75** |

15.3 **Evaluation of Thesis Research**

15.3.1 After assigning the research problem, for each semester, the student has to submit a detailed programme of work to be carried out by him/her during the semester in the prescribed proforma. After scrutiny and approval, a copy of the research programme has to be given to the student for carrying out the work during that semester.

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

15.3.3 The student has to submit his/her research observation note book to the Research Supervisor, who will scrutinize the progress and sign the note book with remarks as frequently as possible. This note book will form the basis for evaluation of research progress.

15.3.4 After completion of 80% attendance for research and on or before the last day of the semester, the research scholars, shall submit Progress Reports in the prescribed format duly endorsed by the Research Advisory Committee to the Director, DARE until they submit their synopsis.

15.3.5 Failure to submit the progress reports shall entail automatic cancellation of registration.

15.3.6 The minutes of the meeting of the Research Advisory Committee along with enclosures will be sent to the Director, DARE.

15.3.7 Candidates who are recipients of fellowships such as JRF/SRF directly from any of the funding agencies/ shall send the progress reports and the utilization certificates in the format prescribed by the respective funding agency through proper channel.

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

**SITUATION – I**

The student has completed the research credits as per the approved programme and awarded **SATISFACTORY** by the RAC. Under the said situation, the student can be permitted to register for fresh research credits in the subsequent semester. If the student is awarded **UNSATISFACTORY**, he/she has to re-register the same block of research credits in the subsequent semester.

**SITUATION – II**

The student who has not secured the minimum attendance of 80 per cent shall be awarded grade ‘E’. The student has to re-register the same block of research credits for which ‘E’ grade was awarded earlier in the following semester with prior permission. Until the completion of re-registered credits, the student should not be allowed to register for fresh (first time) research credits.

**SITUATION – III**

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

- 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 satisfying the advisory committee.
- Under the said situations, grade **EE** should be awarded.

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

**SITUATION – IV**

When the student fails to complete the work even in the 'second time' registration, the student will be awarded **UNSATISFACTORY** and, in the mark, list the 'second time' should be mentioned.

For the registration of research credits for the third time, permission has to be obtained from the Dean based on the recommendation of the RAC, and HOD.

Permission for registration for the fourth time shall be given only by the University based on the recommendation of the RAC, HOD and Dean, Faculty of Agriculture.

## 16. SUBMISSION OF THESIS

16.1 The research credits registered in the last semester should be evaluated only at the time of the submission of thesis, by the RAC. Students can submit the thesis at the end of the final semester.

16.2 If a student has completed the thesis before the closure of the final semester, the research supervisor can convene the RAC meeting and take decision on the submission of the thesis, provided the student satisfies 80 per cent attendance requirement.

16.3 The candidate shall be allowed to submit his/her thesis after the completion of stipulated period. A grace period of 30 days may be allowed to submit the thesis after the prescribed duration. If the thesis is not submitted even after the grace period, the student shall pay the tuition fee for the ensuing year.

16.4 If a student is not able to submit the thesis within the grace period, the student has to re-register for the credits in the forthcoming semester. The student who re-registers the credits after availing of the grace period will not be permitted to avail of grace period for the second time. The Head of the Department can sanction the grace period based on the recommendation of advisory committee and a copy of the permission letter along with the receipt for payment of fine should accompany the thesis while submission.

16.5 Three copies of the thesis (in the approved format) shall be submitted together with the submission fee not later than three months after the submission of the synopsis.

16.6 No dues certificates from the Department and Central Libraries, Hostel, Stores, etc. must be submitted with the thesis copies. The Research Supervisor shall forward the thesis copies with the enclosures to the Director, DARE through the HOD and the Dean. A soft copy of the thesis in PDF format as prescribed by Shodhganga, shall also be submitted.

16.7 The Ph.D. scholars have to publish a minimum of two research papers in NAAS rated journals with 5 and above rating/ Scopus / Web of Science indexed journals at the time of publication of the papers. The synopsis will be accepted for processing only after showing evidences for publications of two such research papers.

16.8 The soft copy of the thesis shall be checked for plagiarism using Turnitin software. Beyond the percentage of reproduction prescribed by UGC, the thesis will not be accepted for valuation.

16.9 **Pre-submission Presentation**

16.9.1 The pre-submission presentation of the thesis is a requirement to enrich the scholar and to fine tune his/her research presentation. This presentation shall be conducted before the submission of the synopsis in the presence of the RAC, Supervisor/Co-Supervisor, HoD, Faculty members, Research Scholars and/or P.G. Students.

16.9.2 The scholar shall present the findings. The gathering may suggest ideas / references to be consulted / suggestions to improve the work.

16.9.3 A report on this event along with an attendance sheet shall be forwarded by the Research Supervisor with the endorsement of the RAC and HOD to the Director, DARE.

16.10 Submission of Synopsis

16.10.1 The submission of synopsis may be permitted 3 months before the completion of required duration on successful completion of course work.

16.10.2 The Research Scholar shall submit 3 copies of the synopsis approved by the Research Advisory Committee along with a soft copy to the Director, DARE through the Research Supervisor, the HOD and Dean of the respective Faculty.

16.10.3 Guidelines for the preparation of the synopsis are appended in Appendix I. Name of the candidate and name of the supervisor shall not be mentioned anywhere in the synopsis; enrolment number of the candidate alone shall be given. A model cover page for a synopsis is given in Appendix III.

16.11 **Guidelines for Preparation of Thesis**

16.11.1 The thesis shall not exceed 250 pages excluding the Bibliography, Appendices, etc. If it exceeds the specified number of pages, the Research Supervisor should write to university with the reasons and get prior approval from the University. The candidate shall pay a penalty for the excess number of pages as decided by the Deans Committee. The thesis should be in A4 size.

16.11.2 The specification for the preparation of the thesis is given in Appendix II. A model cover page for a thesis is given in Appendix IV.

16.11.3 The thesis shall be typed on both sides of the page in order to save paper and postage. The thesis shall contain a Certificate from the guide (Annexure) specifying that the thesis submitted is a record of research work done by the candidate during the period of study under him/her and that the thesis has not previously formed the basis for the award of any Degree, Diploma, Associate ship, Fellowship or similar title.

16.11.4 A statement from the guide indicating the extent to which the thesis represents independent work on the part of the candidate should also be made. (Appendix V)

## 16. VALUATION OF THE THESIS

17.1 **Panel of Examiners**

17.1.1 The thesis submitted in partial fulfilment of the Ph.D. degree shall be evaluated by two external experts one from within the country and the other from outside the country appointed by the Vice-Chancellor on the recommendation of the Research Supervisor of the RAC, HOD and Dean.

17.1.2 The external experts shall be chosen from a panel of at least five names of specialists separately from within the country and outside the country in the particular field, suggested by the Research Supervisor.

17.1.3 The external experts shall send their evaluation reports on the thesis directly to the Director, DARE along with the copy of the evaluated thesis. The Director, DARE on receipt of the reports from the two examiners will send them to the concerned Research Supervisor who is the convener of viva-voce board.

17.1.4 The Research Supervisor will send the consolidated report with his remarks to the Director, DARE through the Head of the Department. Based on the satisfactory reports of the evaluation, Viva-voce examination will be arranged.

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

17.1.6 The Viva-Voce board comprises the student's RAC with the addition of the external examiner who valued the thesis, and the HOD. If the HOD happens to be the Research Supervisor, the Dean, Faculty of Agriculture will nominate a senior member of the staff of the concerned Department as a member.

17.1.7 The candidate is expected to defend the thesis at the Viva-voce examination. The degree shall be awarded on the unanimous recommendation of the Viva-Voce board as **satisfactory** with regard to the thesis and the performance of the student in the final Viva-voce examination.

17.1.8 The recommendation of the Viva-Voce board shall be forwarded to the Director, DARE by the Research Supervisor through HOD and Dean which shall be signed by all members of the committee and the external examiner.

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

17.2 **Revision and Resubmission of Thesis**

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

17.2.2 If the thesis is recommended to be revised by one or both examiners, the points of revision will be indicated clearly in the report. The necessary correction should be carried out, and the revised version should be sent to the concerned examiner(s). If the examiner(s) is / are

still not satisfied with the revised version, the thesis will be rejected. If the thesis is accepted by the examiners (Evaluation), Viva–Voce examination will be conducted by the viva-voce board.

17.3 **Re-registration and Submission of Thesis**

The minimum of 80% attendance requirement for submitting the thesis after re-registration need not be insisted for those students who have fulfilled the minimum academic and residential requirement of three years.

17.4 **Extension of Time**

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

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

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

17.5.1 Number of Chances

17.5.1 A candidate will not be permitted to submit a thesis for the degree on more than two occasions. However, it will be open to the Syndicate, if the Board of Examiners so recommend, to permit the candidate to submit a thesis on a third occasion.

17.5.2 Also, he / she will not be permitted to appear for the viva-voce examination on more than two occasions.

## 18. DISCONTINUANCE AND READMISSION

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

18.2 After completion of course work and qualifying examination, a student is eligible to discontinue temporarily his research program only once within 5 years for Ph. D. program. If the discontinuation period exceeds two semesters, the student has to forego the research credits already registered and register afresh with revised program.

18.3 In the case of field experiments or laboratory experiments in which continuity is essential for research and if a student temporarily discontinues in the middle without completing the experiments, then the entire experiment should be repeated, even if the discontinuation period does not exceed two semesters.

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

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## Ph.D. in Agricultural Economics

**Programme Outcomes**

**PO1:** This programme will enrich further the scholars' capacity on data analysis and data management in econometric modellings.

**PO2:** This programme will bolster the scholars' confidence and skill to take up independent scientific researches aiming on policy revamps.

**PO3:** This programme will enhance the employability of scholars in reputed academic, research and corporate establishments.

## Distribution Pattern of Courses and Credit

| Semester | Major Courses | Minor Courses | Supporting Courses | Seminar | Research | Total Credits | Non Credit Compulsory Courses |
|---|---|---|---|---|---|---|---|
| **I** | 6 | 4 | 2 | 1 | 2 | **15** | - |
| **II** | 6 | 2 | 3 | 1 | 10 | **22** | - |
| **III** | - | - | - | - | 15 | **15** | Research and Publications Ethics |
| **IV** | - | - | - | - | 16 | **16** | MOOC |
| **V** | - | - | - | - | 16 | **16** | - |
| **VI** | - | - | - | - | 16 | **16** | - |
| **Total Credits** | **12** | **6** | **5** | **2** | **75** | **100** | - |

# Ph. D. in Agricultural Economics

## Distribution of Courses

| Sl. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| | | **Compulsory Major Courses** | **12** |
| 1 | AEC 601 | Advanced Micro Economic Analysis | 1+1 |

| | | | |
|---|---|---|---|
| 2 | AEC 602 | Advanced Macro Economic Analysis | 2+0 |
| 3 | AEC 603 | Advanced Econometrics | 2+1 |
| 4 | AEC 604 | Advanced Production Economics | 2+1 |
| | | **Optional Major Courses** | |
| 5 | AEC 605 | Advanced Agricultural Marketing and Price Analysis | 1+1 |
| 6 | AEC 606 | Quantitative Development Policy Analysis | 1+1 |
| | | **Minor Courses** | **6** |
| 1 | AEC 607 | Advanced Agricultural Project Analysis | 1+1 |
| 2 | AEC 608 | Advanced Agricultural Finance and Insurance | 1+1 |
| 3 | AEC 609 | Natural Resource Economics | 1+1 |
| 4 | AEC 610 | Environmental Economics | 1+1 |
| 5 | AEC 611 | International Trade Theories and Policy Applications | 1+1 |
| 6 | AEC 612 | Advances in Price Forecasting and Time Series Analysis | 1+1 |
| 7 | AEC 613 | Impact Evaluation of Development Projects | 1+1 |
| 8 | AEC 614 | Commodity Markets and its Derivatives | 2+0 |
| 9 | AEC 615 | Advances in Applications of Intellectual Property Rights | 2+0 |
| 10 | AEC 616 | Advanced Theories of Growth and Development | 2+0 |
| | | **Supporting Courses** | **5** |
| 1 | COM 601 | Advances in Computer Applications | 1+1 |
| 2 | AEC 617 | Advanced Operations Research | 2+1 |
| | | **Seminar** | **2** |
| 1 | AEC 691 | Doctoral Seminar I | 0+1 |
| 2 | AEC 692 | Doctoral Seminar II | 0+1 |
| | | **Research** | **75** |
| 1 | AEC 699 | Doctoral Research | 0+75 |
| | | **Non Credit Compulsory Courses** | |
| 1 | RPE | Research and Publication Ethics | 2+0 |
| 2 | | MOOC | 2+0 |

# Ph. D. in Agricultural Economics

## Distribution of Courses

| Sl. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| | | **Major Courses: 12 credits** | |
| 1 | AEC 601* | Advanced Micro Economic Analysis* | 1+1 |
| 2 | AEC 602* | Advanced Macro Economic Analysis* | 2+0 |
| 3 | AEC 603* | Advanced Econometrics* | 2+1 |

| | | | |
|---|---|---|---|
| 4 | AEC 604* | Advanced Production Economics* | 2+1 |
| 5 | AEC 605 | Advanced Agricultural Marketing and Price Analysis | 1+1 |
| 6 | AEC 606 | Quantitative Development Policy Analysis | 1+1 |
| | | **Minor Courses: 06 credits** | |
| 1 | AEC 607 | Advanced Agricultural Project Analysis | 1+1 |
| 2 | AEC 608 | Advanced Agricultural Finance and Insurance | 1+1 |
| 3 | AEC 609 | Natural Resource Economics | 1+1 |
| 4 | AEC 610 | Environmental Economics | 1+1 |
| 5 | AEC 611 | International Trade Theories and Policy Applications | 1+1 |
| 6 | AEC 612 | Advances in Price Forecasting and Time Series Analysis | 1+1 |
| 7 | AEC 613 | Impact Evaluation of Development Projects | 1+1 |
| 8 | AEC 614 | Commodity Markets and its Derivatives | 2+0 |
| 9 | AEC 615 | Advances in Applications of Intellectual Property Rights | 2+0 |
| 10 | AEC 616 | Advanced Theories of Growth and Development | 2+0 |
| | | **Supporting Courses:05 credits** | |
| 1 | COM 601 | Advances in Computer Applications | 1+1 |
| 2 | AEC 617 | Advanced Operations Research | 2+1 |
| | | **Seminar: 02 credits** | |
| 1 | AEC 691 | Doctoral Seminar I | 0+1 |
| 2 | AEC 692 | Doctoral Seminar II | 0+1 |
| | | **Research: 75 credits** | |
| 1 | AEC 699 | Doctoral Research | 0+75 |
| | | **Non Credit Compulsory Courses** | |
| 1 | RPE | Research and Publication Ethics | 2+0 |
| 2 | | MOOC | 2+0 |
| | | **Grand Total** | **100** |

***Compulsory Courses**

## Ph. D. in Agricultural Economics

### Semester wise Distribution of Courses

| Sl. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| **I** | **First Semester** | | |
| 1 | AEC 601* | Advanced Micro Economic Analysis* | 1+1 |
| 2 | AEC 602* | Advanced Macro Economic Analysis* | 2+0 |
| 3 | AEC 605<br>AEC 606 | Advanced Agricultural Marketing and Price Analysis<br>Quantitative Development Policy Analysis | 1+1 |
| 4<br>5 | | Minor courses | 1+1<br>1+1 |
| 6 | COM 601 | Advances in Computer Application | 1+1 |
| 7 | AEC 691 | Doctoral Seminar | 0+1 |

| | | | |
|---|---|---|---|
| 8 | AEC 699 | Doctoral Research | 0+2 |
| | | **Total Credits** | **7+8=15** |
| **II** | **Second Semester** | | |
| 1 | AEC 603* | Advanced Econometrics* | 2+1 |
| 2 | AEC 604* | Advanced Production Economics* | 2+1 |
| 3 | | Minor course | 2+0 |
| 4 | AEC 617 | Advanced Operations Research | 2+1 |
| 5 | AEC 692 | Doctoral Seminar | 0+1 |
| 6 | AEC 699 | Doctoral Research | 0+10 |
| | | **Total Credits** | **8+14=22** |
| **III** | **Third Semester** | | |
| 1 | RPE | Research and Publication Ethics** | 2+0 |
| 2 | AEC 699 | Doctoral Research | **0+15** |
| **IV** | **Fourth Semester** | | |
| 1 | | MOOC** | 2+0 |
| 2 | AEC 699 | Doctoral Research | **0+16** |
| **V** | **Fifth Semester** | | |
| 1 | AEC 699 | Doctoral Research | **0+16** |
| **VI** | **Sixth Semester** | | |
| 1 | AEC 699 | Doctoral Research | **0+16** |
| | | **Grand total** | **100** |

***Compulsory Courses**

****Non Credit Compulsory Course**

## Ph.D. in Agricultural Economics

## AEC 601 Advanced Micro Economic Analysis (1+1)

### Learning Objectives

- To gain fundamental understanding of consumer behavior, producer's strategy, market structure through which transactions take place and human and firms interact
- To develop foundations of scarce resource allocation for optimum results.

**Theory**

**Unit I: Theory of Consumer Behaviour**

Theory of consumer behaviour -Duality in consumer theory - Expenditure function and indirect utility function - Measurement of income effect and substitution effect. Measurement of changes in consumers' welfare - Consumer's surplus - Compensating variation and Equivalent variation - Dynamic versions of demand functions - Integrability of demand functions. Demand models - Linear Expenditure System - Almost Ideal Demand System - Applications of consumer theory – Household model and time allocation - Labour supply decisions by households.

**Unit II: Producer's Equilibrium under Different Market Structures**

Perfect competition -Imperfect competition - Monopoly, Monopolistic competition and oligopoly. Oligopoly models -Collusive and non-collusive models of oligopoly - Cournot model, Chamberlin model, Stackleberg solution.

**Unit III: General Equilibrium**

General equilibrium theory -Conceptual overview - General equilibrium conditions with production and consumption - Existence, uniqueness and stability of general competitive equilibrium - Walrasian general equilibrium - Mathematical derivation of conditions for general equilibrium.

**Unit IV: Market Failure**

Market failure - Incomplete markets - Asymmetric information - Principles – Agent problem, adverse selection and moral hazard - Externalities - Network externalities -Public goods- Optimal provision of public goods.

**Unit V: Welfare Economics**

Welfare Economics - concepts, problems, approaches and limitations of welfare economics - Pareto conditions of maximum welfare - Criteria for social welfare -Social welfare functions - Social versus private costs and benefits. Current streams of thought.

**Practical**

Problems in consumer utility maximization -Estimation of income and substitution effects - Estimation and comparison of consumer's surplus-Equivalent variation and Compensating variation. Estimation of demand models - Derivation and estimation of labour supply equations from household models - Comparative static analysis in consumption. Advanced problem solving in price determination under perfect competition, monopoly, oligopoly and monopolistic competition - Game theory models -Problems solving in General Equilibrium Theory and Welfare Economics. Problems in public goods provision.

**Theory Lecture Schedule**

1. Theory of consumer behaviour - Duality in consumer theory - Expenditure function and indirect utility function
2. Measurement of income effect and substitution effect - Measurement of changes in consumers' welfare
3. Consumer's surplus - Compensating variation and equivalent variation
4. Dynamic versions of demand functions-Integrability of demand functions
5. Demand models - Linear Expenditure System, Almost Ideal Demand System
6. Applications of consumer theory - Household model and time allocation - Labour supply decisions by households
7. Perfect competition - Imperfect competition - Monopoly, Monopolistic competition and Oligopoly - Oligopoly models - Collusive and non-collusive models of oligopoly
8. **First Test**
9. Cournot model, Chamberlin model, Stackleberg solution
10. General equilibrium theory - conceptual overview -General equilibrium conditions with production and consumption
11. Existence, uniqueness and stability of general competitive equilibrium
12. Walrasian general equilibrium - Mathematical derivation of conditions for general equilibrium
13. Market failure - Incomplete markets - Asymmetric information - Principles - Agent problem, adverse selection and moral hazard
14. Externalities - Network externalities, public goods - Optimal provision of public goods
15. Welfare Economics - concepts, problems, approaches - limitations
16. Pareto conditions of maximum welfare - criteria for social welfare - Social welfare functions - Social versus private costs and benefits
17. Current streams of thought.

**Practical Schedule**

1. Problems in consumer utility maximization
2. Estimation of income and substitution effects
3. Estimation and comparison of consumer's surplus
4. Estimation of equivalent variation and compensating variation
5. Estimation of demand models-Linear expenditure system
6. Estimation of demand models - Almost Ideal Demand System
7. Derivation and estimation of labour supply equations from household models
8. Advanced problem solving in comparative static analysis in consumption
9. Advanced problem solving in price determination under perfect competition
10. Advanced problem solving in price determination under monopoly
11. Advanced problem solving in price determination under oligopoly
12. Advanced problem solving in price determination under monopolistic competition
13. Game theory models
14. Problems solving in General Equilibrium Theory
15. Welfare Economics-concept, problems, approaches and limitation
16. Problems in public goods provision
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Identify the way to maximize profit through cost minimisation.

**CO2:** Know the different market structures and to identify long run and short run equilibrium.
**CO3:** Understand the different market competitions.
**CO4:** Apply micro economic principles for the welfare of farming community.
**CO5:** Work out strategies for attaining equilibrium in the market.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 1 | | 3 |
| **CO2** | | 3 | 3 |
| **CO3** | 1 | | 3 |
| **CO4** | 1 | 2 | |
| **CO5** | 2 | | |

**Suggested Readings**


1. Ahuja, H.L., (2016), *Principles of Micro Economics,* Sultan Chand, New Delhi.
2. Barthwal, R. R., (2012), *Microeconomic Analysis,* New Age International (P) Ltd., New Delhi.
3. Besanko, D., and R. Braeutigm., (2013), *Micro Economics*, Willey Black Well, New York.
4. David, L. Debertin, (2012), *Applied Micro Economics, Consumption, Production and Markets,* Create Space Independent Publisher, New Delhi.
5. Henderson, J.M.and Quandt, (1958), *Microeconomic Theory: A Mathematical Approach,* Tata McGraw-Hill, New York.
6. Koutsoyiannis, A., (2003), *Modern Microeconomics,* The Macmillan Press Ltd.,London.
7. Pindyck, R., and D. Rubinfeld., (2013), *Microeconomics, 8th Edition*, Pearson Education Incorporation, USA.
8. Salvature, D., (2003), *Microeconomics Theory & Applications, 4th Edition*, Oxford University Press, USA.
9. Silberberg, E., and W. Suen, (2000), *The Structure of Economics - A Mathematical Analysis,* New York: McGraw-Hill Book Company.
10. Varian and Hal, R., (1992), *Microeconomic Analysis*, W.W. Norton and Company, New York.


**Suggested Websites**

1. Open courseware at Massachusetts Institute of Technology, Cambridge MA at www.ocw.mit.edu
2. http://www.kevinhinde.com/
3. http://economicsonline.co.uk
4. http://economicsnetwork.ac.uk
5. http://www.econ.ucsb.edu/~tedb/eep/eep.html.
6. http://www2.econ.iastate.edu/classes/econ501/Hallam/

## AEC 602 Advanced Macro Economic Analysis (2+0)

**Learning Objectives**

- To understand the functioning of national economy, its history and models, the policies governing the modern economic system and concerned institutions.

- To impart the knowledge on the macroeconomic theory and macroeconomic policy implications.

**Theory**

**Unit I: Classical and Keynesian Approach**

Conceptual framework- Classical, Keynesian, Neo-Classical and Neo-Keynesian macroeconomics - Review of Keynes-Classical Synthesis - Aggregate demand and supply in the closed economy with fixed and variable price level- Determination of wage, prices, output and employment.

**Unit II: Open Economy Models**

Exchange rate determination -Purchasing power parity - Asset market approach-Short run open economy models- Mundell-Fleming model- Exchange rate regime - Perfect capital mobility under fixed and flexible exchange rate -Effectiveness of fiscal policy and monetary policy - Dornbusch's overshooting model-Monetary approach to balance of payments -International financial markets.

**Unit III: Dynamic Macroeconomic Models**

Introduction to dynamic macroeconomic models - Dynamic aggregate demand and supply - Short and long-term equilibrium- Rational expectations approach.

**Unit IV: Business Cycles**

Business cycle and its alternative equilibrium model - Stability analysis- Economics of great events-Depression, hyperinflation and deficits - Advances in business cycle theory - Real business cycles and Neo-Keynesian economics.

**Unit V: Macroeconomic Polices**

Monetary policy - Design of monetary policy - Inflation targeting - Fiscal policy - Government budget constraint - The arithmetic of deficits and debt - Current versus future taxes - Evolution of Debt-to-GDP ratio - Public borrowing-Internal and external aid - Deficit financing - Development financing - BOP and adjustment policies- Foreign exchange policy -International macroeconomic policies, IMF, IBRD, UNCTAD. Current streams of thought.

**Theory Lecture Schedule**

1. Conceptual framework-Classical, Keynesian, Neo-Classical and Neo-Keynesian macroeconomics
2. Review of Keynes-Classical synthesis
3. Aggregate demand and supply in the closed economy with fixed and variable price level
4. Determination of wage, prices, output and employment
5. Exchange rate determination -Purchasing power parity - Asset market approach
6. Short run open economy models
7. Mundell-Fleming model
8. Exchange rate regime - Perfect capital mobility under fixed and flexible exchange rate
9. Effectiveness of fiscal policy and monetary policy
10. Dornbusch's overshooting model
11. Monetary approach to balance of payments
12. International financial markets
13. Introduction to dynamic macroeconomic models
14. Dynamic aggregate demand and supply
15. Short and long - term equilibrium
16. Rational expectations approach
17. **First Test**
18. Business cycle and its alternative equilibrium model

19. Stability analysis
20. Economics of great events-Depression, hyperinflation and deficits
21. Advances in Business Cycle Theory
22. Real business cycles and Neo-Keynesian economics
23. Monetary policy - Design of monetary policy
24. Inflation targeting - Fiscal policy
25. Government budget constraint
26. The arithmetic of deficits and debt
27. Current versus future taxes
28. The evolution of Debt-to-GDP ratio
29. Public borrowing-Internal and external aid
30. Deficit financing -Development financing
31. BOP and adjustment policies
32. Foreign exchange
33. International macroeconomic policies, IMF, IBRD, UNCTAD
34. Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to
**CO1:** Understand the nature of inflation and ways to control it.
**CO2:** Figure out how policies are framed to safe guard the national economy.
**CO3:** Understand the advances in business cycle theory.
**CO4:** Understand the rationale behind the working of different economy.
**CO5:** Analyse monetary and fiscal policies.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 2 | 3 |
| **CO3** | 3 | | |
| **CO4** | 3 | | 2 |
| **CO5** | | 2 | |

**Suggested Readings**


1. Ahuja, H.L., (2016), *Macroeconomics, Theory and Policy*, Sultan Chand and Sons, Pvt. Ltd., New Delhi.
2. Andrew, B., Ben, A. S., Bernanke and D. Croushone, (1998), *Macro Economics, Dorling Kindersley (India) Pvt Ltd*., New Delhi.
3. Blanchard, O., Alessia Amighini and Francesco Giavazzi, (2017), *Macro-Economic Analysis*: A European Perspective) Pearson Education ltd., 7th Edition, England.
4. Edward Shapiro., (2013), *Macro Economics,* Galgotia Publications, New Delhi.
5. Heilbrones, (1972), *Understanding Macro Economics*, Prentice Hall India Learning Pvt. Limited, New Delhi.
6. Hicks, J.R., (1979), *Critical Essays in Monetary Theory*, Oxford University Press, Oxford, England, UK.
7. Jhingan, M.L., (2014), *Macro Economics Theory*, Vrinda Publication Pvt. Ltd., New Delhi.

8. Mithai, D. M., (1981), *Macro-Economics: Analysis and Policy*, Oxford and IBH, New Delhi.
9. Samuelson, P.A., and W.D., Nordhaus, (2004), *Economics*, McGraw-Hill, New Delhi.
10. Shapiro, E., (2013), *Macro-Economic Analysis*, Galgotia Publications, New Delhi.

**Suggested Websites**

1. http://ocw.mit.edu/courses/economics/14-02-principles-of-macroeconomics-fall-2009/
2. www.uh.edu/~bsorense/Macro_Lecture_Notes.pdf
3. http://www.cals.ncsu.edu/course/are012/notes.html
4. http://getyourecon.com
5. http://welkerswikinomics.com/blog/

## AEC 603 Advanced Econometrics (2+1)

**Learning Objectives**

- To provide the knowledge and command over analysis of data collected to get the desired results. To train the students in use of econometric models.

**Theory**

**Unit I: Classical Regression Model**

Review of classical regression model -Review of hypothesis testing –Restrictions on parameters -Single equation techniques.

**Unit II: Approaches to Estimation**

Ordinary least squares -Weighted least squares - Generalized least squares - Method of principal components -Instrumental variables method - Maximum likelihood method - Errors in variables, non-linearity and specification tests -Nonspherical error terms.

**Unit III: Limited Dependent Variables**

Dummy variables - Qualitative and truncated dependent variables -Limited dependent variables -LPM, Logit, Probit and Tobit models, their multinomial extensions.

**Unit IV: Time Series Econometrics**

Autoregressive distributed lag models -Panel data - Fixed and random effects modelsand their extensions.

**Unit V: Simultaneous Equation Models**

Simultaneous equation methods - Identification -Estimation by indirect least squares - 2SLS, PIML, SURE, 3SLS. Current streams of thought.

**Practical**

Estimation of multiple regression model - GLS estimation methods -Testing misspecification errors - Testing and managing multicollinearity, heteroscedasticity and autocorrelation - Estimation of LPM, Logit, Probit and Tobit models - Comparing two regressions - Chow test - Estimation of distributed lag models -Panel data - Random and fixed effects models - Indirect least squares - 2SLS, SURE, 3SLS - Estimation of simultaneous equation models.

**Theory Lecture Schedule**

1. Review of classical regression model
2. Approaches to statistical inferences and hypothesis testing
3. Restrictions on parameters
4. Single equation techniques
5. Properties and violation of ordinary least squares with assumptions and consequences
6. Weighted least squares
7. Generalized least squares
8. Method of principal components
9. Instrumental variables method
10. Maximum likelihood approach to the estimation of regression models
11. Errors in variables and their accommodation -specification bias and specification tests
12. Non-linearity tests
13. Specification tests
14. Non spherical error terms
15. Dummy variables and uses of dummy variables
16. Qualitative and truncated dependent variables
17. **First Test**
18. Multinominal extension of limited dependent variable models
19. Specification and estimation of LPM
20. Specification and estimation of Logit model
21. Specification and estimation of Probit model
22. Specification and estimation of Tobit model
23. Multinomial extensions of limited dependent variable models
24. Autoregressive distributed lag models
25. Specification of panel data models
26. Specification and estimation of fixed effects models
27. Specification and estimation random effects models
28. Extensions of panel data models
29. Specification and identification of simultaneous equation regression models
30. Estimation by indirect least squares - 2SLS
31. Estimation by indirect least squares - PIML
32. Estimation by indirect least squares- SURE
33. Estimation by indirect least squares- 3SLS
34. Current streams of thought.

**Practical Schedule**

1. Estimation of multiple regression model
2. GLS estimation methods
3. Testing misspecification errors
4. Testing and managing multicollinearity
5. Testing and managing heteroscedasticity
6. Testing and managing autocorrelation
7. Estimation of LPM
8. Estimation of Logit Model
9. Estimation of Profit Model
10. Estimation of Tobit model
11. Comparing two regressions
12. Test of structural change - Chow test
13. Estimation of distributed lag models
14. Estimation of panel data - random and fixed effects models
15. Indirect least squares - 2SLS, SURE, 3SLS
16. Estimation of simultaneous equation models
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Analyse the data collected for testing the framed hypotheses.

**CO2:** Get expertise in analytical frame work.

**CO3:** Develop the necessary skills needed for empirical research using econometrics techniques.

**CO4:** Identify the appropriate econometric model for qualitative data.

**CO5:** Estimate the simultaneous equation models and interpret the results.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 3 | 2 |
| **CO3** | 3 | | |
| **CO4** | | 3 | |
| **CO5** | | | 3 |

**Suggested Readings**


1. Damodar, N. Gujarati and S. Sangeetha, (2005), *Basic Econometrics (with CDROM)*, Tata McGraw Hill Education, New Delhi.
2. Damodar, N. Gujarati, (2002), *Student Solution Manual for Use with Basic Econometrics*, McGraw Hill, New Delhi.
3. Dougherty, C., (2011), *Introduction to Econometrics*, Oxford University Press, England.
   Greene, WH., (2002), *Econometric Analysis*, Pearson Education, New Delhi.
4. Gujarati, D., and Porter, D., (2009), *Basic Econometrics*, McGraw-Hill/Irwin, New York.
5. Jeffrey, M., and Wooldridge, (2000), *Introductory Econometrics*: *A Modern Approach*, South-Western Publishing Co.Ltd, USA.
6. Johnston, J., and J. Dinardo, (2000), *Econometric Methods*, McGraw-Hill, New Delhi.
7. Maddala, G.S., (1983), *Limited Dependent and Qualitative Variables in Econometrics*, Cambridge University Press, England.
8. Maddala G.S., (2002), *Econometrics*, Mc Graw Hill Book, New York.
9. Shyamala, S., and N. Kaur, (2013), *A Text Book on Econometrics, Theory and Applications*, Vishal Publishing Company, New Delhi.
10. Wooldridge, Jeffrey M., (2001), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Massachusetts.


**Suggested Websites**

1. http://www.oswego.edu/kane/econometrics/stud_resources.htm
2. http://nickchk.com/econometrics.html
3. https://inomics.com/insight/top-youtube-channels-to-learn-econometrics-economics49279
4. https://inomics.com/econometrics-free-online-courses
5. https://www.economicsnetwork.ac.uk/subjects/econometrics

## AEC 604 Advanced Production Economics (2+1)

### Learning Objectives

- To expose the scholars to advanced models in agricultural production decisions.
- To train the students on the analysis of production functions, its interpretation, decision making with multiple input use, factor sharing and decision making under risk and uncertainty.

### Theory

**Unit I: Scope of Production Economics**

Nature and scope of production economics - Agricultural production process - Relationship between farm planning and production economics-Scope of agricultural production and planning-Methods/procedures in Agro-economic research and planning.

**Unit II: Production Functions Analysis**

Production functions, components, assumptions, properties and their economic interpretation - Concepts of homogeneity, homotheticity, APP, MPP, elasticities of substitution and their economic relevance - Production relations -Optimality-Commonly used functional forms, nature, properties, limitations, estimation and interpretation - Linear, Spillman, Cobb Douglas, Quadratic, Multiplicative (power)functional forms - Translog and transcendental functional forms - CES, production functional forms-Conceptual and empirical issues in specification, estimation and application of production functions- Analytical approaches to economic optimum - Determination of economic optimum with constant and varying input and output prices - Economic optimum with production function analysis -Input use behaviour.

**Unit III: Decision Making in Production**

Decision making with multiple inputs and outputs - MRT and product relationship-Cost of production and adjustment in output prices-Single input and multiple product decisions- Multi input, and multiproduct production decisions - Decision making with no risk -Cost of wrong decisions - Cost curves - Principles and importance of duality theory - Correspondence of production, cost and profit functions - Principles and derivation of demand and supply functions.

**Unit IV: Technology, Efficiency and Risk Management**

Technology, input use and factor shares -Effect of technology on input used decomposition analysis-Factor shares-Estimation methods- Economic efficiency in agricultural production - Technical, allocative and economic efficiency -Measurement-Yield gaps analysis -Concepts and measurement - Risk and uncertainty in agriculture -Incorporation of risk and uncertainty in decision making -Risk and uncertainty and input use level- Risk programming.

**Unit V: Simulation and Programming**

Simulation and programming techniques in agricultural production-Multiple Objective Programming (MOP) - Goal programming - Weighted sum and Compromise programming - applications. Current streams of thought.

### Practical

Estimation of different forms of production functions- Optimal input and product choice from estimated functions-Derivation of demand and supply functions and estimation-Estimation of cost function and interpretations-Optimal product and input choice under multi input and output system -Estimation of factor shares from empirical functions estimated - Estimating production functions incorporating technology changes - Decomposition analysis and incorporation of technology-Estimation of efficiency measures - Stochastic, probabilistic and deterministic frontier production functions-Risk programming - MOTAD-Quadratic programming-Simulation models

for agricultural production decisions-Goal programming -Weighted, lexicographic and fuzzy goal programming-Compromise programming.

**Theory Lecture Schedule**

1. Nature and scope of production economics Agricultural production process - Relationship between farm planning and production economics
2. Scope of agricultural production and planning - Methods/procedures in agro-economic research and planning
3. Production functions, components, assumptions, properties and their economic interpretation
4. Concepts of homogeneity, homotheticity, APP, MPP, elasticities of substitution and their economic relevance
5. Production relations - optimality
6. Commonly used functional forms, nature, properties, limitations, estimation and interpretation
7. Linear, Spillman, Cobb Douglas, quadratic, multiplicative (power)functional forms
8. Translog and transcendental functional forms, CES production functional forms
9. Conceptual and empirical issues in specification, estimation and application of production functions
10. Analytical approaches to economic optimum
11. Determination of economic optimum with constant and varying input and output prices
12. Economic optimum with production function analysis -input use behaviour
13. Decision making with multiple inputs and outputs - MRT and product relationship
14. Cost of production and adjustment in output prices
15. Single input and multiple product decisions
16. Multi input, and multi product production decisions
17. **First Test**
18. Decision making with no risk
19. Cost of wrong decisions
20. Cost curves - principles and importance of duality theory
21. Correspondence of production, cost, and profit functions
22. Principles and derivation of demand and supply functions
23. Technology, input use and factor shares - effect of technology on input used
24. Decomposition analysis
25. Factor shares-estimation methods
26. Economic efficiency in agricultural production - technical, allocative and economic efficiency - measurement
27. Yield gaps analysis - concepts and measurement - Risk and uncertainty in agriculture - Incorporation of risk and uncertainty in decision making
28. Risk and uncertainty and input use level
29. Risk programming
30. Simulation and programming techniques in agricultural production
31. Multiple Objective Programming (MOP)
32. Goal programming
33. Weighted sum and Compromise programming - applications
34. Current streams of thought.

**Practical Schedule**

1. Estimation of different forms of production functions

2. Optimal input and product choice from estimated functions
3. Derivation of demand and supply functions and estimation
4. Estimation of cost function and interpretations
5. Optimal product and input choice under multi input and output system
6. Estimation of factor shares from empirical functions estimated
7. Estimating production functions incorporating technology changes
8. Decomposition analysis and incorporation of technology
9. Estimation of efficiency measures
10. Stochastic, probabilistic and deterministic frontier production functions
11. Risk programming - MOTAD
12. Quadratic programming
13. Simulation models for agricultural production decisions
14. Goal programming
15. Weighted, lexicographic and fuzzy goal programming
16. Compromise programming
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Differentiate technological, allocative and economic efficiency and applications.

**CO2:** Understand and apply production and cost function and implication for profit maximization in the short and long run.

**CO3:** Get familiar with different production functions and use them in practice and come out with useful decisions.

**CO4:** Work out the efficiency of the production process and use models for finding the optimum solutions.

**CO5:** Quantify risk and uncertainty in agricultural production.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 3 | 3 |
| **CO3** | 2 | | |
| **CO4** | 3 | 3 | |
| **CO5** | | | 3 |

**Suggested Readings**


1. Bedi, K., (2013), *Production Operation Management*, Oxford University Press, Oxford.
2. Bruce, R., Beattie, Taylor, C. R., Myles, J., and Watss, (2009), *The Economics of Production*, Krieger Publishing Company, New Delhi.
3. Chambers, R. G., (1988), *Applied Production Analysis*, Cambridge University Press, England.
4. David, L. Debertin., (2012), *Agricultural Production Economics*, Create Space Independent Publishing Platform, New Delhi.
5. Dhaka, J. M., (2010), *Economics of Agricultural Production and Farm Management*, Aaviskar.

6. Heady, Earl O., and J. L. Dillon, (2012), *Agricultural Production Functions*, Ames: Iowa State University Press, United States.
7. Ludden, D (2005), *Agricultural Production and South Asian History*, Oxford Indian Paper Books, New Delhi.
8. Palanisami, K., P. Paramasivam and C.R. Ranganathan., (2016), *Agricultural. Production Economics, Analytical Methods and Applications*, Associated Publishing Company, Chennai.
9. Shepherd, R. W., (2016), *Theory of Cost and Production Economics*, Princeton University Press, United States.
10. Yacob Khojasteh, (2017), *Production Management: Advanced Models, Tools and Applications for Full System*, McGraw Hill, New Delhi.

**Suggested Websites**

1. http://ocw.mit.edu/courses/economics
2. https://www.msu.edu/course/ECO/855
3. http://www.uky.edu/~deberti/prod/agprod5.pdf
4. http://www.csuchico.edu/ag/_assets/documents/syllabi/ABUS/ABUS%20301%20AG%20Prod uction%20Econ%20Analysis.pdf

## AEC 605 Advanced Agricultural Marketing and Price Analysis (1+1)

### Learning Objectives

- To impart adequate knowledge and analytical skills in the field of agricultural marketing and enhance expertise in improving the performance of the marketing institutions and the players in marketing of agricultural commodities.
- To explain price analysis with their application at both micro and macro levels.

### Theory

**Unit I: Agricultural Marketing Insights**

Importance of market analysis in the agricultural system - Types of marketing-Advantages and disadvantages - Quantitative estimation - Distinguishing characteristics and role of agricultural prices - Data sources for agricultural products and prices - Software used in market analysis.

**Unit II: Marketing Institutions**

Role of various formal institutions in agricultural marketing - functions -Measuring their efficiency. Public - private partnership - Institutional arrangements. Successful case studies.

**Unit III: Market Analysis**

Multi market estimation - Supply response models. Market integration and price transmission -Supply/value chain management. GAP analysis. Current trends in information in the changing Agri-food systems.

**Unit IV: Commodity Marketing**

Agricultural commodity marketing -Spot and futures- Marketing of derivatives - speculation, hedging, swap, arbitrage etc. Commodity exchanges - Price discovery and risk management in commodity markets-Regulatory mechanism of future stranding.

**Unit V: Forecasting Models**

Lag operators and difference equations -Stationary and stochastic processes – Unit roots and co-integration -Conditional heteroscedasticity - ARCH and GARCH models-Forecast evaluation -Methods of forecasting. Price indices and econometric estimation and simulation. Current streams of thought.

### Practical

Estimation of demand and supply forecasting -Supply chain and value chain analysis for different commodities- Case studies -Commodity models- Multi market estimation- Time series analysis, Market integration studies- Price discovery -Price volatility estimation -Commodity price forecasting using econometric software.

### Theory Lecture Schedule

1. Importance of market analysis in the agricultural system - types of marketing-advantages and disadvantages
2. Quantitative estimation - distinguishing characteristics and role of agricultural prices
3. Data sources for agricultural products and prices-Software used in market analysis
4. Role of various formal institutions in agricultural marketing - functions -measuring their efficiency
5. Public - private partnership - Institutional arrangements
6. Successful case studies
7. Multi market estimation - supply response models
8. **First Test**
9. Market integration and price transmission - Supply / value chain management
10. GAP analysis - current trends in information in the changing Agri-food systems

11. Agricultural commodity marketing - spot and futures - marketing of derivatives - speculation, hedging, swap, arbitrage, etc.
12. Commodity exchanges - price discovery
13. Risk management in commodity markets - regulatory mechanism of futures trading
14. Lag operators and difference equations - stationary and stochastic processes- unit roots and co-integration
15. Conditional heteroscedasticity - ARCH and GARCH models
16. Forecast evaluation - methods of forecasting - Price indices and econometric estimation and simulation
17. Current streams of thought.

**Practical Schedule**

1. Estimation of demand elasticity and forecasting
2. Estimation of supply elasticity and forecasting
3. Supply chain analysis for different commodities
4. Value chain analysis for agricultural commodities
5. Value chain analysis for horticultural commodities
6. Case studies in supply chain
7. Case studies in value chain
8. Commodity models-fundamentals, construction, estimation and application
9. Multi market estimation - fundamentals, construction and application
10. Time series analysis- Decomposition of time series data
11. Forecasting techniques
12. Market integration studies
13. Price discovery in different markets
14. Price volatility estimation
15. Software used in market analysis
16. Commodity price forecasting using econometric software
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Use marketing concepts for analysing market structures and performance and formulate effective agricultural marketing policy.

**CO2:** Understand price discovery mechanism under different market structures.

**CO3**: Gain knowledge on the role of marketing institutions.

**CO4**: Work out the interaction between different markets and analyse their working.

**CO5**: Gain expertise in forecasting of prices and build up market intelligence.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | 3 |
| **CO2** | 3 | | 2 |
| **CO3** | 2 | | 3 |
| **CO4** | | 2 | |
| **CO5** | 2 | | 3 |

**Suggested Readings**


1. Bhagat, D., and S.L.S. Akoijam, (2016), *Agricultural Marketing System in India*,Biotech Books, New Delhi.
2. Chakraborty, K. S., (2009), *Rural Market and Agricultural Marketing*, Mittal Publication, New Delhi.
3. Ferris, J. N., (1998), *Agricultural Prices and Commodity Market Analysis,* McGraw-Hill, New Delhi.
4. Ferris, J., (2006), *Agricultural Prices and Commodity Market Analysis*, Michigan State University Press, USA.
5. Kalita, D.C., and K.K. Jha Amod Sharma., (2021), *Agricultural Marketing, Trade, Price Analysis and Rural Marketing India*, Today and Tomorrow's Printers and Publishers, New Delhi.
6. Norwood, B., and T. Lusk., (2007), *Agricultural Marketing and Price Analysis,* Pearson, New Delhi.
7. Ravikumar, N. K., (2014), *Agricultural Marketing*, Astral International Pvt. Ltd., New Delhi.
8. Schruimper, R.A, (2001), Economics of Agriculture Markets, Pearson, London.
9. Tomek W.G., and K.L. Robinson., (2003), *Agricultural Product Prices*, Cornell University Press, New York.
10. Vercammen, J., (2011), *Agricultural Marketing - Structural Models for Price Analysis*, Routledge, New Delhi.


**Suggested Websites**

1. http://courses.cals.uidaho.edu/aers/agecon289/Index.htm
2. http://www.uky.edu/Classes/AEC/305- 001/classppts/01.pdf
3. http://www.youtube.com/watch?v=1vixHc37DII
4. http://www.stanford.edu/group/FRI/indonesia/.../chapt4.fm.
5. html http://www.Franciscovergara.Com/Pricecontrols.doc
6. http://www.docstoc.com 375
7. http://en.wikipedia.org/wiki/Market_structure
8. http://pdf.usaid.gov/pdf_docs/PNADL965.pdf
9. http://ageconsearch.umn.edu/handle/47883
10. http://faculty.quinnipiac.edu/charm/CHARM%20proceedings/.../160%20faria.pdf

## AEC 606 Quantitative Development Policy Analysis (1+1)

### Learning Objectives

- To develop expertise in understanding the rationale behind development of policies.
- Conceptualization of equilibrium and working out the economic implications of development policy.

### Theory

**Unit I: Policy Framework**

Policy framework - goals, value, beliefs and welfare maximization. Market – Policy and State - State Vs Market - Failure of policy - Failure of markets – Rationale for government intervention. Role of quantitative policy analysis.

**Unit II: Demand and Supply Analysis**

Demand analysis for policymaking - Alternative approaches to demand analysis - Policy implications. Supply response - Alternative approaches to measurement of supply response - Nerlovian models of supply response - Policy implications.

**Unit III: Household Behaviour Models**

Household behaviour and policy analysis - Household models.

**Unit IV: Multi-Pronged Approach to Policy Review**

Partial equilibrium analysis -Concept of reference prices -Price distortions - Indicators and impact. Transaction costs - Implications for efficiency and productivity - Institutional solutions - Multi market approach to policy analysis.

**Unit V: General Equilibrium and Programming**

Social accounting matrices and multipliers - Computable general equilibrium models to assess economy vide impact of policy changes -Fuzzy goal programming-Compromise programming. Current streams of thought.

### Practical

Review of criteria for policy evaluation -Estimation of price elasticities -Review of estimation of complete demand systems -Estimation of Nerlovian supply response model -Review of household models -Specification and estimation of household models -Partial equilibrium analysis-Input output table-Social Accounting Matrix -Construction of a SAM -Computation of multipliers -Multi market analysis -Review of computable general equilibrium models.

### Theory Lecture Schedule

1. Policy framework - goals, value, beliefs and welfare maximization
2. Market - Policy and State -State Vs Market - Failure of policy
3. Failure of Markets - rationale for government intervention
4. Role of quantitative policy analysis
5. Demand analysis for policymaking - alternative approaches to demand analysis - Policy implications
6. Supply response - alternative approaches to measurement of supply response
7. Nerlovian models of supply response - policy implications
8. **First Test**
9. Household behaviour and policy analysis
10. Household models - Partial equilibrium analysis
11. Concept of reference prices - Price distortions - Indicators and impact
12. Transaction costs - Implications for efficiency and productivity
13. Institutional solutions - Multi market approach to policy analysis
14. Social Accounting Matrices and multipliers

15. Computable general equilibrium models to assess economy vide impact of policy changes
16. Fuzzy goal programming - Compromise programming
17. Current streams of thought.

**Practical Schedule**

1. Review of criteria for policy evaluation
2. Estimation of price elasticities
3. Estimation of complete demand systems (AIDS)
4. Estimation of elasticities and policy analysis
5. Estimation of profit functions
6. Derivation of input demand and supply functions and policy analysis
7. Estimation of Nerlovian supply response model
8. Review of household models - Specification and estimation of household models
9. Estimation of household response to price incentives
10. Partial equilibrium analysis
11. Input-output table
12. Social Accounting Matrix
13. Construction of a SAM
14. Computation of multipliers
15. Multi market analysis
16. Review of computable general equilibrium models
17. **Final Practical Examination.**

**Course Outcomes**

After the completion of the course, the student will be able to

**CO1:** Conceptualize the policy framework.

**CO2:** Get acquainted with analysing the policy and work out corrective solutions.

**CO3:** Understand the various household models.

**CO4:** Develop multi-market approach to policy analysis.

**CO5:** Compute the general equilibrium models to assess economy vide impact of policy changes.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | 3 |
| **CO2** | 3 | | |
| **CO3** | 2 | | 3 |
| **CO4** | | 2 | |
| **CO5** | 2 | | 3 |

**Suggested Readings**


1. Chenery, H and T.N. Srinivasan eds., (1988), *Hand book of Development Economics*, Amsterdam: North-Holland, USA.
2. Eicher, K.C., and J. M. Staatz., (1998), *International Agricultural Development*, Baltimore: The Johns Hopkins University Press, USA.
3. Elizabeth, S., and A. D. Janvry., (1995), *Quantitative Development Policy Analysis*, London: The John Hopkins University Press, United States America.

4. Fischer G. J. Miller and Mara S. Sidney, Eds., (2007), *Handbook of Public Policy Analysis: Theory, Politics and Methods*, Boca Raton, Fla: CRC Press.
5. Frank, E., (1992), *Agricultural Polices in Developing Countries*, Cambridge University Press, New York.
6. John, and J. Walley., (1992), *Applied General Equilibrium*, Cambridge University Press, New York.
7. Kindleberger, P. Charles., (1977), *Economic Development*, Mc Grew Hill International Book Company,London.
8. Meier, M. G and Stigilitz J. E., (2001), *Frontiers of Development Economics- the Future Perspective*, Oxford University Press, New York.
9. Shoven Neck, S., Richter, R. C., and P. Mooslechner., (2008), *Quantitative Economic Policy*, Essays in Honour of Andrew Hughes Hallett Edition, New York.
10. Subrata, G., and K. Ingersent., (1984), *Agriculture and Economic Development*, Select Book Service Syndicate, New Delhi.

**Suggested Websites**

1. http://www.lib.cam.ac.uk/
2. http://www.grlc.vic.gov.au/content/collection-development-policy
3. http://library2.jfku.edu/about/cd_policy.html
4. http://www.mga.edu/library/policies.aspx
5. http://www.libs.uga.edu/colldev/cdpolicy.html

## AEC 607 Advanced Agricultural Project Analysis (1+1)

### Objectives

- To educate the scholars on the scope and complexity of modern agricultural projects of national and international importance.
- To impart knowledge on various appraisal tools and techniques of agricultural investment projects and to highlight the importance of pre- and post-evaluation of various components of projects and its management.

### Theory

**Unit I: Project Planning**

Projects -concepts. Features of agricultural projects - Project cycle - Project analysis - meaning, importance, scope, objectives and steps - Identification of agricultural projects - Project duration - Short term, medium term and long term projects with examples - Strategies for planning agricultural projects - Project management - success, maturity. Excellence -definition and strategic planning for excellence.

**Unit II: Project Formulation**

Project planning -Steps involved in planning - SWOC analysis- Project costs and benefits - Direct transfer payments - Costs of agricultural projects - Tangible and intangible costs and benefits of agricultural projects. Secondary costs and benefits - Project feasibility - Technical, institutional, social, commercial, financial, economic, environmental feasibility of agricultural investment projects - Project Scheduling - PERT / CPM methods. Breakeven analysis. - Cases related to project formulation- IAM WARM projects.

**Unit III: Financial Analysis of Agricultural Projects**

Project finance, sources, incentives - Subsidies and public policies for supporting agricultural investment projects - Time value of money - Compounding and discounting techniques. Discounted and undiscounted measures - NPV, BCR, IRR and Payback period. Sensitivity analysis- Funds flow analysis - Cash flow management - Capital rationing - Impact of inflation.

**Unit IV: Project Implementation**

Project implementation processes - Operation manuals, components. Financial management analysis of agricultural projects - Ratio analysis - Types of ratios - Liquidity ratios, Leverage ratios, Acid test ratio, Debt equity ratio, etc. - Venture capital process and issues in India. Mergers - acquisitions and amalgamations - Types of mergers - Effects of mergers and acquisitions on project management.

**Unit V: Project Monitoring and Controlling**

Appraisal of projects - Monitoring and evaluation of projects - Monitoring and evaluation (M&E) - concepts - Designing of M&E systems and indicators used in M&E. Evaluation of agricultural projects - Concurrent and summative evaluation - Evaluation methods - With and without and before and after project. Risks in financing agricultural projects - Identification and measurement of risks-Risk management strategies and coping mechanism. Current streams of thought.

### Practical

Features of agricultural project. SWOC analysis. Project cycle. Estimation of costs and benefits of agricultural projects. Tangible and intangible costs and benefits of agricultural projects.

Estimation of secondary costs and benefits. Assessment of technical, institutional, social, commercial, financial, economic and environmental (TISCOFEE) feasibility of agricultural investment projects. Study on PERT and CPM analysis. Breakeven analysis - Case analysis of agricultural projects (World Bank)- Project appraisal - compounding and discounting techniques. Sensitivity analysis. Preparation of project proposals in agriculture and allied enterprises. Funds flow analysis - Preparation of cash flow statement. Financial management analysis of agricultural projects - Ratio analysis. Risks in financing agricultural projects. Identification and measurement of risks. Risk management strategies and coping mechanism. Appraisal of projects - Monitoring and evaluation of projects.

**Theory Lecture Schedule**

1. Concepts of projects - features of agricultural projects -Project cycle -Project analysis - meaning, importance, scope, objectives and steps
2. Identification of agricultural projects, - Project duration short term- medium term and longterm projects with example
3. Strategies for planning agricultural projects
4. Project management - success, maturity and excellence - definition and strategic planning for excellence
5. Capital budgeting decisions - Project planning - SWOC analysis
6. Project costs and benefits - Direct transfer payments - Costs of agricultural projects - Tangible and intangible costs and benefits of agricultural projects - Secondary costs and benefits
7. Project design - Project feasibility -technical, institutional, social, commercial, financial, economic and environmental aspects (TISCOFEE)
8. **First Test**
9. Project Scheduling - PERT / CPM methods. Breakeven analysis- Cases related to project formulation - IAM WARM projects.
10. Project finance - sources, incentives, subsidies and public policies for supporting agricultural investment projects
11. Time value of money - Compounding and discounting techniques. Discounted and undiscounted measures - NPV, BCR, IRR and Payback period. Sensitivity analysis
12. Funds flow analysis - Cash flow management. Capital rationing - Impact of inflation
13. Financial management analysis of agricultural projects - Ratio analysis - Types of ratios - Liquidity ratios, Leverage ratios, Acid Test ratio, Debt Equity ratio, etc
14. Project implementation processes - Project managers and their types - Venture capital process and issues in India
15. Mergers - acquisitions and amalgamations - Types of mergers - The effect of mergers and acquisitions on project management
16. Risks in financing agricultural projects. Identification and measurement of risks. Risk management strategies and coping mechanism
17. Ex-post appraisal of projects - Monitoring and evaluation of projects - Monitoring and Evaluation (M&E) - concepts. Current streams of thoughts.

**Practical Schedule**

1. Analysing the features of agricultural project
2. SWOC analysis. Project cycle
3. Estimation of Costs and benefits of agricultural projects - Tangible and intangible costs and benefits of agricultural projects
4. Estimation of secondary costs and benefits - Assessment of technical, institutional, social, commercial, financial, economical and environmental feasibility of agricultural investment projects
5. Break even analysis. Project scheduling - PERT and CPM analysis
6. Project appraisal techniques - Discounting and compounding techniques - NPV, BCR and IRR
7. Project analysis - Payback period. Sensitivity analysis
8. Preparation of project proposals in agriculture and allied enterprises following TISCOFEE principles
9. Funds Flow analysis - Preparation of Cash Flow Statement.
10. Financial management analysis of agricultural projects - Ratio analysis
11. Risks in financing agricultural projects - Identification and measurement of risks
12. Risk management strategies and coping mechanism
13. Ex-post appraisal of projects - Monitoring and evaluation of projects.
14. Designing of M&E systems and indicators used in M & E
15. Evaluation of agricultural projects - Concurrent and summative evaluation
16. Methods of evaluation of projects - With and without, and before and after project
17. **Final Practical Examination**.

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Identify major domestic financial management tools, techniques and practices.

**CO2:** Analyse financial statements using standard financial ratios.

**CO3**: Know the way to monitor agricultural projects.

**CO4**: Understand the usage of project appraisal techniques.

**CO5:** Identify relevant cash flows for capital budgeting.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | 3 |
| **CO2** | 3 | | |
| **CO3** | | | 3 |
| **CO4** | 2 | 2 | |
| **CO5** | | | 2 |

**Suggested Readings**

1. David, H. W. and A. Raitze., (2007), *Impact Evaluation of Development Interventions, A Practical Guide*, Asian Development Bank, Philippines.

2. Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B. and M. J. Vermeersch., (2016), *Impact Evaluation in Practice*, second edition. Washington, DC: Inter-American Development Bank and World Bank, License: Creative Commons Attribution CC BY 3.0 IGO.
3. Independent Evaluation Group, (2011), *Impact Evaluations in Agriculture: An Assessment of the Evidence*, Washington, DC: World Bank.
4. Jerome, D. Wiest and Fertinand, K. Lezy., (1991), *A Management Guide to PERT / CPM with GERT / PLM / DCPM and Other Networks,* Prentice Hall of India Private Limited, New Delhi.
5. Judy L. Baker., (2000), *Evaluating the Impact of Development Projects on Poverty-A Handbook for Practitioners, Directions in Development*, The World Bank, Washington, D.C.
6. Little, I.M.D. and Mirlees, J.A., (1974), *Project Appraisal and Planning for Developing Countries*, Oxford & IBH Publications, New Delhi.
7. Prasanna Chandra., (2009), *Projects - Planning Analysis, Selection, Financing, Implementation and Review*, McGraw Hill Education, New York.
8. Price Gittinger J., (1982), *Economic Analysis of Agricultural Projects*, The Johns Hopkins University Press, Baltimore.
9. Shahidur, R., Khandker, Gayatri, B., Koolwal Hussain, and A., Samad., (2010), *Handbook on Impact Evaluation Quantitative Methods and Practices*, The International Bank for Reconstruction and Development / Washington, DC: World Bank.
10. Smith, P, (2011), *Agricultural Project Management, Monitoring and Control of Implementation*, Springer Publishing, New York.

## AEC 608 Advanced Agricultural Finance and Insurance (1+1)

### Learning Objectives

- The main objective of the course is to understand the issues related to priority sector lending and credit management and to acquire proficiency in financial analysis.
- To evaluate various financial risk management techniques including crop insurance products.

**Theory**

**Unit I: Flow of Agricultural Credit**

Evolution of banking system in India. Credit flow to rural / priority sector. Agricultural lending - Direct and indirect financing through co-operatives, commercial banks, RRBs, private sector banks and foreign banks. Role of lead bank and NABARD. Credit linked Rural Development Programmes. Financial instruments and methods - Kisan credit cards and credit, debit and smart Cards - Retail banking, Core banking, e-banking, Internet banking and mobile banking. Issues and policies of rural lending. Banking sector reforms. Agricultural credit policy.

**Unit II: Capital Market and Credit Management**

Capital markets and instruments - Equity and debt. Primary and secondary markets. Negotiable instruments - Treasury bills, certificates of deposit and bearer deposit notes, Commercial paper, Bonds - Markets, yields, prices and interest rates. Fixed income capital market Instruments - Government bonds, Provincial and municipal bonds,corporate bonds, Mortgage - backed securities - Bond price volatility - Technical feasibility, economic viability and repaying capacity of borrowers and appraisal of agricultural credit proposals.

**Unit III: Microfinancing**

Microfinancing and role of MFIs, NGOs and SHGs in rural development. Microfinance - as a viable business model and various models for MFI - Common factors among successful MFIs - Indices for performance assessment - Social and economic impact of MFIs - their limitations for alleviating poverty -Financial inclusion - Credit widening and credit deepening - Concept of social venture capitalism.

**Unit IV: Non-Banking Financial Companies and Mutual Funds**

Non-Banking Financial Companies (NBFC) - Asset and liability management in NBFCs - Reforms in NBFCs in India- Credit rating companies - Leasing and its types - Conceptual and legal frame work of leasing and hire purchase. Factoring and forfeiting in India. Export credit – Export Credit Guarantee Corporation of India.

**Unit V: Risks and Insurance in Agriculture**

Risks in financing agricultural projects. Selection of risk - Factors affecting risk - Sources of risk. Measurement of risk. Risk management strategies and coping mechanism adopted by bankers and firms / farms. Principles of insurance. Evolution of insurance, kinds - Insurance Organizations in India. Functions of IRDA. Crop insurance programmes - Global experiences on Crop insurance - Yield and weather based insurance schemes and their applications in India - Significance and issues - Livestock insurance, Private insurance, Group insurance, Micro insurance, Mutual insurance and reinsurance. Current streams of thought.

**Practical**

Development of rural institutional lending - Rural lending programmes of commercial banks and RRBs. Lead bank scheme - District Credit Plan. Role of NABARD. Rural lending programmes of Cooperative lending institutions. Financial instruments and methods - e-Banking, Kisan Credit Cards and Core Banking. Technical feasibility, economic viability and repaying capacity of borrowers and appraisal of agricultural credit proposals. Supervisory credit system- Issues and policies of rural lending. Banking sector reforms. Microfinancing in rural development. Performance of Microfinancing institutions - NGOs and Self Help Groups. Non-Banking Financial Companies (NBFC) - Asset and liability management in NBFCs - Reforms in NBFCs in India. Financial risk and risk management strategies - Functions of IRDA. Crop Insurance programmes. Global experiences on Crop Insurance - Yield and weather based insurance schemes and their applications in India - Significance and issues.

**Theory Lecture Schedule**

1. Evolution of banking system in India - Credit flow to rural / priority sector - Agricultural lending - Direct and indirect financing through co-operatives
2. Financing through commercial banks, RRBs, private sector banks and foreign banks - principles and practices of cooperation
3. Role of lead bank and NABARD - Credit linked rural development programmes
4. Financial instruments and methods - Kisan Credit Cards, and Credit, Debit and Smart Cards; and Retail banking, Core banking, e-banking, Internet banking and Mobile banking - Issues and policies of rural lending - Banking sector reforms - Agricultural credit policy
5. Capital markets and instruments - Equity and debt - Primary and secondary markets - Negotiable instruments - Treasury bills, Certificates of deposit and bearer deposit notes, Commercial paper, Bonds - markets, Yields, Prices and Interest rates
6. Fixed income capital market instruments - Government bonds, Provincial and municipal bonds, corporate bonds, mortgage backed securities - Bond price volatility
7. Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of agricultural credit proposals
8. **First Test**
9. Microfinancing and role of MFIs - NGOs, and SHGs in rural development
10. Microfinanceas a viable business model and various models for MFI - common factors among successful MFIs - Indices for performance assessment
11. The social economic impact of MFIs - Their Limitations for alleviating poverty - Concept of social venture capitalism - Financial inclusion - Credit widening and credit deepening
12. Non-Banking Financial companies (NBFC) - Asset and liability management in NBFCs - Reforms in NBFCs in India - Credit rating companies
13. Leasing and its types - Conceptual and legal frame work of leasing and hire purchase - Factoring and forfeiting in India - Export credit - Export Credit guarantee Corporation of India
14. Risks in financing agricultural projects. Selection of risk - Factors affecting risk - Sources of risk. Measurement of risk - Risk management strategies and coping mechanism adopted by bankers and firms / farms
15. Principles of insurance -Evolution of insurance -kinds - Insurance organization in India - IRDA -Functions - Agricultural Insurance Company of India - Global experiences on crop insurance
16. Crop Insurance Programmes - Yield based Crop Insurance Schemes and their applications in India - Significance and issues - Weather Based Crop Insurance schemes - significance and Issues

17. Private Insurance, Group Insurance, Micro-insurance, Mutual Insurance and Reinsurance - Current streams of thought.

**Practical Schedule**

1. Development of rural institutional lending
2. Rural lending programmes of Co-operative lending institutions, RRBs and Commercial banks
3. Lead bank scheme - Study on District Credit Plan - Role of NABARD
4. Financial instruments and methods - e-banking - Kisan Credit Cards and Core banking
5. Fixed income capital - Market instruments and Corporate bonds
6. Demand for agricultural credit - Determinants of demand for agricultural credit - Credit gap - Credit rationing
7. Technical feasibility, Economic viability and Repaying capacity of borrowers and Appraisal of credit proposals
8. Supervisory credit system -Causes, consequences and mitigating measures- Management of NPAs
9. Issues and policies of rural lending - Banking sector reforms
10. Micro-financing and role of MFIs - NGOs, and SHGs
11. Non-Banking Financial Companies (NBFC)
12. Asset and liability management in NBFCs - Reforms in NBFCs in India
13. Financial risks and Risk management strategies - Functions of IRDA
14. Agricultural Insurance Company of India - Crop insurance programmes
15. Global experiences on crop insurance
16. Yield and Weather based insurance schemes and their applications in India - Significance and issues
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Understand the principles of agricultural finance lending.
**CO2:** Understand the procedure to repay the loan.
**CO3**: Know the way to monitor financial risk and strategies to manage.
**CO4**: Understand the e-banking and credit card.
**CO5:** Understand the global experiences in crop insurance.

**CO- PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 2 | 3 |
| **CO3** | 2 | 2 | |
| **CO4** | 3 | | |
| **CO5** | | | 3 |

**Suggested Readings**

1. Ellinger, B., Hopkin, and Baker, (2012), *Financial Management in Agriculture*,

Seventh Edition, Interstate Printers and Publishers, Inc.
2. Gupta, S. C., (1987), *Development Banking for Rural Development*, Deep and Deep Publication, New Delhi.
3. Khan, M. Y and P.K.Jain., (2003), *Financial Management*, Tata McGraw Hill Publishing Ltd, New Delhi.
4. Muniraj, R., (1987), *Farm Finance for Development*, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
5. Nelson, Lee, and Murray, (1973), *Agricultural Finance*, Sixth Edition, Iowa State University Press, United States.
6. Penson and Lins, (1980), *Agricultural Finance*, Second Edition, Prentice-Hall, Inc, New Jersey.
7. Peter S. Rose and Sylvia C. Hudgins., (2006), *Bank Management & Financial Services*, Tata Mc Graw Hill Publishing Ltd, New Delhi.
8. Prasanna, C., (1999), *Financial Management*, Tata McGraw Hill Publishing Ltd, New Delhi.
9. Rahul B., Nappal., (2017), *Agricultural Finance*, Pacific Books International, New Delhi.
10. Wareen F., Lee and Michael D., Boehlje and Aaron G. Nelson., (1999), *Agricultural Finance*, Willey - Black Well, New Jersey.

**Suggested Websites**

1. https: //www.taylorfrancis.com Agricultural Finance. Charles B. Moses. eBook Published in 2013
2. https://annualreport.rbi.org.inReserve Bank of India Publications
3. https://www.nabard.org/PublicationNABARD Publications
4. http://www.aicofindia.comAnnual Reports of Agriculture Insurance Company of India Limited

**AEC 609 Natural Resource Economics (1+1)**

## Learning Objectives

- To focus on the concept building of natural resource and to gain expertise in economic aspect of natural resources and maintain a balance between economic gains and environment conservation.
- To solve natural resource management problems via mathematical approach using dynamic optimization techniques.

**Theory**

**Unit I: Dynamics of Natural Resources**

Natural resources - definition - Characteristics and classification. Stock dynamics of renewable and non-renewable resources. Equation of motion for renewable and non-renewable resources. Fundamental equation of renewable resources.

**Unit II: Efficiency in Natural Resource Use**

Growth curves of fishery and forest resources. The role of time preference in natural resource use. Simple two-period model of optimal use of renewable and non-renewable resources. Advanced models of optimal resource use - Static Vs - dynamic efficiency in natural resource use - Applications of dynamic programming and optimal control.

**Unit III: Natural Resource Use in Agriculture**

Economics of groundwater use - Optimal extraction of groundwater. Analytical and numerical solutions for optimal inter-temporal allocation of natural resources - Optimal harvesting of single rotation and multiple rotation forests – Optimal management of fishery.

**Unit IV: Common Property Resource Management**

Property rights in natural resources and their implication for conservation and management of natural resources - Management of common property natural resources- Institutional arrangements for conservation and management of common pool fishery, groundwater and forestry resource.

**Unit V: Dynamics of Resource Economics**

Resource scarcity - Natural resource degradation - Poverty and resource degradation - Natural resource accounting - Pricing and valuation of natural resources – Natural resources policy. Current streams of thought.

## Practical

Derivation of the fundamental equation of renewable resources- Estimation of growth curves and stock dynamics for fishery and forestry resources. Simple two period problem of optimal resource use - Numerical solution for simple two-period model of dynamic efficiency in natural resource extraction. Multi-period dynamic efficiency - Using Excel solver in solving dynamic natural resource harvesting problems. Using analytical solution procedureforsolvingnaturalresourcemanagementproblemsoptimalcontrol.

**Theory Lecture Schedule**

1. Natural resources - definition - characteristics - classification of natural resources
2. Stock dynamics of renewable - stock dynamics of non-renewable resources
3. Equation of motion for renewable - Equation of motion for non-renewable resources - Fundamental equation of renewable resources
4. Growth curves of fishery resources - forest resources
5. The role of time preference in natural resource use
6. Simple two-period model of optimal use of renewable and non-renewable resources

7. Advanced models of optimal resource use - Static Vs. dynamic efficiency in natural resource use
8. **First Test**
9. Applications of dynamic programming and optimal control
10. Economics of groundwater use - Optimal extraction of groundwater
11. Analytical and numerical solutions for optimal inter-temporal allocation of natural resources
12. Optimal harvesting of single rotation and multiple rotation forests - Optimal management of fishery
13. Property rights in natural resources - Their implication for conservation and management of natural resources
14. Management of common property natural resources - Institutional arrangements for conservation and management of common pool fishery
15. Groundwater and forestry resource - resource scarcity - Natural resource degradation
16. Poverty and resource degradation - Natural resource accounting - Pricing and valuation of natural resources
17. Natural resources policy. Current streams of thought.

## Practical Schedule

1. Mathematical modeling of natural resource problems.
2. Estimation of growth curve and stock dynamics for fishery and forestry resources.
3. Simple two-period problem of optimal resource use - Numerical solution for simple two-period model of dynamic efficiency in natural resource extraction.
4. Multi-period dynamic efficiency-problem solving.
5. Solvingdynamicnaturalresourceharvestingproblems-Fisheriesproblem.
6. Solvingdynamicnaturalresourceharvestingproblems-Timberharvestingproblem.
7. Solving dynamic natural resource harvesting problems-Groundwater extraction problem.
8. Solvingdynamicnaturalresourceharvestingproblems-Mineralharvestingproblem
9. Usinganalyticalsolutionproceduresforsolvingnaturalresourcemanagementproblems
10. Natural resource accounting-Problem solving
11. Analysis of water conservation and water allocation problems
12. Cooperativegametheoryproblemsincommonpoolnaturalresourcemanagement.
13. Non-cooperativegametheoryproblemsincommonpoolnaturalresourcemanagement.
14. Impact of wealth in equality on common pool natural resource management.
15. Comparative analysis of open access, common property and private property equilibrium in natural resource exploitation
16. Natural resource evaluation - valuation techniques
17. **Final Practical Examination.**

## Course Outcomes

At the end of the course students will be able to

**CO1:** Analyse economic problems related to natural resource use including climate change problems.

**CO2:** Understand environmental legislations in India.

**CO3:** Understand the natural resources and methodologies to develop plans for their optimal use.

**CO4:** Work out the economics of forest, fisheries and ground water.

**CO5:** Deal with the legal matters of the natural resources.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | 3 |
| **CO2** | 3 | | |
| **CO3** | | 3 | 3 |
| **CO4** | 3 | 2 | |
| **CO5** | | | 2 |

**Suggested Readings**


1. Baland, J.M.andJ.P.Platteau., (1996), *Halting Degradation of Natural Resources: Is There a Role for Rural Communities?*,Oxford: Clarendon Press and FAO.
2. Carlson, G.A., J. Miranowski and D.Zilberman., (1998), *Agricultural and Environmental Resource Economics*, Oxford: Oxford University Press.
3. Chiang, Alpha C., (1992), *Elements of Dynamic Optimization*, Waveland Press, Illinois.
4. Fisher, A.C., (1981), *Resource and Environmental Economics*, Cambridge University Press, Cambridge.
5. Hackett, S.C., (2001), *Environmental and Natural Resource Economics: Theory, Policy and the Sustainable Society*, M.E. Sharpe, Armonk, New York.
6. Hartwick, J.M and Olewiler N. D., (1998), *The Economics of Natural Resource Use*. 2nd Edition, Addison-Wesley Educational Publishers, United States.
7. Kerr, J.M, Marothia D. K, Singh, K., Ramasamy, C., and W. R. Bentley., (1997), *Natural Resource Economics: Theory and Applications in India*, Oxford &IBH, New Delhi.
8. Pearce, D. W., and K. Turner., (1990), *Economics of Natural Resources and the Environment*, John Hopkins University Press, Baltimore.
9. Philip, A., Neher., (1990), *Natural Resource Economics, Conservation and Exploitation*, Cambridge University Press, England.
10. Tietenberg, T., (2003), *Environment and Natural Resource Economics*, 6thEd, Addison Wesley, United States.


**Suggested Websites**

1. Resources for the Future: www.rff.org
2. University of Colorado, Natural Resource Economics: ECON3535-001http://spot.colorado.edu/~kaplan/econ3535/econ3535.html, from where link can be established for eTextat : chrome://epubreader/content/reader.xul?id=1
3. Students' self-study guide for Tom Tietenberg's Environmental & Natural Resources Economics, 10/e at http://www.pearsonhighered.com/tietenberg/
4. www.env-econ.net
5. Companion web site provides a set of resources associated with the 4th edition of the textbook Natural Resource and Environmental Economics by Perman, Ma, Common, Maddison and McGilvry: http://personal.strath.ac.uk/r.perman/enviro7.htm
6. http://economicsnetwork.ac.uk
7. http://personal.strath.ac.uk/r.perman/EERclassnotes.htm

## AEC 610 Environmental Economics (1+1)

### Learning Objectives

- To understand the economic outcomes of environmental degradation.
- To make the students proficient in decision making regarding environment protection, resource use, and conservation policy.

### Theory

**Unit I: Overview of Environmental Economics**

Environmental pollution as a consequence of market failure - Causes and consequences of market failure - Externalities - Public goods and externalities-Economics of pollution - Private Vs Social cost of environmental pollution – Property rights, environment and development - Theory of environmental policy.

**Unit II: Economic Assessment**

Environmental cost benefit analysis - Environmental impact assessment techniques-Total economic valuation of environmental goods - Non-market valuation of environmental resources (WTP / WTA) - Environment, market and social welfare.

**Unit III: Economic Growth vis-à-vis Environmental Degradation**

Economic growth and environmental cost - Growth oriented economic policies and their environmental impacts - Population and environmental quality - Poverty and environmental degradation - Sustainable development - Indicators of sustainable development - Issues in sustainable development.

**Unit IV: Environmental Policies and Regulation**

Environment, ecology and environmental accounting - Environmental pollution with respect to water and air - Land and forest resources related environmental pollution - Coastal externalities - Urbanization and environment - Basic environmental policy (Tax, subsidy, pollution permits, *etc*.). Green taxes – Political economy of environmental regulation and management.

**Unit V: Global Environmental Issues**

Transboundary environmental problems - Economics of global warming, climate change and emission trading - Environment, international trade and development. Current streams of thought.

### Practical

Contemporary global environmental global environmental issues, movement, policies, programmes, laws and other regulatory mechanisms- Criteria for evaluating the environment related projects and review of Environmental Impact Assessment (EIA) techniques- Recreation demand models of environmental valuation - Contingent valuation techniques - Environmental resource accounting techniques -Discussion on the techniques dealing with air pollution and review of case studieson air pollution and its impacts - forest environment and wild life conservation - Green GDP and Green house insurance -Practical considerations and comparison of instruments of environmental policy - Non-point source pollution control methodologies - Environment in macroeconomic modelling - Meta-analysis, economic valuation and environmental economics - Multi-criteria methods for quantitative, qualitative and fuzzy evaluation problems related to environment -Input output analysis, technology and the environment -Computable general equilibrium models for environmental economics and policy analysis.

### Theory Lecture Schedule

1. Environmental pollution as a consequence of market failure

2. Causes and consequences of market failure-Externalities - Public goods and externalities
3. Economics of pollution - Private vssocial cost of environmental pollution - Property rights, environment and development
4. Theory of environmental policy - Environmental cost benefit analysis
5. Environmental impact assessment techniques - Total economic valuation of environmental goods
6. Non-market valuation of environmental resources (WTP / WTA)
7. Environment, market and social welfare - Economic growth and environmental cost
8. **First Test**
9. Growth oriented economic policies and their environmental impacts
10. Population and environmental quality - Poverty and environmental degradation
11. Sustainable development - Indicators of sustainable development - Issues in sustainable development - Environment, ecology and environmental accounting
12. Environmental pollution with respect to water and air - Land resources related environmental pollution - Forest resources related environmental pollution
13. Coastal externalities - Urbanization and environment - Basic approaches to environmental policy (Tax, subsidy, pollution permits, *etc*.)
14. Green taxes - Political economy of environmental regulation and management
15. Transboundary environmental problems - Economics of global warming
16. Climate change and emission trading - Environment, international trade and development
17. Current streams of thought.

**Practical Schedule**

1. Contemporary global environmental issues, movement, policies, programmes, laws and other regulatory mechanisms
2. Criteria for evaluating the environment related projects
3. Review of Environmental Impact Assessment (EIA) techniques
4. Recreation demand models of environmental valuation
5. Contingent valuation techniques -Environmental resource accounting techniques
6. Discussion on the techniques dealing with air pollution
7. Review of case studies on air pollution and its impacts
8. Forest environment and wild life conservation
9. Green GDP and Green house insurance
10. Practical considerations and comparison of instruments of environmental policy
11. Non-point source pollution control methodologies
12. Environment in macroeconomic modelling
13. Meta-analysis, economic valuation and environmental economics
14. Multi-criteria methods for quantitative, qualitative and fuzzy evaluation problems related to environment
15. Input output analysis, technology and the environment
16. Computable general equilibrium models for environmental economics and policy analysis
17. **Final Practical Examination**.

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Understand the evaluation of environmental benefits.

**CO2:** Work out the economics of productions activities in terms of losses to environment.
**CO3:** Learn about accounting of environmental costs and other related issues.
**CO4:** Understand the concept of pollution and externalities caused by economic activity.
**CO5:** Analyze economic problems related to natural resource use including climate change problems.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 3 | 3 |
| **CO3** | 3 | 2 | |
| **CO4** | 2 | 3 | |
| **CO5** | | | 2 |

**Suggested Readings**


1. Bromley, W. Daniel, (2005), *The Hand Book of Environmental Economics*, Black Well Publications, Madison.
2. Fisher, Antony C., (2015), *Resource and Environmental Economics*, Cambridge University Press, London.
3. Hanley, N., Shogran, J.F. and Benwhite., (2009), *Environmental Economics in Theory and practice*, Mc Millan, New Delhi, India.
4. Joy E. Hecht., (2012), *Natural Environmental Accounting- Bridging the gap between Ecology and Economy*, John Hopkins University Press, United states.
5. Karpagam, M., (1999), *Environmental Economics*, Sterling Publishing Pvt. Ltd, New Delhi.
6. Myrick Freeman. A., (2014), *The Measurement of Environmental and Resource values - Theory and Methods*, Resource for the future press, Florida.
7. Rabindra N., Bhahacharya, (2002), *Environmental Economics - An Indian Perspective*, Oxford University Press, New Delhi.
8. Singh, K., and A. Shishodia, (2007), *Environmental Economics: Theory and Application*, Saga India, New Delhi.
9. Totenberg T,(2003), *Environment and Natural Resource Economics*, 6$^{th}$ Edition Addison Wesley, USA.
10. William J. Baumol and Wallace E. Oates, (2009), *The Theory of Environment Policy*, Cambridege University Press, London.


**Suggested Websites**

1. http://ocw.mit.edu/courses/economics/14-42-environmental-policy-and-economicsspring-2011/lecture-notes/
2. http://www.colorado.edu/economics/morey/4545/4545lnts.html
3. http://www.economicsnetwork.ac.uk/environmental/resources
4. http://personal.strath.ac.uk/r.perman/EERclassnotes.htm
5. http://www.agecon.purdue.edu/staff/shively/courses/AGEC406/index.htm

**AEC 611 International Trade Theories and Policy Applications (1+1)**

## Learning Objectives

- To describe the nature of trade, its causes and welfare effect, the gains from trade and their measurement, different causal explanations for the determinants of the pattern of trade, and trade's effect on fact or rewards.
- Further, the course will help to understand the impact of different trade policy instruments on firm profits, domestic and world prices. The welfare effects of prefer entail trade agreements and some topic as the frontier form of international trade are also discussed.

**Theory**

**Unit I: International Trade Theories-I**

Why do Nations trade - Classical theory - Ricardian model of trade - Factor price equalization theorem - Stolper - Samuelson theorem - The Rybczynski theorem - The Heckscher Ohlin theorem - New Trade Theory (NTT) - Contributions by Paul Krugman.

**Unit II: International Trade Theories-II**

Walras's Law and Trade Equilibrium - Factor price and factor proportions of the firm in open economy - Scitovsky's social indifference curves - Factor mobility - Equilibrium under NTT.

**Unit III: Trade Agreements**

Trade Indifference curves - Economics of scale - Imperfect competition and trade- International trade in the presence of product differentiation- Theory of protection - Tariffs and other barriers to trade - Arguments for protection - Regional blocks – FTA/ RTA.

**Unit IV: Trade and Growth**

Sources of economic growth - Standard model of trade and economic growth - Kaldors theory of export led growth - Prebisch and Singer effects - Terms of trade - Trade and income distribution.

**Unit V: Trade and Exchange Rate Dynamics**

Markets for foreign exchange - Exchange rates - Balance of payment - FDI and exchange rate relationships - Prices adjustment and exchange rate determination -Fixed/ flexible exchange rate regime - Recent events in IMF relations. Current streams of thought.

**Practical**

Welfare analysis of trade - Direction and pattern of trade - Gravity models - Introduction to partial and general equilibrium models - Analysing the effect of trade policies both under partial and general equilibrium cases - Empirical estimation of partial and general equilibrium models of trade - Application of multi-market and CGE models to trade - Standard model of trade and economic growth - Exchange rate determination under fixed / flexible exchange rate regime.

**Theory Lecture Schedule**

1. Classical theory of trade revisited - causes for nations to trade
2. Welfare implications under different trade models
3. Contributions by New Trade Theory - scope and implications
4. General equilibrium analysis under open and closed economy
5. Factor mobility and international trade
6. Imperfect competition and returns to scale - trade implications
7. Trade protective measures - impact of tariff measures
8. **First Test**
9. Trade protective measures - impact of non-tariff measures

10. Trade blocks - impact of RTA / FTA - case studies
11. Trade creation and trade diversion - direction of trade
12. Terms of trade and income distribution
13. Models of trade and economic growth - arguments
14. Demand and supply of foreign exchange
15. Balance of payment, foreign direct investment and exchange rate relationships
16. Trends in IMF relations
17. Current streams of thought.

**Practical Schedule**

1. Welfare analysis under open and closed economy
2. Direction of trade - Constant Market Share (CMS) approach
3. Direction of trade - Gravity trade models
4. Tariff implications on small country assumptions
5. Tariff implications on large country assumptions
6. Welfare implications under classical trade models
7. Welfare implications under new trade models
8. Effect of trade policies - partial equilibrium setting - PAM
9. Effect of trade policies - partial equilibrium setting - MM
10. Effect of trade policies - general equilibrium setting - CGE
11. Effect of trade policies - general equilibrium setting - CGE
12. Terms of trade and income estimation
13. Exchange rate determination - fixed regime
14. Exchange rate determination - flexible regime
15. Empirical estimation of FDI, BoP and exchange rate relationships
16. Impact of regional trade agreement
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Understand the nature of trade, its causes and welfare effect.

**CO2:** Describe the, the gains from trade and their measurement, different causal explanations for the determinants of the pattern of trade.

**CO3**: Uunderstand the impact of different trade policy instruments on firm profits, domestic and world prices.

**CO4**: Create awareness on the impact of WTO agreements.

**CO5:** Identify the impact of regional trade agreements.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | 3 |
| **CO2** | | 2 | 3 |
| **CO3** | 3 | 3 | |
| **CO4** | 2 | | |
| **CO5** | | 3 | 2 |

**Suggested Readings**


1. Cherunilam, F., (2004), *International Economics*, Tata McGraw Hill Publishing Company, New Delhi.
2. James R. M and J. Melvin., (1988), *The Theory of International Trade*, Harper collins Publications, New York, US.
3. Jhingan, M.L., (2006), *International Economics*, Vrinda Publications, New Delhi.
4. Krugman, P.R., Obsfeld, M., and M. Melit., (2011), *International Economics*, ($9^{th}$ edition), Pearson Education, North America.
5. Merlinda D., Ingco and John D Nash., (2004), *Agriculture and WTO*, Atlantic Publishers and distributors, New Delhi.
6. Pomfret, R., (1991), *International Trade: An Introduction to Theory and Policy*, Willey-Black Well, UK.
7. Prankrishna, P., (2008), *Intellectual Property Rights in India*, Deep & Deep Publication Pvt. Ltd., New Delhi.
8. Ritu Dubey., (2007), *Global Marketing and Agricultural Exports*, Regal Publications, New Delhi.
9. Robert C. F., (2003), *Advanced International Trade - Theory and Evidences*, Princeton University press, New Jersey.
10. Sankaran, S., (2005), *International Trade*, Marghum Publications, Chennai.


**Suggested Websites**

1. http://internationalecon.com/Trade/Tch5/Tch5.php
2. http://ocw.mit.edu/courses/economics/14-581-international-economics-i-spring-2013/
3. http://catalog.flatworldknowledge.com/catalog/editions/suranovic-internationaleconomics-theory-and-policy

**AEC 612 Advances in Price Forecasting and Time Series Analysis (1+1)**

**Learning Objectives**

- To provide a survey of the theory and application of time series methods in econometrics.
- Topics covered will include univariate stationary and non-stationary models, vector auto regressions, models for estimation and inference in persistent time series and structural breaks.

**Theory**

**Unit I: Basics of Time Series Econometrics**

Overview of forecasting - Qualitative forecasting - Data sources - Seasonality, trends, cycles - Stationarity and differencing - Forecasting a non-stationary series -The trend line model and the random walk ("naïve") model.

**Unit II: Forecasting Model for Seasonal and Non-seasonal Series**

Types of forecasts -Estimation period, validation period and extrapolations into the future - Evaluation- forecast errors and compare models - General considerations in working with seasonal data -Causes of seasonality, stability of seasonal patterns - Seasonal random walk -Seasonal random trend models.

**Unit III: Moving Average and Smoothing Forecasting Model**

Seasonal adjustment by the ratio-to-moving average method - Additive versus multiplicative seasonal adjustment - Trend /cycle decomposition of time series. Simple moving average model - Exponential smoothing models - Combination of smoothing and seasonal adjustment - Time series regression models.

**Unit IV: ARIMA Model and Extension**

Introduction to ARIMA -Non-seasonal models - Identifying the orders of AR or MA process - Identifying the order of ARIMA parameter-Estimation of ARIMA models - Estimation of seasonal ARIMA - ARCH/GARCH models - Application artificial neural networks.

**Unit V: Multivariate Time Series Models**

Issues in forecasting - Principles and applications of VAR model - Cointegration - Granger and Johanson- Impulse response function and Vector error correction mechanism. Current streams of thought.

**Practical**

Qualitative forecasting - Decomposition of time series - Estimation of seasonal index - Application of simple moving average model in price forecasting - Exponential smoothing model in price forecasting - Regression models in price forecasting - Estimation of ARIMA models - Estimation of seasonal ARIMA models with estimation of volatility models - ARCH and GARCH - Application of neural networks for price forecasting. Application of VBAR modelling - Cointegration - Granger and Johanson- Impulse response function and vector error correction mechanism.

**Theory Lecture Schedule**

1. Time series analysis introduction - component and decomposition of time series
2. Characteristics of time series – Stationarity and non-stationarity properties
3. White noise and random walk series
4. Autocorrelation and partial autocorrelation and tests
5. Types of forecasting - estimation period, validation period and explorations into the future and evaluation of forecast errors
6. Seasonal data - causes of seasonality, stability of seasonal patterns

7. Seasonal adjustment by the ratio-to-moving average method - simple moving average model and exponential smoothing models
8. **First Test**
9. AR, MA, ARMA and ARIMA models - Using ACF and PACF plots to determine the "signature" of a time series
10. Seasonal ARIMA models
11. Volatility models - ARCH/ GARCH and TGRACH.
12. VAR modelling
13. Co integration-Granger and Johanson
14. Impulse response functions and vector error correction mechanism.
15. Advanced topics - neural network models
16. Kalmanfiltering - issues in forecasting
17. Current streams of thought.

**Practical Schedule**

1. Quantitative and qualitative forecasting
2. Trend/cycle seasonal decomposition of time series
3. Evaluation of forecast model and residual analysis
4. Estimation simple moving average model
5. Exponential smoothing models(Holts and Winter Brown's etc) in price forecasting
6. Regression models in price forecasting
7. Estimation of AR and MA models for stationary series
8. Estimation of ARIMA models
9. Estimation of seasonal ARIMA models
10. Estimation of volatility models - ARCH/GARCH
11. Estimation of volatility models - TGARCH
12. Estimation of VAR model
13. Tests - cointegration-Granger and Johanson
14. Impulse response function
15. Vector error correction mechanism
16. Application of neural networks models for price forecasting
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1**: Understand the applications of different time series models.
**CO2:** Forecast prices for different products.
**CO3:** Apply the network models for price forecasting.
**CO4:** Estimate different time series model.
**CO5**: Identify the applications of neural networks for forecasting.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 3 |
| **CO3** | 3 | 3 | |
| **CO4** | 3 | | |
| **CO5** | | 2 | 2 |

**Suggested Readings**


1. Enders, W., (2004), Applied *Econometric Time Series*, 2nd edition, Willey, Utah, US.
2. Fishman G. Discrete., (2001), *Event Simulation: Modeling, Programming and Analysis*, *Springer* - Verlag, Berlin.
3. Fishwick P., (1995), *Simulation Model Design and Execution: Building Digital Worlds*, Prentice - hall, Englewood Cliffs, US.
4. Haas P., (2002), *Stochastic Petri Net Models Modelling and Simulation*, Springer Verlag, Germany.
5. Harrington J., and K.Tumay., (1998), *Simulation Modeling Method: An interactive Guide to Results* - Based Decision, McGraw – Hill.
6. Hill D., (1996), *Object - Oriented Analysis and Simulation Modelling*, Addison – Wesley.
7. Holton Wilson, J. and B. Keating., (1998), *Business Forecasting*, Third Edition, Mc Graw-Hill education Pvt limited, India.
8. Kouikogou V., and Y. Phillis., (2001), Hybrid *Simulation Model of Production Networks*, Kluwer Pub, Springer, Germany.
9. Nelson B., (1995), *Stochastic Modeling: Analysis & Simulation*, McGraw-Hill Pvt limited, New Delhi.
10. Nikoukaran J., (1999), *Software selection for Simulation in Manufacturing*: A Review Simulation Practice and Theory, Averill M. Law and Associate, Inc, USA.


**Suggested Websites**

1. http://ocw.mit.edu/courses/economics/14-384-time-series-analysis-fall-2013/
2. http://stat565.cwick.co.nz/
3. https://onlinecourses.science.psu.edu/stat510/node/33
4. https://www.otexts.org/fpp
5. http://extras.springer.com.

**AEC 613 Impact Evaluation of Development Projects (1+1)**

**Learning Objectives**

- To educate the scholar son the scope and complexity of modern agricultural projects of national and international importance.
- To impart knowledge on various appraisal tools and techniques of agricultural investment projects and to highlight the importance of pre- and post-evaluation of various components of projects.

**Theory**

**Unit I: Introduction**

Impact Evaluation -meaning and importance-Monitoring versus evaluation-Prospective versus Retrospective - Impact evaluation -Efficacy studies and effectiveness studies - Complementary approaches -Ethical considerations -Impact evaluation for policy decisions.

**Unit II: Preparing for an Evaluation**

Initial steps- Constructing a theory of change -Developing a results chain -Specifying evaluation questions -Selecting outcome and performance indicators - Getting data for Indicators- Data for IE - Selection of sample and its size - Sources of data - Core elements of a well designed impact evaluation-Mitigating common risks in conducting an impact evaluation.

**Unit III: Impact Evaluation Methods**

Causal inference and counterfactuals - Impact evaluation in practice -Economic surplus approach- Randomized assignment- Instrumental variables - Regression discontinuity design - Propensity score matching -Addressing methodological challenges -Evaluating multifaceted programs.

**Unit IV: Implementation of Impact Evaluation**

Choosing the method -Comparison of impact evaluation methods - Managing an impact evaluation - The ethics and science of impact evaluation -Disseminating results and achieving policy impact.

**Unit V: Impact Evaluations in Agriculture -Special**

Impact evaluation characteristics- Challenges facing users of impact evaluations in Agriculture- Introduction to the taxonomy of interventions-Characteristics of the interventions- Land tenancy and titling -Extension interventions-Irrigation interventions-Improved NRM technology interventions -Input technology interventions -Marketing interventions - Microfinance interventions -Other interventions - Infrastructure and safety nets - Current streams of thought.

**Practical**

Working with data using excel and other econometric software packages - Impacts of programme placement and participation - Propensity score matching techniques - Difference in differences methods - Instrumental variable methods - Regression discontinuity methods- Case study presentation - Impact evaluation of technology intervention programme - Case study presentation -Impact evaluation of micro finance Programme - Case study presentation - Impact evaluation of nutritional programme - Case study presentation - Impact evaluation of irrigation development programme - Case study presentation - Impact evaluation of natural resource management programme - Case study presentation - Impact evaluation of market intervention programme.

**Theory Lecture Schedule**

1. Impact evaluation - meaning and importance
2. Monitoring versus evaluation - Prospective versus retrospective impact evaluation
3. Efficacy studies and effectiveness studies
4. Complementary approaches - ethical considerations - Impact evaluation for policy decisions
5. Initial steps - Constructing a theory of change - Developing a results chain - Specifying evaluation questions

6. Selecting outcome and Performance indicators - Getting data for indicators - Data for IE - Selection of sample and its size
7. Sources of data - core elements of a well -designed impact evaluation - Mitigating common risks in conducting an impact evaluation
8. **First Test**
9. Causal inference and Counter factual
10. Impact evaluation in practice - Economic surplus approach - Randomized assignment
11. Instrumental variables - Regression discontinuity design
12. Propensity score matching - Addressing methodological challenges
13. Evaluating multifaceted programs - Choosing the method - Comparison of impact evaluation methods - Managing an impact evaluation - The ethics and science of impact evaluation
14. Disseminating results and achieving policy impact - Impact evaluation characteristics - Challenges facing users of impact evaluations in agriculture - Introduction to the taxonomy of interventions - Characteristics of the interventions
15. Land tenancy and titling - Extension interventions - Irrigation interventions
16. Improved NRM technology interventions - Input technology interventions
17. Marketing interventions - Microfinance interventions -other interventions - Infrastructure and safety nets- Current streams of thought.

**Practical Schedule**

1. Working with data using excel and other econometric software packages.
2. Impact of programme placement and participation - I
3. Impacts of programme placement and participation - II
4. Propensity score matching technique- I
5. Propensity score matching technique-II
6. Difference in differences method-I
7. Difference in differences method-II
8. Instrumental variable method-I
9. Instrumental variable method -II
10. Regression discontinuity method -I
11. Case study presentation - Impact evaluation of technology intervention programme
12. Case study presentation - Impact evaluation of micro finance programme
13. Case study presentation - Impact evaluation of nutritional programme
14. Case study presentation - Impact evaluation of irrigation development programme
15. Case study presentation - Impact evaluation of natural resource management programme
16. Case study presentation - Impact evaluation of market intervention programme
17. **Final Practical Examination**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Identify scope and complexities of modern agricultural projects.
**CO2:** Analyse the impact evaluation techniques for development projects.
**CO3**: Know the importance of pre- and post- evaluation of projects.
**CO4**: Understand project appraisal techniques.
**CO5:** Work with different project data using econometric software packages.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **CO1** | | 3 | 3 |
| **CO2** | 3 | | |
| **CO3** | | | 3 |
| **CO4** | 2 | 2 | |
| **CO5** | 3 | | 2 |

**Suggested Readings**


1. Flay, B. R., (1986), Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. *Preventive medicine*, *15*(5), 451-474.
2. Judy L. Baker., (2000), *Evaluating the Impact of Development Projects on Poverty-A Handbook for Practitioners-Directions in Development*, The World Bank, Washington, D.C.
3. Hoagwood, K., Hibbs, E., Brent, D., & Jensen, P., (1995), Introduction to the special section: efficacy and effectiveness in studies of child and adolescent psychotherapy. *Journal of consulting and clinical psychology*, *63*(5), 683.
4. Howard White David A. Raitze., (2007), *Impact Evaluation of Development Interventions*- A Practical Guide, Asian Development Bank, Philippines.
5. Morgan, S. L., and C. Winship., (2015), *Counterfactuals and causal inference*. Cambridge University Press.
6. Premand, P., Laura B. Rawlings, and M. J Christel Vermeersch., (2016), *Impact Evaluation in Practice*, second edition. Washington, DC: Inter-American Development Bank and World Bank, License: Creative Commons Attribution CC BY 3.0 IGO.
7. Peter Smith., (2011), *Agricultural Project Management, Monitoring and Control of Implementation*, Springer Publishing, New York.
8. Prasanna Chandra., (2009), *Projects - Planning Analysis, Selection, Financing, Implementation and Review,* McGraw Hill Education, New York.
9. Shahidur R., Khandker Gayatri B., Koolwal Hussain and A. Samad., (2009), *Handbook on Impact Evaluation Quantitative Methods and Practices, The International Bank for Reconstruction and Development*, Washington, DC: World Bank.
10. White, H., (2009), *Some reflections on current debates in impact evaluation*, International Initiative for Impact Evaluation, New Delhi, India.


## AEC 614 Commodity Markets and Its Derivatives (2+0)

**Learning Objective**

- This course is aimed at providing the basic understanding about commodity markets, its evolution, mode of functioning, derivatives traded, regulation of markets in Indian context.

**Theory**

**Unit I: Evolution of Commodity Markets**

History and evolution of commodities markets - Characteristics for tradability - Price relationships for storable and non-storable Commodities - Impact of innovations in storage, distribution, and seasonal costs - Government policy - Institutional and regulatory framework for derivatives.

**Unit II: Functioning of Commodity Markets**

Spot versus derivatives markets - Organisation and role of exchanges - Trading in commodity derivatives - Transaction and settlement - Role of exchanges, brokers/members and

intermediaries - Trading strategies, pricing, margin requirements, settlement process, delivery mechanism, compulsory delivery and its impact - Role of banks and warehousing in commodity markets - Potential impact foreign exchange, FDI, FIIs in commodity markets - Factors influencing spot and future markets - Supply, demand, trade and global market integration - Spot market valuation, models, methods and procedures.

**Unit III: Commodity Derivatives**

Derivatives markets - Meaning and definition - Speculation mechanics - Types of markets - spot, forward and futures markets - Reasons of derivatives -Managing market price risk - Hedging, speculation, arbitrage, swaps- Derivative instruments, pricing, and features - Concepts of open interest, close out, mark-to-market practice, margins- Futures and strategies to hedge risk.

**Unit IV: Risk Management Procedures**

Options, types, features, pay off profiles - Strategies using options to hedge risks, long and short positions, spreads, straddles, strangles - Option pricing - Option trading strategies - Combining futures and options - Selecting the right strategy - Diversification strategies in risk management - Economics of futures markets - Futures price spread relationships - Price performance and forecasting - Price performance and behaviour.

**Unit V: Regulation of Commodity Markets**

Risk management and surveillance mechanism for commodity futures trading through commodity exchanges- Psychology of markets - Risk in commodity trading, importance and need for risk management measures -Value at risk case studies-Comparison of stock and commodity markets - Accounting and taxation for commodity derivatives - Service tax and stamp duty - Current streams of thought.

**Theory Lecture Schedule**

1. History and evaluation of commodity markets
2. Characteristics for tradability - price relationships for storable and non -storable Commodities
3. Impact of innovations in storage, distribution and seasonal costs
4. Government pricing, institutional and regulation framework for derivatives
5. FMC & SEBI - organization and functions
6. Spot versus derivatives markets
7. Organizations and role of exchanges
8. Transaction and settlement - role of exchanges
9. Role of intermediaries and brokers/ members
10. Trading strategies pricing and delivering mechanisms
11. Settlement process and delivering mechanisms
12. Compulsory delivery and its impact.
13. Role of banks and ware housing in commodity markets.
14. Factors influencing spot and future markets, supply demand, trade and global market integration.
15. Spot markets valuation models
16. Stock valuation methods and procedures
17. **First Test**
18. History and evaluation and derivatives markets- meaning and definition
19. Speculation mechanics
20. Types of markets - spot, forward and futures markets. Reasons of derivatives
21. Managing market price risk - hedging, speculation arbitrage swaps
22. Derivative instruments, pricing and features
23. Concepts of open interest close out, mark-to-market practice, margins
24. Futures and strategies to hedge risk - options, types and features and pay off profiles

25. Strategies using options to hedge risks, long and short positions, spreads straddle, strangles
26. Option pricing- option trading strategies- combining futures and options
27. Selecting the right strategy - diversification strategies in risk management
28. Economics and futures markets- Futures price spread relationships
29. Price performance and forecasting- Price performance and behaviour
30. Risk management and surveillance mechanism for commodity futures trading through commodity exchanges
31. Psychology of markets - Risk in commodity trading, importance and need for risk management measures, value at risk case studies
32. Comparison of stock and commodity markets
33. Accounting and taxation for commodity derivatives- Service tax and stamp duty, GST
34. Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to

**CO1**: Understand about commodity markets and its evolution.

**CO2:** Analyse the mode of functioning of commodity markets.

**CO3:** Gain knowledge on the regulations of markets in Indian context.

**CO4:** Cope up the risks in commodity futures trading.

**CO5**: Understand the speculation mechanism in commodity trading.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 2 |
| **CO3** | 2 | 3 | |
| **CO4** | 3 | | |
| **CO5** | | 2 | 3 |

**Suggested Readings**


1. Acharya, S. S. and N. L. Agarwal., (2004), *Agricultural Prices - Analysis and Policy*, Oxford and IBH, New Delhi.
2. Acharya, S. S. and N. L. Agarwal., (2008), *Agricultural Marketing in India*, Oxford and IBH, New Delhi.
3. Cherunilam, F., (2006), *International Trade and Export management*, Himalaya Publishing House, Mumbai.
4. David, L., Debertin., (2012), *Agricultural Production Economics*, (Second edition), Macmillan Publishing Company, New York.
5. Dhal, C. Dale and Hammond W. Jerome., (1997), Market and Price Analysis - The Agricultural Industries, McGraw Hill Book Company, New York.
6. Doll, John P. and F. Orazem., (1985), *Production Economics - Theory and Applications*, John Wiley and Sons, New York.
7. Gulati and Ashok., (1996), *Agricultural Price Policy in India - An Econometric Approach*, Concept Publishing Company, New Delhi.
8. Palanisami, K., P. Paramasivan and C.R. Ranganathan., (2011), *Agricultural Production Economics - Analytical Methods and Applications*, Associate Publishing Company, New Delhi.
9. Peter, B. R., Hazell and Roger D. Nortan., (1986), *Mathematical Programming for Economic Analysis in Agriculture*, Macmillan Publishing Company, New York.
10. Sankhayan, P. L., (1998), *Introduction to the Economics of Agricultural Production*, Prentice Hall of India, New Delhi.


**Suggested Websites**

1. www.sebi.gov.in
2. www.fmc.gov.in
3. www.mcxindia.com
4. www.ncdex.com
5. www.moneycontrol.com
6. www.commodityonline.com

## AEC 615 Advances in Applications of Intellectual Property Rights (2+0)

### Learning Objectives

The main objective of the course is to understand and apply the economic rationale in the arena of applications of IPR in agricultural technologies; to understand the global and domestic policies of IPR and applications to agriculture; to understand India's growing R & D operations requiring patent expertise and coverage of innovations internationally; to develop the competency of the students to apply economic models and enable them to understand the field of Intellectual Property, drafting patent claims and patent applications.

### Theory

**Unit I**: **Intellectual Property Rights and Economy**

Introduction- concepts of IPR- Instruments of IPR-Legal and economic rights of IPR-Trends in international use of IPR-Developed and developing countries perspectives-Role of multi-lateral organizations involved in IPR-WIPO, WTO, IPO, NIPO, USPTO, EPO, PCT - Domestic and international policies to promote Intellectual Property- Recent trends in international transaction in IPR sensitive goods, services and information- Implementation of strategies of TRIPS under varying developing levels of economics.

**Unit II: Economics of Intellectual Property Rights**

Introduction- Social and non-economic regulations of IPRs -static and dynamic failures in markets for information- Economic effects of patents-Economic surplus model, R&D production function and supply model-Decision making behaviour,*viz*., maximizing surplus, welfare, government size and minimizing piracy-Determinants of IPR- Production and monopoly pricing - Benefits and costs of TRIPS agreement- Application of simultaneous equation model of impact of patent strength on the exploitation of International intellectual assets.

**Unit III: Economics of Growth and Innovations of IPR**

Developing index for IPR- Ginarte Park, Activity Index -Effect of IPR on investment- IPR and FDI - Fixed effects model and domestic patents and investment-Innovations and economic growth - Incentives to innovate-Technology spillovers-Market structure and innovations-strategic management of innovation-labour market effects- IPR information and economic growth - Estimation of general equilibrium- Knowledge capital model- Determinants of Intellectual Property Rights and its growth- Applications of simulated models on trade due to IPR.

**Unit IV: Role and Licensing of Technology Transfer and IP**

WTO dispute settlement mechanism- Administration and enforcement- Enforcement of Industrial Property Rights, Patent Rights, Copyright and related rights and TRIPS Agreement-Technology and development-Public Vs private sector research, Patents and social network-Commercial transfer and acquisition of technology -Negotiation of licensing agreements - Remuneration - Types of intellectual property licenses -Government control of licensing a-agreements- Intellectual Property Laws in India-Procedures of obtaining patents, Geographical indications- IPR interaction with international trade, FDI and licensing transactions.

**Unit V: Applications of IPR**

Technological progress in agriculture- Applications of IPR in bio-technology-Gene bank - patenting issues in Basmati, Ponni rice and transgenic crops-Adoption and dissemination-Need for protection-Existing protection-Protection of traditional knowledge-Industrial property protection and development inventions, Protection of plant varieties and Farmers Rights Acts of software and internet transmissions - Public policy- University-Industry linkages. Current streams of thought.

### Theory Lecture Schedule

1. Concepts of IPR- Instruments of IPR - Legal and economic rights of IPR - Intellectual property laws in India
2. Trends in international use of IPR - Developed and developing countries perspectives and recent trends in international transaction in IPR sensitive goods, services and information
3. Role of multi-lateral organizations involved in IPR-WIPO, WTO, IPO, NIPO
4. Domestic and international policies to promote Intellectual Property
5. Implementation of strategies of TRIPS under varying developing levels of economics
6. Social and Non-economic regulations of IPRs -static and dynamic failures in markets for information
7. Economic effects of patents-Economic surplus model, R&D production function and Supply model, Benefits and costs of TRIPS agreement
8. Decision making behaviour, *viz*., maximizing surplus, welfare, government size and minimizing piracy
9. Application of simultaneous equation model of impact of patent strength on the exploitation of International Intellectual assets
10. Determinants of IPR and developing indices for IPR - Ginarte Park index
11. Effect of IPR on government and private investment, IPR and Foreign Direct Investment
12. Innovations and Economic growth-Incentives to innovate
13. Public vs private sector research - new technology-Technology spillovers and its impact
14. Impact of IPR induced technology on labour market effects
15. Market structure and innovations - Production and monopoly pricing
16. Fixed effects model and Investment
17. **First Test**
18. IPR information and economic growth and Impact of asymmetric information
19. General equilibrium model - Knowledge capital model
20. Determinants of Intellectual property rights and its growth
21. Applications of simulated models on trade due to IPR
22. WTO dispute settlement mechanism - Administration and enforcement
23. Enforcement of Intellectual property rights, Patent rights, Copyright and related rights and TRIPS agreement
24. Patents and social network - Commercial transfer and acquisition of technology
25. Negotiation of licensing agreements - Remuneration of agreements
26. Types of Intellectual property licenses - Government control of licensing agreements
27. Procedures of obtaining patents and Geographical indications
28. IPR interaction with International Trade, FDI and Licensing transactions
29. Technological progress in agriculture - applications of IPR in bio-technology - Gene bank, Patenting issues in Basmati, Ponni rice and Transgenic crops
30. Adoption and dissemination of IPR technologies
31. Need for protection - existing protection-protection of traditional knowledge - Protection of plant varieties and Farmers rights act
32. Public policy- University- Industry linkages, Government R&D
33. MoU between government and private institutions
34. Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to

**CO1**: Understand and apply the economic rationale in the arena of applications of IPR in agricultural technologies.

**CO2:** Understand the global and domestic policies of IPR.

**CO3:** Apply IPR to agriculture and global upsurge in innovations and increasing demand for patents.
**CO4:** Develop the competency of the students to apply economic models in the field of IPR.
**CO5**: Draft patent claims and patent applications.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 3 |
| **CO3** | 2 | 3 | |
| **CO4** | 3 | | |
| **CO5** | | 2 | 3 |

**Suggested Readings**


1. Frank, E., (1992), *Agricultural Policies in Developing Countries*, Cambridge University Press, New York.
2. Ghatak,, S and K. Ingersent., (1984), *Agriculture and Economic Development*, Select Book Service Syndicate, New Delhi.
3. Gordon V. Smith and Russell L. Parr., (1989), *Valuation of Intellectual Property and Intangible Assets*, New York, USA.
4. Gordon V. Smith and Russell L. Parr., (1995), *Intellectual Property: Licensing and Joint Venture Profit Strategies,* Wiley.
5. Holzwarth, A. S., (1998), *Patent Protection and Computer Programs in the Practice of the European Patent Office*, WIPO/CNR/KYI/98/3, July 1998.
6. Jhingan, M. L., (1998), *The Economics of Development and Planning*, Vrinda Publication, New Delhi.
7. Johnson, P.S., (1995), *The Economics of Invention and Innovation*, Durham University, UK.
8. Naqvi Syed Nawab Haider., (2002), *Development Economics* - Nature and Significance, Sage Publication, New Delhi.
9. Jovan Kurbaliji., (2012), *An Introduction to Internet governance* (IG), Diplo Foundation, Switzerland.
10. Vyas, V.S., (1998), *Policies for Agricultural Development*, Tamil Nadu Book House, Chennai.


**Suggested Websites**

1. www.ipindia.nic.in
2. www.wto.org
3. *www.wipo.int*
4. www.archive.india.gov.in
5. www.plantauthority.gov.in
6. www.cbd.int
7. www.upov.int.

## AEC 616 Advanced Theories of Growth and Development (2+0)

**Learning Objectives**

Candidates should be able to explain the difference between absolute and comparative advantage; Evaluate how external trade can promote economic development and growth; Understand the assumptions and predictions of the theories and models of economic development and growth; Understand the limitations of the theories and models; Apply the theories and models to actual cases; Discuss their usefulness in the understanding of the process and problems of development.

**Theory**

**Unit I: Economic Development: Concepts and Approaches**

Economic growth and development - Concepts and measurement of economic development factors affecting economic growth -Economic and non-economic factors -Capital, labour and technology. Growth models - Harrod and Domar, Neo-classical growth models - Solow and Meade, Joan Robinson's growth model. Technological progress embodied and disembodied technical progress - Hicks, Harrod - Production function approach to the economic growth - Total factor productivity and growth accounting.

**Unit II: Economic Growth Models**

Growth models of Kaldor and Pasinetti -Optimal savings and Ramsay's rule -Golden rule of accumulation -Two-sector model of Uzawa - Stability of equilibrium -Money in economic growth - Tobin, Levhari, Patinkin and Johnson - Endogenous growth - Intellectual capital -Role of learning, education and research - AK model - Explanations of cross country differentials in economic growth.

**Unit III: Theories of Development**

Classical theory of development - Contributions of Adam Smith, Ricardo, Malthus and James Mill - Karl Marx and development of capitalistic economy - Theory of social change, surplus value and profit - Immutable laws of capitalist development - Crisis in capitalism - Schumpeter and capitalistic development innovation - Role of credit, profit and degeneration of capitalism - Structural analysis of development - Imperfect market paradigm.

**Unit IV: Approaches to Development**

Partial theories of growth and development - Vicious circle of poverty, circular causation - Unlimited supply of labour -Big push -Balanced growth, unbalanced growth - Critical minimum effort thesis - Low-income equilibrium trap - Dualism - technical, behavioural and social - Ranis and Fei model - Dixit and Marglin model, Kelly *et.al*. model - Dependency theory of development - Structural view of development.

**Unit V: Trade and Economic Development**

International trade as engine of growth - Static and dynamic gains from trade - Prebisch, Singer and Myrdal thesis vs. free trade - Export-led growth - Dual gap analysis - Balance of payments - Tariffs and effective protection – Post GATT international economic order - WTO and developing countries. Role of monetary and fiscal policies in developing countries - Prior savings, inflation and growth - Empirical evidence - External resources - FDI, aid vs. trade, technology inflow - MNC activity in developing countries - Borrowings - domestic and external - Burden of borrowing - IMF and World Bank policies in developing countries. Current streams of thought.

**Theory Lecture Schedule**

1. Economic growth and development - concepts and measurement
2. Factors affecting economic growth: economic and non - economic factors - capital, labour and technology

3. Growth models - Harrod and Domar
4. Neo-classical growth models - Solow and Meade, Joan Robinson's growth model
5. Neo-classical growth models- Joan Robinson's growth model
6. Technological progress - embodied and disembodied technical progress; Hicks, Harrod
7. Production function approach to the economic growth; Total factor productivity and growth accounting
8. Growth models of Kaldor and Pasinetti
9. Optimal savings and Ramsay's rule; golden rule of accumulation
10. Two-sector model of Uzawa
11. Stability of equilibrium, money in economic growth, Tobin, Levhari, Patinkin and Johnson
12. Endogenous growth; Intellectual capital - role of learning, education and research
13. AK model - Explanations of cross country differentials in economic growth
14. Classical theory of development - contributions of Adam Smith, Ricardo
15. Classical theory of development - contributions of Malthus and James Mill
16. Karl Marx and development of capitalistic economy - theory of social change, surplus value and profit - Immutable laws of capitalist development
17. **First Test**
18. Crisis in capitalism - Schumpeter and capitalistic development innovation - role of credit, profit and degeneration of capitalism
19. Structural analysis of development - Imperfect market paradigm
20. Partial theories of growth and development - vicious circle of poverty, circular 406 causation
21. Unlimited supply of labour, big push, balanced growth, unbalanced growth theory
22. Critical minimum effort thesis, low-income equilibrium trap
23. Dualism - technical, behavioural and social; Ranis and Fei model
24. Dixit and Marglin model, Kelly *et.al.* Model- Dependency theory of development; Structural view of development
25. International trade as engine of growth - Static and dynamic gains from trade
26. Prebisch, Singer and Myrdal thesis vs. free trade
27. Export-led growth; Dual gap analysis
28. Balance of payments, Tariffs and effective protection
29. Post-GATT international economic order, WTO and developing countries
30. Role of monetary and fiscal policies in developing countries - Prior savings, inflation and growth - Empirical evidence
31. External resources - FDI, aid vs. trade, technology inflow
32. MNC activity in developing countries
33. Borrowings - domestic and external; Burden of borrowing
34. IMF and World Bank policies in developing countries - Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Explain the difference between absolute and comparative advantage.

**CO2:** Evaluate how external trade can promote economic development and growth.

**CO3:** Understand the assumptions and predictions of the theories and models of economic development and growth.

**CO4:** Understand the limitations of the theories and models and apply the theories and models to actual cases.

**CO5:** Discuss their usefulness in the understanding of the process and problems of development.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 2 |
| **CO3** | 2 | 2 | |
| **CO4** | 3 | | |
| **CO5** | | 3 | 2 |

**Suggested Readings**


1. Adelman, I., (1961), *Theories of Economic Growth and Development*, Stanford University Press, Stanford, California.
2. Behrman, S. and T. N. Srinivasan., (1995), *Handbook of Development Economics*, Vol. 3, Elsevier, Amsterdam.
3. Brown, M., (1966), *On the Theory and Measurement of Technical Change*, Cambridge University Press, Cambridge.
4. Chenery, H. B., (1974), *Redistribution with Growth*, Oxford University Press, Oxford.
5. Chenery, H. and T. N. Srinivasan, (1989), *Handbook of Development Economics*, vols. 1 & 2, Elsevier, Amsterdam.
6. Ellis Frank., (1992), *Agricultural Polices in Developing Countries*, Cambridge University Press, New York.
7. Ghatak, S., (1986), *An Introduction to Development Economics*, Allen and Unwin, London.
8. Jhingan, M.L., (2015), *The Economics of Development and Planning*, 40$^{th}$edition Vrinda Publications (P) Ltd, New Delhi.
9. Kindleberger, P. Charles., (1958), Economic Development, Mcgrew Hill International Book Company, London.
10. Subrata, G., and K. Ingersent., (1984), *Agriculture and Economic Development*, Select Book Service Syndicate, New Delhi.

## AEC 617 Advanced Operations Research (2+1)

### Learning Objectives

- To acquaint the learner with the applications of some important operations research techniques.
- To gain elementary knowledge of solving problems and decision making for managing farming and organization in resource constraint in order to achieve the objective.

### Theory

**Unit I: Concepts**

Elementary concepts and objectives of Operations Research - Review of linear programming - Assumptions and methods - Non-linear programming problem - Quadratic programming - Multi Objective Programming (MOP).

**Unit II: Inventory- A Review**

Inventory control models - Costs involved in Inventory management - Types of inventories - Economic order quantity model - Waiting line models - Waiting line problem - Characteristics of a waiting line system - Single channel model.

**Unit III: Models**

Markov Chains - Sequencing - Replacement models - Transportation and assignment problems.

**Unit IV: Decision Making**

Decision making under risk and uncertainties - Decision problem - Maximax criterion - Maximin criterion - Minimax regret criterion - Laplace criterion - Pay off tables - Decision trees - Expected value of perfect information.

**Unit V: Game Theory**

Game Theory - Two-person Zero sum game - Simulation - Network Analysis- PERT and CPM. Current streams of thought.

### Practical

Linear and Non-linear programming problem - Quadratic programming - Multi-objective programming- Goal programming, Lexicographic, Weighted sum. Determining economic order quantity, reorder levels of EOQ model. Waiting line problem - Problems on Markov Chains - Sequencing and replacement models. Formulating and solving transportation type problems - Assignment problems as a special type of transportation problem. Solving deterministic and probabilistic queuing models - Structuring and solving decision trees for optimal decisions - Game theory - Simulation - Developing network (PERT/CPM) diagrams and determining the critical path.

### Theory Lecture Schedule

1. Elementary concepts and objectives of operations research
2. Review of linear programming
3. Assumptions and methods
4. Non-linear programming problem
5. Quadratic programming
6. Multi Objective Programming (MOP)
7. Inventory control models
8. Costs involved in Inventory management
9. Types of inventories

10. Economic order quantity model
11. Waiting line models
12. Waiting line problem
13. Characteristics of a waiting line system
14. Single channel model
15. Markov Chains
16. Sequencing
17. **First Test**
18. Replacement models
19. Transportation problems
20. Assignment problems
21. Decision making under risk and uncertainties
22. Decision problem
23. Maximax criterion
24. Maximin criterion
25. Minimax regret criterion
26. Laplace criterion
27. Pay off tables
28. Decision trees
29. Expected value of perfect information
30. Game Theory
31. Two-person Zero sum game
32. Simulation analysis
33. Network Analysis- PERT & CPM
34. Current streams of thought.

**Practical Schedule**

1. Linear programming problem
2. Non-linear programming problem
3. Quadratic programming
4. Multi-Objective Programming
5. Goal Programming, Lexicographic, Weighted Sum.
6. Determining economic order quantity, reorder levels of EOQ model
7. Waiting line problem
8. Problems on Markov Chains
9. Sequencing and Replacement models
10. Formulating and solving transportation type problems
11. Assignment problems as a special type of transportation problem
12. Solving deterministic and probabilistic queuing models
13. Structuring and solving decision trees for optimal decisions
14. Game theory - Simulation
15. Developing network (PERT/CPM) diagrams
16. Determining the critical path
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1**: Develop a general understanding of the Operational Research (OR) approach to decision making.

**CO2:** Gain expertise in formulating problems of management into mathematical form and work out optimal solutions.
**CO3:** Apply the knowledge of different models in better decision making and controlling of the firms.
**CO4:** Solve the problems using special solutions algorithms.
**CO5**: Set up decision models for nonlinear optimization problems.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 3 |
| **CO3** | 3 | 3 | |
| **CO4** | 3 | | 2 |
| **CO5** | | 2 | |

**Suggested Readings**


1. Barry Render Ralph, M., Stair Michael and E. Hanna, (2008), *Quantitative Analysis for Management*, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
2. Gupta, P. K. and D. S. Hira, (2004), *Operations Research*, Sultan Chand and Sons, New Delhi.
3. Hamdy A. Taha, (2018), *Operations Research - An Introduction*, Dorling Kindersley, India Pvt. Ltd., New Delhi.
4. Hillier, F., and G. Lieberman, (2005), .*Introduction to Operations Research*, McGraw Hill, New Delhi.
5. Kanti Swarup, P. K. Gupta and Manmohan, (2014), *Introduction to Operations Research*, Sul./tan Chand and Sons, New Delhi.
6. Paul A. Jensen and Jonathan F. Bard, (2008), *Operations Research Models and Methods*, Willey Blackwell, UK.
7. Taha, H. A., (1982), *Operations Research - An Introduction*, Macmillan India Ltd., New Delhi.
8. Taha, H.A., (2005), *Operations Research- An Introduction*, Prentice Hall, New Delhi
9. Vohra, N.D., (2006), *Quantitative Techniques in Management*, McGraw Hill, New Delhi.
10. Wagner, H.M., (2005), *Principles of Operation Research*, Prentice Hall, New Delhi.

**Programme Outcomes**

**PO 1:** This programme will facilitate scholars to enrich their managerial expertise and communication skills with sound theoretical mastery and practical outlook.

**PO 2:** This programme will enhance the employability of students in niche emerging area like data analysis, data management in corporate administrations.

**PO 3:** This programme will hone the scholars' skill and confidence to take up independent research and prepare and evaluate projects, which will further ensure their employability in reputed academic and research organisations.

## Distribution Pattern of Courses and Credit

| Semester | Major Courses | Minor Courses | Supporting Courses | Seminar | Research | Total Credits | Non-Credit Compulsory Courses |
|---|---|---|---|---|---|---|---|
| **I** | 6 | 4 | 2 | 1 | 2 | **15** | - |
| **II** | 6 | 2 | 3 | 1 | 10 | **22** | - |
| **III** | - | - | - | - | 15 | **15** | Research and Publications Ethics |
| **IV** | - | - | - | - | 16 | **16** | MOOC |
| **V** | - | - | - | - | 16 | **16** | - |
| **VI** | - | - | - | - | 16 | **16** | - |
| **Total Credits** | **12** | **6** | **5** | **2** | **75** | **100** | - |

## Ph. D. (Agri Business Management)

### Distribution of Courses

| Sl. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| | | **Compulsory Major Courses** | **12** |
| 1 | ABM 601 | Econometrics for Agri Business | 2+1 |
| 2 | ABM 602 | Research Methods- I | 2+1 |
| 3 | ABM 603 | Research Methods-II | 2+1 |
| | | **Optional Major Courses** | |
| 4 | ABM 604 | Agri Input and Output Marketing | 2+1 |
| 5 | ABM 605 | Advances in Business Economics | 2+1 |
| | | **Minor Courses** | **6** |
| 1 | ABM 606 | Advanced Applications in Marketing Management | 2+0 |
| 2 | ABM 607 | Rural Marketing and Consumer Behaviour | 2+0 |
| 3 | ABM 608 | Advances in Financial Management | 2+0 |
| 4 | ABM 609 | Value Chain Management in Agribusiness | 2+0 |
| 5 | ABM 610 | Agri-Entrepreneurship and Corporate Governance | 2+0 |
| 6 | ABM 611 | International Food and Agri Business | 2+0 |
| 7 | ABM 612 | Natural Resource Management | 2+0 |
| 8 | ABM 613 | Knowledge Management | 2+0 |
| 9 | ABM 614 | Communication for Management Teachers | 2+0 |
| | | **Supporting Courses** | **5** |
| 1 | COM 601 | Advances in Computer Applications | 1+1 |
| 2 | ABM 615 | Advanced Operations Research | 2+1 |
| | | **Seminar** | **2** |
| 1 | ABM 691 | Doctoral Seminar I | 0+1 |
| 2 | ABM 692 | Doctoral Seminar II | 0+1 |
| | | **Research** | **75** |
| 1 | ABM 699 | Doctoral Research | 0+75 |
| | | **Non-Credit Compulsory Courses** | |
| | RPE | Research and Publication Ethics (2+0) | 2+0 |
| | | MOOC (2+0) | 2+0 |
| | | **Grand Total** | **100** |

## Ph. D. (Agri Business Management)
### Distribution of Courses and Credit

| Sl. No | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| I | **Major Courses: 12 credits** | | |

| | | | |
|---|---|---|---|
| 1. | ABM 601* | Econometrics for Agri Business* | 2+1 |
| 2. | ABM 602* | Research Methods- I* | 2+1 |
| 3. | ABM 603* | Research Methods - II* | 2+1 |
| 4. | ABM 604 | Agri Input and Output Marketing | 2+1 |
| 5. | ABM 605 | Advances in Business Economics | 2+1 |
| **II** | **Minor Courses: 06 credits** | | |
| 1. | ABM 606 | Advanced Applications in Marketing Management | 2+0 |
| 2. | ABM 607 | Rural Marketing and Consumer Behavior | 2+0 |
| 3. | ABM 608 | Advances in Financial Management | 2+0 |
| 4. | ABM 609 | Value Chain Management in Agribusiness | 2+0 |
| 5. | ABM 610 | Agri-Entrepreneurship and Corporate Governance | 2+0 |
| 6. | ABM 611 | International Food and Agri Business | 2+0 |
| 7. | ABM 612 | Natural Resource Management | 2+0 |
| 8. | ABM 613 | Knowledge Management | 2+0 |
| 9. | ABM 614 | Communication for Management Teachers | 2+0 |
| **III** | **Supporting Courses: 05 credits** | | |
| 1. | COM 601 | Advances in Computer Applications | 1+1 |
| 2. | ABM 615 | Advanced Operations Research | 2+1 |
| **IV** | **Seminar: 02 credits** | | |
| | ABM 691 | Doctoral Seminar I | 0+1 |
| | ABM 692 | Doctoral Seminar II | 0+1 |
| **V** | **Research: 75 credits** | | |
| | ABM 699 | Doctoral Research (0+75) | 0+75 |
| **VI** | **Non-Credit Compulsory Courses** | | |
| | RPE | Research and Publication Ethics (2+0) | |
| | | MOOC (2+0) | |
| | | **Total Credits** | **100** |

***Compulsory Courses**

## Ph. D. in Agri Business Management

### Semester wise Distribution of Courses

| Sl. No. | Course Code | Course Title | Credit Hours |
|---|---|---|---|
| **I** | **First Semester** | | |
| 1 | ABM 601* | Econometrics for Agri Business * | 2+1 |
| 2 | ABM 602* | Research Methods - I * | 2+1 |

| | | | |
|---|---|---|---|
| 3<br>4 | | Minor courses | 2+0<br>2+0 |
| 5 | COM 601 | Advances in Computer Application | 1+1 |
| 6 | ABM 691 | Doctoral Seminar | 0+1 |
| 7 | ABM 699 | Doctoral Research | 0+2 |
| | | **Total Credits** | **9+6=15** |
| **II** | **Second Semester** | | |
| 1 | ABM 603* | Research Methods – II * | 2+1 |
| 2 | ABM 604<br>ABM 605 | Agri Input and Output Marketing<br>Advances in Business Economics | 2+1 |
| 3 | | Minor course | 2+0 |
| 4 | ABM 615 | Advanced Operations Research | 2+1 |
| 5 | ABM 692 | Doctoral Seminar | 0+1 |
| 6 | ABM 699 | Doctoral Research | 0+10 |
| | | **Total Credits** | **8+14=22** |
| **III** | **Third Semester** | | |
| 1 | RPE | Research and Publication Ethics** | 2+0 |
| 2 | ABM 699 | Doctoral Research | **0+15** |
| **IV** | **Fourth Semester** | | |
| 1 | | MOOC** | 2+0 |
| 2 | ABM 699 | Doctoral Research | **0+16** |
| **V** | **Fifth Semester** | | |
| 1 | ABM 699 | Doctoral Research | **0+16** |
| **VI** | **Sixth Semester** | | |
| 1 | ABM 699 | Doctoral Research | **0+16** |
| | | **Grand total** | **100** |

***Compulsory Courses**

**** Non-Credit Compulsory Course**

## ABM 601 Econometrics for Agri Business (2+1)

### Objectives

The course will cover several key models as well as identification and estimation methods used in modern econometrics. The objective of the course to expose the scholars to advanced models in quantitative analysis and train the research scholars in advanced business quantitative analytical tools for decision making and policy analysis.

### Theory

**Unit I: Regression Analysis and Hypothesis Testing**

Nature of regression analysis - Two variable linear models - Least squares estimators- Properties of the least square estimators – Extension of two variable models- Assumptions of OLS -Violations - Hypothesis testing -Interval estimation - Prediction in linear regression model - Problem of estimation and inference - Specification errors and errors of measurement.

**Unit II: Dummy Variables and Probability Model**

Nature of dummy variables - Dummy variable approach to compare two regressions - Interaction effects - Use of dummy variables in seasonal analysis - Linear Probability Model - Logit, Probit and Tobit models.

**Unit III: Lag Models**

Autoregressive and Distributed lag Models - The Koyck approach to distributed lag models -Nerlovian supply response - The stock adjustment or partial adjustment model.

**Unit IV: Simultaneous Equation Models**

Nature of simultaneous equation model - Simultaneous equation bias - Identification and estimation procedure - Single equation methods - Indirect Least Square - 2SLS.

**Unit V: Forecasting Models**

Time series analysis - Stationarity, unit root and cointegration - Approaches to forecasting - ARIMA and VAR Model -Current streams of thought.

### Practical

Learning of various software for performing quantitative analysis- Identification of dependent and independent variables for performing regression analysis-Construction of two variable and multiple regression models-Testing the significance and inferences of regression estimates-Exercise on use of dummy variables in management science-Dummy dependent variables and application of LPM, Logit, Probit and Tobit Models in business analysis- Exercise on auto regressive models-Exercise on distributed lag models-Construction of simultaneous equation model, Method of estimation and inference of simultaneous equation models- Time series analysis-Forecasting techniques and exercises on ARIMA and VAR models - Forecasting agricultural commodity prices-Visit to DEMIC.

### Theory Lecture Schedule

1. Correlation - Basic concept of regression analysis
2. Two variable linear model
3. Least squares estimators-Properties of the least square estimators
4. Extension of two variable models
5. Assumptions of OLS - Violations
6. Heteroskedasticity and Auto correlation
7. Multicollinearity

8. Hypothesis testing
9. Interval estimation

10. Prediction in linear regression model
11. Problem of estimation- Inference
12. Specification errors and Errors of measurement
13. Selection of regressors - Set of regression equations, causality and simultaneity application
14. Nature of dummy variables - Dummy variable approach to compare two regressions, interaction effects
15. Use of dummy variables in seasonal analysis
16. Qualitative dependent variable
17. **First test**
18. Linear Probability Model - Logit model
19. Linear Probability Model –Probit model
20. Linear Probability Model - Tobit model
21. Autoregressive and Distributed lag models
22. The Koyck approach to distributed lag models
23. Nerlovian supply response
24. The stock adjustment or partial adjustment model
25. Nature of simultaneous equation model
26. Simultaneous equation bias identification and estimation procedure
27. Single equation methods - Indirect LS - 2SLS
28. Time series analysis and its application
29. Stationarity, unit root and cointegration
30. Error correction model-AR, MA, ARMA
31. Error correction model- ARIMA processes
32. Approaches to forecasting
33. Application of ARIMA - Application of VAR models
34. Current streams of thought.

**Practical Lecture Schedule**

1. Learning of various software (LIMDEP) for performing quantitative analysis
2. Learning of various software (e-views, SPSS) for performing quantitative analysis
3. Identification of variables for performing regression analysis- Dependent and independent variables
4. Construction of two variable and multiple regression models
5. Testing the significance and inferences of regression estimates
6. Exercise on use of dummy variables in management sciences
7. Dummy dependent variables and their applications-LPM and Logit
8. Probit and Tobit Models in business analysis
9. Exercise on autoregressive models
10. Exercise on distributed lag models
11. Construction of simultaneous equation model
12. Method of estimation and inference of simultaneous equation models
13. Time series analysis - Forecasting techniques
14. Exercises on ARIMA and VAR models
15. Forecasting agricultural commodity prices
16. Visit to DEMIC
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to,

**CO1:** Develop necessary skills for empirical research using econometric techniques.

**CO2:** Conduct independent research using secondary data.
**CO3:** Identify the variables for performing regression analysis.
**CO4:** Understand the different models for qualitative variables.
**CO5:** Forecast economic variables using AR, MA, and ARIMA models.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | |
| **CO2** | 3 | 3 | |
| **CO3** | | 3 | 3 |
| **CO4** | | | |
| **CO5** | | | 3 |

**Suggested Readings**


1. Bonini, C. P., Hausman, W., and H. Bierman., (1997), *Quantitative Analysis for Management*, McGraw – Hill/Irwin, New York.
2. Damodar and N. Gujarati., (2002), *Student Solution Manual for use with Basic Econometrics*, McGraw Hill, New Delhi.
3. Damodar N. Gujarati, Dawn C. Porter, and Sangeetha Gunasekar., (2011), *Basic Econometrics*, McGraw Hill Education (India) Pvt. Ltd., New Delhi.
4. Damodar, N. Gujarati and S. Sangeetha., (2005), *Basic Econometrics with CD ROM*, Tata McGraw Hill Education, New Delhi.
5. Dougherty C., (2011), *Introduction to Econometrics*, Oxford University Press, England.
6. Harper, Row and G. S. Maddala., (2002), *Econometrics*, McGraw Hill, New Delhi.
7. Jack Johnston and John Di Nardo, (1997), Econometric Methods, Mc Graw Hill, Inc, New Delhi.
8. Navdeep Kaur, Arul Pragasam and Shyamala, (2013), *A Text Book on Econometrics, Theory and Applications*, Vishal Publishing Company, New Delhi.
9. Render, (2006), *Outlines and Highlights for Quantitative Analysis for Management*, Academic Internet Publishers, Europe.
10. Studenmund, A.H., (2017), *Using Econometrics a Practical Guide*, Pearson Education, New Delhi.


**Suggested Websites**

1. https://ocw.mit.edu/courses/economics/14-382- econometrics-spring-2017/
2. https://onlinecourses.nptel.ac.in/noc21_hs01/preview
3. https://quantecon.org/lectures

## ABM 602 Research Methods - I (2+1)

### Objectives

The objective of the course is to enable research scholars in developing the knowledge and skills required to specify, evaluate and utilize different types of unstructured and semi-unstructured information. They are required to develop competence in problem formulation, hypothesis generation and method of carrying scientific research in situations, where research work plays a critical role. The course is practical in nature and students are expected to learn by doing live projects and studying the latest researches in different fields related to agribusiness.

### Theory

**Unit I: Research Problem**

Translating problems to research issue - Selection of qualitative vs quantitative research - Definitions, objectives -Research methodologies-Rationale -Sample/sources of data -Data collection techniques - Measurement of scales -Sources of error -Techniques of developing tools. Questionnaire designing -Use of measurement and scaling techniques -Reliability testing.

**Unit II: Sampling Design**

Sampling design - Criteria, characteristics, types, random sampling. Fieldwork - Data collection -Gaining access and entry, ethical considerations, identifying key informants, validation and evaluation of fieldwork, data preparation, field notes and recording.

**Unit III: Data Collection**

Primary data collection methods -Observation method, interview method, questionnaires, schedules - Difference between questionnaires and schedules, other methods - Secondary data.

**Unit IV: Hypothesis Development**

Hypothesis development and theoretical modelling - Business analytics - Business Intelligence.

**Unit V: Business Analytics**

Types of business analytics - Introduction to predictive modelling/analytics - Linear programming - Contemporary applications of marketing research- Current streams of thought.

### Practical

Research problem identification-Qualitative Research- Quantitative Research-Scale construction techniques - Sampling design- Data collection- Hypothesis development- Business analytics- Business intelligence- Linear programming- Marketing research.

### Theory Lecture Schedule

1. Translating problems to research issues
2. Selection of qualitative Vs Quantitative research-Definitions, objectives, research methodologies, rationale.
3. Sample/sources of data - data collection techniques
4. Measurement scales
5. Sources of error in measurement
6. Technique of developing measurement tools
7. Meaning of scaling - Scale classification bases, important scaling techniques
8. Scale construction techniques
9. Questionnaire designing -Use of measurement and scaling techniques
10. Reliability testing
11. Sampling design-Criteria and characteristics
12. Types of sample designs

13. Random sampling
14. Fieldwork - Data collection, gaining access and entry, ethical considerations
15. Identifying key informants, validation and evaluation of fieldwork
16. Data preparation
17. **First Test**
18. Field notes and recording
19. Collection of primary data
20. Observation method
21. Interview method
22. Collection of data through questionnaires
23. Collection of data through schedules
24. Difference between questionnaires and schedules
25. Other methods of data collection
26. Collection of secondary data
27. Hypothesis development
28. Theoretical modelling
29. Business analytics
30. Types of business analytics - Business intelligence
31. Introduction to predictive modelling/analytics
32. Linear programming
33. Contemporary applications of marketing research
34. Current streams of thought.

**Practical Schedule**

1. Research problem identification-I
2. Research problem identification -II
3. Qualitative research-I
4. Qualitative research-II
5. Quantitative research-I
6. Quantitative research-II
7. Scale construction techniques -I
8. Scale construction techniques -II
9. Sampling design-II
10. Sampling design-II
11. Data collection
12. Hypothesis development
13. Business analytics
14. Business intelligence
15. Linear programming
16. Marketing research - Market information
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Develop competence in problem formulation, hypothesis generation and method of carrying scientific research.

**CO2:** Understand the different sampling methods and its importance.

**CO3:** Select appropriate method of data collection.

**CO4:** Analyze the latest researches in different fields related to agribusiness.

**CO5:** Know the different scaling techniques.

**CO -PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | 3 | |
| **CO2** | 3 | 2 | |
| **CO3** | | 3 | 3 |
| **CO4** | | | |
| **CO5** | | | 3 |

**Suggested Readings**


1. Cohen, L., Lawrence, M., and Morrison, K., (2005), *Research Methods in Education*, 5thEd, Oxford: Oxford University Press, New Delhi.
2. Creswell, J.W., (1999), *Research Design - Qualitative and Quantitative Approaches*, SAGE Publication, New Delhi.
3. Denscombes, M., (2010), *The Good Research Guide: For small-scale social research projects*, Maiden-Read: Open University Press.
4. Dornye, Z., (2007), *Research Methods in Applied Linguistics*, Oxford: Oxford University Press.
5. Kothari, C. R., Gang, G., (2014), *Research Methodology - Methods and Techniques*, New Age International Publication, New Delhi.
6. Kumar, R., (2011), *Research Methodology: A Step-by-Step Guide for Beginners*, 3rdEd, SAGE Publications India Pvt Ltd, New Delhi.
7. Raj, G.L., Mondal, S., (2004), *Research Methods in Social Science and Extension Education*, Kalyani Publication, New Delhi.
8. Rao, K.V., (1993), *Research Methodology in Commerce and Management*, Sterling Publication, New Delhi.
9. Sharma, K. V. S., (2010), *Statistics Made Simple: Do it Yourself on PC*, Prentice Hall of India, New Delhi.
10. Sing, Y. K, (2006), *Fundamental of Research Methodology and Statistics*, New International (P) Limited, Publishers, New Delhi.


**Suggested Websites**

1. https://www.statisticshowto.com
2. https://www.questionpro.com
3. http://ase.tufts.edu/gdae/?gclid=CPGY7pfyjL4CFU0pjgodul8AWA
4. https://www.iser.essex.ac.uk/study
5. http://www.sagepub.com/isw4/weblinks.htm

**ABM 603 Research Methods - II (2+1)**

**Objective**

Once the students are equipped with the information required for interpretive research, RM II will train the students with advanced analytical tools and their uses.

**Theory**

**Unit I: Data Analysis**

Exploratory data analysis - Frequency table, bar charts, histograms. Cross tabulation.

**Unit II: Hypothesis Testing**

Hypothesis testing- logic. Tests of significance-types, selection of a test. One sample, two independent, K-Independent, one sample, two independent, K-Independent - Parametric tests - Non parametric tests - Nominal data, ordinal data.

**Unit III: Analysis of Variance**

Analysis of variance and covariance - Correlation and regression - Discriminant and logit analysis - Factor analysis - Cluster analysis - Multidimensional scaling and conjoint analysis. Structural equation modelling - Basics and software.

**Unit IV: Data Mining**

Data mining- Introduction. Data mining methods - Data dredging - Data fishing - Data snooping and process mining - Business process discovery - Conformance checking and model enhancement - Arena modelling.

**Unit V: Statistical Software**

Applications of statistical software like SAS - Modelling with statistical software. Report preparation - Components and presentation - International marketing research. Current streams of thought.

**Practical**

Data analysis-Hypothesis testing-Parametric and Non parametric tests - Correlation and regression - Discriminant and logit analysis - Factor analysis - Cluster analysis - Multidimensional scaling and conjoint analysis. Structural equation modelling-Data mining-Arena modelling - Report writing.

**Theory Lecture Schedule**

1. Exploratory data analysis - Frequency table, Bar charts, Histograms
2. Cross Tabulation
3. Hypothesis testing- logic
4. Tests of significance-types, selection of a test
5. One sample, two independents
6. K-Independent, test
7. Parametric tests
8. Nonparametric - Measures of association - Nominal data, Ordinal data
9. Analysis of variance and covariance
10. Correlation
11. Regression analysis
12. Discriminant Analysis
13. Logit analysis
14. Factor analysis
15. Cluster analysis
16. Multi-dimensional scaling
17. **First Test**
18. Conjoint analysis
19. Structural Equation Modelling- Basics, software
20. Data mining-Introduction

21. Data mining methods - Data Dredging, Data Fishing
22. Data snooping and process mining
23. Business process discovery
24. Conformance checking and model enhancement
25. Arena modelling
26. Applications of statistical software like SAS
27. Modelling with statistical software
28. Research reports
29. Research report components
30. Writing the report
31. Presentation of statistics- Text and semi tabular presentation
32. Presentation of statistics- Tabular and graphics
33. Insights of business research - International marketing research
34. Current streams thought.

**Practical Schedule**

1. Data Analysis-I
2. Data Analysis- II
3. Hypothesis testing
4. Parametric tests
5. Non parametric tests
6. Correlation
7. Regression analysis
8. Discriminant analysis
9. Logit analysis
10. Factor analysis - Cluster analysis
11. Multi-dimensional scaling
12. Conjoint analysis
13. Structural equation modelling
14. Data mining
15. Arena modelling
16. Report writing
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to,

**CO1:** Identify the information required for interpretive research.
**CO2:** Understand the usage of econometric software packages in agribusiness research.
**CO3:** Know the parametric and non-parametric tests used for agribusiness research.
**CO4:** Know the insights of agribusiness research.
**CO5:** Test the hypothesis and write the project reports independently.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | | | 2 |
| **CO2** | 3 | | |
| **CO3** | | | 2 |
| **CO4** | | 2 | 3 |

| | | | |
|---|---|---|---|
| **CO5** | | 2 | 3 |

**Suggested Readings**


1. Cohen, L. Lawrence, M., and Morrison. K, (2005), *Research Methods in Education*, 5thEd, Oxford: Oxford University Press.
2. Denscombes, M., (2010), *The Good Research Guide: For small-scale social research projects*, Maiden-Read: Open University Press.
3. Dornyei, Z., (2007), *Research Methods in Applied Linguistics*, Oxford University Press, Oxford.
4. Kothar, C.R., (1980), *Research Methodology: Research and techniques*, New Age International Publishers, New Delhi.
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6. Kumar, R., (2011), *Research Methodology: A step-by-step guide for beginners*, 3rdEd, SAGE India Pvt Ltd, New Delhi.
7. Ray G. L, and Mondal, S., (2004), *Research Methods in Social Science and Extension Education*, Kalyani Publication, New Delhi.
8. Rao, K. V., (1993), *Research Methodology in Commerce and Management*, Sterling Publication, New Delhi.
9. Sharma, K. V. S., (2010), *Statistics Made Simple: Do it yourself on PC*, Prentice Hall of India, New Delhi.
10. Singh, Y.K, (2006), *Fundamental of Research Methodology and Statistics*, New Delhi, New International (P) Limited, Publishers.


**Suggested Websites**

1. https://www.statisticshowto.com
2. https://www.questionpro.com

## ABM 604 Agri Input and Output Marketing (2+1)

### Objectives

This course is oriented towards various sectors of agribusiness and the environment within which it operates. This course is oriented toward practical application of theory and analytical principles to the identification, analysis and solution of an agribusiness organization /management problem.

### Theory

**Unit I: Input Sector**

Market structure, nature of competition, pricing, subsidy, government intervention for agriculture inputs. Seeds - growth, issues and policies. Fertilizer- issues, supply, subsidy, micronutrients. Pesticides -market for new molecules, herbicides and bio-control. Farm machineries and equipments. Irrigation and micro irrigation equipments -Machineries and implements. Food processing and Bio-energy -Market, subsidy and polices.

**Unit II: Food Processing and Manufacturing Sectors**

Trends in food processing and manufacturing- Management problems of food processors. -Trends in food retail and wholesaling -Specialization and diversification in food markets. Organic food industry in India- Sugar, dairy and poultry sectors- Issues and prospects.

**Unit III: Agri Services**

Agribusiness consultancy and technology transfer, finance (Venture capital, microfinance). Marketing services -Research and development in agribusiness industries - Private sector initiatives in Agri-service sectors. Agribusiness information portals -Nature of information offered and spread - Certification agencies in organic agriculture and food safety. Publications and periodicals in agribusiness.

**Unit IV: Exports and Imports**

Exports and imports of agricultural commodities - Government policies on export and import of agricultural commodities - WTO regulations related to agribusiness and its implications on agribusiness industries.

**Unit V: Environment Analysis**

Economic environment and agribusiness development - Climate change and agribusiness development - IPR and other regulations and agribusiness development - Government intervention and policies for agribusiness development - Public private partnership models for agribusiness development - Infrastructure and agribusiness development. Current streams of thought.

### Practical

Identifying agribusiness opportunities - Market structure, conduct and performance - Porters five forces model - Seed sector analysis - Fertilizer sector -Forecasting and market structure analysis - Pesticides sector analysis - Farm machineries sector - Market segmentation - Irrigation systems - Brand management for processed food - Non-conventional energy systems - Farmers' preference for agri-consultancy firms - Capital requirement - Marketing services - Policy analysis for agribusiness development - Impact analysis of climate change - Analysis of infrastructure requirement for agribusiness.

**Theory Lecture Schedule**

1. Market structure, nature of competition, pricing, subsidy, government intervention with reference to agricultural inputs
2. Seeds - growth, issues and policies
3. Fertilizer- Issues, supply, subsidy, micronutrients
4. Pesticides - market for new molecules
5. Herbicides and bio-control
6. Farm machineries and equipments
7. Irrigation and micro irrigation equipments, machineries and implements
8. Bioenergy - market, subsidy and polices
9. Trends in food processing and manufacturing
10. Management problems of food processors
11. Major fruits and vegetables markets in India
12. Trends in food wholesaling - specialization and diversification in food markets
13. Organic food industry in India
14. Sugar industry - issues and prospects
15. Dairy and poultry sectors- issues and prospects
16. Agri-business consultancy and technology transfer
17. **First Test**
18. Financial institutions and policies promoting agribusiness (Venture capital, microfinance, Specialized Hi-Tech branches)
19. Marketing services, research and development in agribusiness industries
20. Private sector initiatives in agri-service sectors
21. Agribusiness information portals - nature of information offered and spread
22. Certification agencies in organic agriculture and food safety
23. Publications and periodicals in agribusiness
24. Food grain markets - Markets for fruits and vegetables
25. Commodity market analysis - Rice, Wheat, Spices
26. Commodity market analysis - Cotton, Sugar, Palmolein, Turmeric, Groundnut oil, Maize
27. Government policies on export and import of agricultural commodities
28. Exports and imports of agricultural commodities - WTO regulations related to agribusiness and its implications on agribusiness industries
29. Economic environment and agribusiness development
30. Climate change and agribusiness development
31. IPR and other regulations and agribusiness development
32. Government intervention and policies and agribusiness development
33. Public private partnership models for agribusiness development - Infrastructure and agribusiness development
34. Current streams of thought.

**Practical Schedule**

1. Identifying agribusiness opportunities
2. Discussion on market structure, conduct and performance analysis model
3. Porters five forces model on competitiveness
4. Seed sector analysis
5. Fertilizer sector - forecasting and market structure analysis
6. Pesticides sector analysis
7. Sector analysis for farm machineries
8. Market segmentation for irrigation systems
9. Brand management for processed food products

10. Market analysis for non-conventional energy systems
11. Farmers' preference for agri-consultancy firms
12. Capital requirement assessment for agribusiness ventures
13. Case analysis on marketing services
14. Policy analysis for agribusiness development
15. Impact analysis of climate change
16. Implications for agribusinesses - Analysis of infrastructure requirement for agribusiness
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to
**CO1:** Identify the agribusiness opportunities.
**CO2:** Construct strategies for the efficient distribution of agricultural products and services by knowing consumer behavior.
**CO3:** Determine strategies for developing new products and services that are constant with evolving market needs.
**CO4:** Know the financial institutions and policies promoting agribusiness.
**CO5:** Analyze various channels involved in agribusiness for effective distribution of goods.

**CO - PO Mapping**

| | **PO1** | **PO2** | **PO3** |
|---|---|---|---|
| **CO1** | | 3 | |
| **CO2** | 3 | 2 | |
| **CO3** | | 3 | 3 |
| **CO4** | | | |
| **CO5** | 2 | | 3 |

**Suggested Readings**


1. Africa Competitiveness Report., (1998), World *Economic Forum and Harvad Institute for International Development*, Geneva, Switzerland.
2. Grewal, D., and Levy, M., (2008), *Marketing,* The McGraw Hill Company Ltd., New Delhi.
3. Jha, S. M., (2007), *Service Marketing*, Himalaya Publishing House, New Delhi.
4. Kotler, P., Keller, K. L., Koshy, A., and Jha, M., (2013), *Marketing Management-South Asian Perspective*, Pearson Education, UK.
5. Michael Etzel, J., Bruce J. Walker, William J. Stanton and Pandit, A., (2004), *Marketing - Concepts and Cases,* The McGraw Hill Company Ltd., New Delhi.
6. Parvatiyar, A., and Sisodia, R., (2018), *Advances in Marketing*, Sage Publications India Pvt. Ltd., New Delhi.
7. Porter, Michael E., (1990), *The Competitive Advantage of Nations*, Free Press, New York, New York.
8. Richard L, Kohls and Joseph, N., (1998), *Marketing of Agricultural Products*, Prentice Hall, New Jersey.
9. Varshney, R. L. and Bhattacharya, (2015), *International Marketing Management*: *An Indian Perspective*, New Delhi.
10. Venugopal, P., and Ram, K., (2014), *Agri Input Marketing in India*, Published by SAGE Response, New Delhi.

**Suggested Websites**

1. http://www.niti.gov.in
2. https://agricoop.nic.in

**ABM 605 Advances in Business Economics (2+1)**

**Objectives**

The main objective is to expose the scholars to advanced business economics principles and their applications. To train the research scholars in advanced business economics tools for decision making and policy analysis.

**Theory**

**Unit I: Theory of Consumption**

Theory of consumption - Cardinal utility theory - Indifference curve theory - Revealed preference hypothesis - Consumer surplus - Recent developments in the theory of market demand - Dynamic version - Demand functions - Linear Expenditure System (LES) - Almost Ideal Demand System model.

**Unit II: Theory of Production**

Theory of production - Production functions - Returns to scale - Law of variable proportion - Technical progress and production functions - Theory of costs and business applications of cost analysis.

**Unit III: Perfect and Imperfect Markets and Neo -Classical Theory**

Theory of the firm - Perfect competition -Equilibrium of firm and pricing under dynamic changes in demand and costs - Monopoly- Equilibrium of the monopolist- Short run, long run. Monopolistic competition- assumption, equilibrium- Oligopoly-Non collusive oligopoly- Cournot's, Bertrnand's, Kinked demand models. Collusive Oligopoly-Cartels - Criticism of Neo - classical theory of the firm - Managerial and behavioral theories of firm.

**Unit IV: Behavioral Theory and Externalities**

Behavioral theory- Cyert and March. Strategic behavior -Information and externalities - Game theory -Two-person zero sum game - Non-zero-sum game - The prisoners dilemma. Strategic behavior - Asymmetric information and decision making - Moral hazard and adverse selection - Network Externalities - Markets with network externalities - Implications for business.

**Unit V: Macro Environment of Business**

Macro environment of business - National income -Determinants, aggregate consumption function and multiplier - Income level and consumption spending hypotheses - Concept and phases of business cycle. Current streams of thought.

**Practical**

Theory of consumer behavior - Elasticity's and business applications - Derivation of demand and supply functions - Producer and consumer surplus and business implications - Estimation of production function - derivation of cost curves from production function - Risk analysis - Equilibrium prices under different market conditions - Computation of factor prices and factor shares - Analysis of trends in national income - Inflation -Calculation of price indices and policies - Impact of fiscal and monetary policies on business environment.

**Theory Lecture Schedule**

1. Theory of consumption and consumer behavior
2. Derivation of Demand - Hicksian and Slutsky analysis
3. Cardinal utility theory, indifference curve theory
4. Revealed preference hypothesis - Consumer surplus
5. Recent developments in the theory of market demand
6. Linear expenditure system (LES) -Almost Ideal Demand System model

7. Production functions-Returns to scale-Law of variable proportion
8. Scale of production
9. Technical progress and production functions
10. Theory of costs and business applications of cost analysis
11. Perfect markets - equilibrium of firm and pricing under dynamic changes in demand and costs
12. Monopoly- Equilibrium of the monopolist- short run, long run
13. Monopolistic competition - assumption- equilibrium
14. Oligopoly-non collusive oligopoly- Collusive oligopoly - definition and equilibrium
15. Non collusive oligopoly Cournot's, Bertrnand's model
16. Kinked demand model
17. **First test**
18. Collusive oligopoly-Cartels
19. Duopoly with product differentiation- without product differentiation
20. Imperfect markets - equilibrium of firm and pricing under dynamic changes in demand and costs
21. Price discrimination-assumption, model and types
22. Criticism of neo-classical theory of the firm
23. Managerial and behavioral theories of firm
24. Behavioral theory- Cyert and March
25. Game theory definition -Two-person zero sum game
26. Certainty and uncertainty model
27. Non-zero-sum game - The prisioners' dilemma
28. Factor pricing and factor shares
29. Asymmetric information and decision making-moral hazard and adverse selection
30. Network externalities -markets with network externalities
31. Implication for business - network externalities
32. National income - its determinants, aggregate consumption function and multiplier
33. Income level and consumption spending hypotheses
34. Concept and phases of business cycle - Current streams of thought.

**Practical Schedule**

1. Review of theory of consumer behavior
2. Calculation of elasticities and business applications
3. Derivation of demand functions
4. Derivation of supply functions
5. Producer and consumer surplus and business implications
6. Estimation of production function
7. Least cost combination-derivation of cost curves from production function
8. Risk analysis
9. Equilibrium prices under different market conditions - Monopoly
10. Monopolistic competition
11. Oligopoly and cartels
12. Computation of factor prices and factor shares
13. Analysis of trends in national income
14. Inflation - calculation of price indices and policies
15. Impact of fiscal policies on business environment
16. Impact of monetary policies on business environment
17. **Final Practical Examination.**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Understand the business economics principles and their applications.
**CO2:** Know the tools used in advanced decision making and policy analysis.
**CO3:** Determine the factor pricing and factor shares.
**CO4:** Understand the price discovery mechanism under different market structures.
**CO5:** Know the consumer behavior in various situations.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | 3 | |
| **CO2** | | 3 | 3 |
| **CO3** | 2 | | 3 |
| **CO4** | | | 2 |
| **CO5** | | 2 | |

**Suggested Readings**


1. Brewster, D., (1997*), Business Economics: Decision-making and the firm*, Dryden.
2. Buckley, P., and Michie, J., (1996), *Firms, Organizations and Contracts*, Oxford University Press, England.
3. Gupta, G.S., (1997), *Managerial Economics*, Tata McGraw Hill, New Delhi.
4. Casson, M., (1995), *Entrepreneurship and Business Culture*, Edward Elgar Publication, USA.
5. Easey, K., (1997), *Corporate Governance*, Oxford University Press, Oxford.
6. Hendrikse, G., (2003), *Economics and Management of Organizations: Co-ordination, Motivation and Strategy*, McGraw-Hill, New Delhi.
7. Milgrom, P, & Roberts, J (1992), *Economics, Organization and Management*, Prentice Hall Inc, USA.
8. Reddy J. R, 2004, *Advanced Business Economics*, Publisher: Aph Publishing Corporation, New Delhi
9. Philips, L., (1998), *Applied Industrial Economics*, Cambridge University Press, England.
10. Ricketts, M., (2002), *Economics of the Business Enterprise*, Harvester Wheatsheaf, London.


**Suggested Websites**

1. https://redfame.com › journal › index.php › bms
2. https://www.sciedupress.com › journal › index.php › bmr
3. https://ajbmr.smartsociety.org

## ABM 606 Advanced Applications in Marketing Management (2+0)

**Objectives**

The course curriculum is designed to expose the scholars to advanced management models in marketing management. The specific objectives of the course are: to expose the scholars to advanced marketing techniques and their applications; to train the research scholars in marketing and application in business.

**Theory**

**Unit I: Bottom of Pyramid**

Low-income markets / bottom of the pyramid -Nature of the BOP Market - Products and services for BOP - BOP global opportunities - Market analysis - Consumer characteristics - Marketing strategy.

**Unit II: Marketing Models**

Omni and Multi channel marketing - Business to business marketing - Direct marketing - Digital Marketing - Advances in electronic marketing - Networking and e-marketing models.

**Unit III: Service Marketing**

Service marketing models-Service marketing mix- Insurance service in agriculture sector - Venture Capital-Financial services - Consumer behavior and organizational behavior in services- Market information services - Importance of services in agricultural sector – Service marketing strategies.

**Unit IV: Customer Relationship Management**

Developing a CRM Strategy - Value creation process - CRM and strategic marketing - Marketing performance measurement.

**Unit V: Social Marketing**

Social marketing theory - Social marketing opportunities in agriculture sector - Marketing strategies - Assessing impact of social marketing programs. Agriculture input and output marketing environment-Current status, trends - Market segmentation - Product and pricing, promotion and advertisement in promotional strategies - Marketing channels for different Agri-inputs and outputs. Current streams of thought.

**Theory Lecture Schedule**

1. Low income markets / bottom of the pyramid - nature of the BOP Market
2. Products and services for BOP
3. BOP global opportunities
4. Research issues in BOP
5. Marketing models for BOP
6. Market analysis - consumer characteristics
7. Marketing strategy for BOP
8. Omni and Multi -channel marketing
9. Business to business marketing
10. Direct marketing - Digital marketing
11. Networking and e-marketing models
12. Service marketing models
13. Service marketing mix
14. Venture capital-Financial services
15. Insurance service in agriculture sector
16. Financial services in agriculture sector
17. **First test**
18. Consumer and organizational behavior in services
19. Market information services
20. Importance of services in agriculture sector
21. Services marketing strategies
22. Developing a CRM strategy
23. Value creation process - CRM and strategic marketing
24. Marketing performance measurement
25. Social marketing theory
26. Social marketing opportunities in agriculture sector
27. Social marketing models
28. Issues and strategies in social marketing

29. Assessing impact of social marketing programs
30. Agriculture input and output marketing environment - current status and trends
31. Market segmentation
32. Product, pricing, promotion and advertisement in promotional strategies
33. Marketing Channels for Agri-inputs and outputs.
34. Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Formulate a marketing plan.

**CO2:** Construct strategies for the efficient distribution of agricultural products and services by knowing consumer behavior.

**CO3:** Determine strategies for developing new products and services that are constant with evolving market needs.

**CO4:** Evaluate results of marketing activities.

**CO5:** Analyze various channels involved in agribusiness for effective distribution of goods.

**CO - PO Mapping**

| | **PO1** | **PO2** | **PO3** |
|---|---|---|---|
| **CO1** | | 3 | |
| **CO2** | 3 | 2 | |
| **CO3** | | 3 | 3 |
| **CO4** | | | |
| **CO5** | 2 | | 3 |

**Suggested Readings**


1. Jha, S. M., (2007), *Service Marketing*, Himalaya Publishing House, New Delhi.
2. Kiplimo, J. C., Ngenoh, E., Koech, W., and Bett, J. K, (2015), "Determinants of access to credit financial services by smallholder farmers in Kenya", *Journal of Development and Agricultural Economics*, *7*(9), 303-313.
3. Mahajan, V, (1996), "Financial Services for the Rural Poor and Women in India: Access and Sustainability", *Journal of International Development*, *8*(2), pp.211-224.
4. Philip, K., Keller, K. C., Koshi, A., and Jha, M., (2007), *Marketing Management - A South Asian Perspective*, Prentice Hall of India Pvt. Ltd, NewDelhi.
5. Peterson Borin, (1997), *Marketing – A Contemporary Introduction,* Johns Wiley and Sons, Inc, New York.
6. Rampal, M.K, and S.L. Gupta, (2002), *Service Marketing: Concepts, Applications and Cases,* Galgotia Publishing Co-Orporation, New Delhi.
7. Roy, D., and Banerjee, S. (2014), "Identification and Measurement of Brand Identity and Image Gap: A Quantitative Approach", *Journal of product & brand management*.
8. Steenkamp, J. B., Batra, R., and Alden, D. L. (2003), How Perceived Brand Globalness Creates Brand Value, *Journal of international business studies*, *34*(1), pp.53-65.
9. Thomson, K., and Hecker, L., (2000), "Value-Adding Communication: Innovation in Employee Communication and Internal Marketing", *Journal of Communication Management*.


**Suggested Websites**

1. https://www.smartinsights.com
2. https://www.proofanalytics.ai › proof-insight › what-are.

## ABM 607 Rural Marketing and Consumer Behavior (2+0)

### Objectives

The course curriculum is designed to expose the scholars to advanced rural marketing and consumer behavior models in management. The specific objectives of the course are to expose the scholars to rural marketing and consumer behavior techniques and their applications and to train the research scholars in rural marketing and application in business.

### Theory

**Unit I: Rural Marketing**

Characteristics and marketing environment of rural markets - Perspectives of rural market - Rural markets and economic development. Trends in rural marketing - Innovative marketing institutions - Rural finance.

**Unit II: Rural Marketing Models**

Organized retail chains for rural areas - e-marketing models. Models for rural distribution and Government policies for rural markets. Assessing infrastructure needs and information system for rural markets. Rural market STP - Rural marketing mix - 7 P's.

**Unit III: Consumer Behavior**

Consumer behavior- Theories of consumer behavior - Consumer behavior models - Factors affecting consumer behavior-Marketing implications of consumer behavior.

**Unit IV: Psychological Aspects of Consumer Behavior**

Psychological aspects of consumer behavior - Motivation, ability and opportunity-Exposure, attention and perception-Knowledge and understanding.

**Unit V: Approaches to Consumer Analysis**

Approaches to consumer analysis - Affect and cognition - Product knowledge and involvement - Attentions and comprehension -Attitudes and intentions -Conditioning and learning process - Culture and behavior - Cognitive processes in consumer decision making. Current streams of thought.

### Theory Lecture Schedule

1. Characteristics of rural markets and marketing environment
2. Perspectives of rural market
3. Rural markets and economic development
4. Trends in rural marketing
5. Rural market structure
6. Challenges in rural marketing and strategy to overcome
7. Planning rural research
8. Innovative rural marketing Institutions
9. Rural finance
10. Organized retail chains and formats in rural areas
11. Rural Innovative and e-marketing models
12. Rural distribution
13. Government policies and assessing infrastructure needs for rural markets
14. Information system for rural markets
15. Ruralmarket STP
16. Rural marketing mix -7 P's
17. **First test**
18. Theories of consumer behavior
19. Consumer behavior Models - Traditional models

20. Contemporary models of consumer behavior
21. Factors affecting consumer behavior
22. Marketing implications of consumer behavior
23. Consumer perception towards brands
24. Approaches to consumer analysis
25. Affective and cognitive processes in consumer decision making
26. Psychological aspects of consumer behavior - Motivation, ability, opportunity
27. Exposure - factors influencing exposure - selective exposure and measuring exposure
28. Attention -characteristics -focal and non-focal attention
29. Perception - Perceiving through senses (vision, touch, smell, taste and hearing)
30. Knowledge - content and structure
31. Understanding conditioning and learning process - culture and behavior
32. Post decision dissonance and regrets
33. Innovation -characteristics–Resistance/ Adoption of innovation
34. Diffusion of innovation and factors affecting the diffusion - Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to
**CO1:** Gain conceptual knowledge about rural marketing.
**CO2:** Understand the rural market distribution and factors affecting it.
**CO3:** Know about the consumer behavior and trend in rural marketing.
**CO4:** Know in detail about the service sector and apply the 7P's of service marketing.
**CO5:** Identify recent innovations in rural marketing.

**CO -PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | 3 | 3 | |
| **CO3** | | | 3 |
| **CO4** | | 2 | 2 |
| **CO5** | | | |

**Suggested Readings**


1. Blackwell, Miniard and Engel, (2006), *Consumer Behavior*, (10th Ed.), Thomson Learning, Prentice Hall Inc, US.
2. Bucatariu, L., and George, B., (2020), "Ho Chi Minh City, Vietnam: A Case Study in Mental Health Marketing", *The International Journal of Applied Business (TIJAB)*, *4*(1), 1-12.
3. Dinesh K, and Punam Gupta, (2019), *Rural Marketing: Challenges and Opportunities*, 1st edition, SAGE, New Delhi
4. Foxall, G., (2005), *Understanding Consumer Choice*, Basingstoke, Palgrave Macmillian.
5. Gopalswamy, T. P., (1998), *Rural Marketing*, published by Wheeler publishing (New Delhi).
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7. Montgomery, A. L., (1997), Creating Micro-Marketing Pricing Strategies Using Supermarket Scanner Data, *Marketing science*, 16(4), 315-337.

8. Putsis J, W. P., Balasubramanian, S., Kaplan, E. H., and Sen, S. K., (1997), Mixing behavior in cross-country diffusion. *Marketing Science, 16*(4), 354-369.
9. Solomon, M.R., (1994), *Consumer Behavior, Allyn & Bacon*, London.
10. Singh, A. K., and Pandey, S., (2005), *Rural marketing: Indian perspective*. New Age International Pvt. Ltd, New Delhi.

**Suggested Websites**

1. http://www.ibef.org> Indian Economy
2. www. World-agriculture.com/marketing/rural-marketing.php
3. www.martural.com

## ABM 608 Advances in Financial Management (2+0)

### Objectives

The course curriculum is designed to expose the scholars to advanced models in financial management. The specific objectives of the course are: to expose the scholars in advanced financial principles and their applications. to train the research scholars in developing financial strategies and plans.

### Theory

**Unit I: Indian Financial System and Financial management**

Financial function and objective of the firm - Market efficiency - Strategic financial management - Indian financial system- Financial markets- Agents. Money market and its instruments - Capital market and its instruments. Financial institutions and intermediaries - Depositories, stock and commodity exchanges - Institutional investors- Foreign Portfolio Investors (FPI) - Custodians, clearing houses.

**Unit II: Fundamental and Technical Analysis**

Capital structure theories I and II- Capital investment decisions-Process and techniques - Working capital management and cash conversion cycle - Dividend decisions-Theories- Stock exchanges in India- Commodity exchanges in India- Risk Management-Types of risk.

**Unit III: Security Valuation**

Security analysis- Fundamental analysis, Technical analysis- Security valuation- Risk and return - Equity shares, Preference shares, Debentures/bonds.

**Unit IV: Portfolio Management and Derivatives**

Portfolio management -activities, objectives and phases, theories - Portfolio risk analysis. Securitization-concepts, benefits, participants and mechanism. Derivative analysis-Forward and future - Options and SWAP and commodity derivatives.

**Unit V: Mergers and Acquisitions and Startup Finance**

Corporate valuation- concepts and approaches. Mergers and acquisitions -concepts and forms. Corporate restructuring. Start up financing- concept and sources. International financial management. Current streams of thought.

### Theory Lecture Schedule

1. Financial function and objective of the firm
2. Market efficiency - Strategic financial management
3. Indian financial system
4. Financial markets- agents
5. Money market and its instruments
6. Capital market and its instruments
7. Financial institutions and intermediaries - Depositories, Stock and commodity exchanges, Institutional investors
8. Foreign Portfolio Investors (FPI), Custodians, clearing houses
9. Capital structure theories- I
10. Capital structure theories- II
11. Capital investment decisions-process and techniques
12. Working capital management and cash conversion cycle
13. Dividend decisions theories
14. Stock exchanges in India
15. Commodity exchanges in India
16. Risk management-types of risk

17. Security analysis- Fundamental analysis
**18. First test**
19. Security analysis- Technical analysis
20. Security valuation- Risk and return
21. Security valuation- Equity shares
22. Security valuation-Preference shares
23. Security valuation- Debentures/bonds
24. Portfolio management - Activities, objectives and phases
25. Portfolio management- Theories
26. Portfolio management- Portfolio risk analysis
27. Securitization-concepts, benefits, participants and mechanism
28. Derivative analysis-Forward and Future
29. Derivative analysis-Options and SWAP
30. Derivative analysis- commodity derivatives
31. Corporate valuation- concepts and approaches
32. Mergers and acquisitions - concepts and forms
33. Corporate restructuring
34. Start up Financing- concept and sources
34. International Financial Management - Current streams of thought.

**Course Outcomes**

At the end of the course students will be able to
**CO1:** Grasp the significance of common investment criteria and project cash flows.
**CO2:** Know capital investments decision and financial policies to business valuations.
**CO3:** Analyze working capital and inventory for Agri business.
**CO4:** Identify relevant cash flows for capital budgeting projects and apply various methods to analyze projects.
**CO5:** Understand the functions of various financing institutions and analyze financing system in agribusiness sectors.

**CO -PO Mapping**

| | **PO1** | **PO2** | **PO3** |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | 3 | 2 | 2 |
| **CO3** | | | 3 |
| **CO4** | | 2 | |
| **CO5** | | | 2 |

**Suggested Readings**


1. Brigham, E., and M. C. Ehrhard, (2015), Financial Management - Text and Cases, *SW Cengage Learning India Pvt. Ltd.* New Delhi.
2. Chandra, P., (2008), *Financial Management*, Tata *Mc-Graw Hill*, New Delhi.
3. Eigene Brigham and Micheal C. Ehrhardt, (2005), *Financial Management – Text and Cases*, SW Cengage Learning India, Pvt.Ltd., New Delhi.
4. Goel, B.B, (1999), *Project Management*, Deep and Deep Publication, New Delhi.
5. Gopal Krishnan, P. and K. Nagarajan, (2005), *Project Management,* New Age Publishing Company, New Delhi.
6. Gittinger, Price J., (1982), *Economic Analysis of Agricultural Projects,* The John Hopkins University Press, London.
7. Prasana Chandra, (2008), *Financial Management*, Vikas Publishing House Pvt.Ltd., New Delhi.
8. Khan M. Y., and P. K. Jain., (2019), *Financial Management*, Tata *Mc-Graw Hill*, New Delhi.
9. Pandey, I. M., (2000), *Financial Management,* Vikas Publishing House Pvt. Ltd, New Delhi.
10. Van Horne, J.C., (1997), *Financial Management and Policy*, Prentice Hall of India, New Delhi.


**Suggested Websites**

1. https://www.fm-magazine.com/
2. https://onlinelibrary.wiley.com/journal/1755053x
3. https://www.fma.org/
4. https://www.nifm.ac.in/
5. https://www.icai.org/post.html?post_id=14365

## ABM 609 Value Chain Management in Agribusiness (2+0)

### Objectives

This course aims to provide students with an overview of the commodity market. It also helps to understand fundamental supply chain management concepts and evaluate and manage an effective supply chain and understand the role of logistics as it relates to transportation and warehousing.

### Theory

**Unit I: Commodity Market Analysis**

Food grain markets - Markets for fruits and vegetables - Commodity market analysis - Rice, Wheat, Spices, Cotton, Sugar, Palmolein, Turmeric, Groundnut oil, Maize - Futures and Option market in agriculture- Seasonal commodity patterns. Risk management in agricultural commodity markets - Structural models of commodity prices.

**Unit II: Supply Chain Management**

Supply Chain Management (SCM) - Metrics/Drivers and obstacles - SCM networks - Distribution network - SC inventories - Inventory planning with known and uncertain demand - Coordination in SCM - Bullwhip effect - Green and global supply chains.

**Unit III: Purchase Management**

Role of purchasing in business - Purchasing control, budgeting - Sourcing, quality, quality control - Contract buying, retail buying, state and institutional purchasing, international buying, make or buy, negotiations -Value analysis - Measuring purchasing performance - Strategic purchasing management - Developing lean supply -Partnership sourcing - Network souring- Benchmarking -Role of information technology in purchasing.

**Unit IV: Logistics Management**

Organizing logistics function - Measurement of performance of logistics functions - Logistics operation - its importance and effectiveness - Integrated logistics management - Third party alliance - Multimodal transport system in India - Warehousing- Classes of warehouse, Functions and operations of a warehouse - Third Party Logistics - 4PL service providers.

**Unit V: Performance Modeling of Supply Chains**

Performance modeling of supply chains using different techniques - Mathematical programming models for supply chain planning, design, and optimization - Best practice supply chain solutions - Internet enabled supply chains - e-marketplaces, e-procurement, e-logistics. Customer relationship management -Web services -Supply chain automation and integration. Current streams of thought.

### Theory Lecture Schedule

1. Fundamental and technical analysis of commodity markets
2. Food grain markets - Markets for fruits and vegetables - Commodity market analysis - Rice, Wheat, Spices, Cotton, Sugar, Palmolein, Turmeric, Groundnut oil, Maize
3. Futures and Option market in agriculture- Seasonal commodity patterns
4. Risk management in agricultural commodity markets
5. Structural models of commodity Prices
6. Managing agricultural risk in developing countries
7. SCM Metrics/Drivers and Obstacles
8. SCM networks and distribution network
9. SC Inventories - Inventory planning with known and uncertain demand
10. Coordination in SCM
11. Value of and distortion of information - Bullwhip effect

12. Green and Global Supply Chains
13. Role of purchasing in business - purchasing control, budgeting
14. Sourcing, quality, quality control
15. Contract buying, retail buying, state and institutional purchasing, international buying
16. Make or buy decisions, negotiations and value analysis
17. **First Test**
18. Strategic purchasing management
19. Developing lean supply, partnership sourcing, network souring, benchmarking
20. Role of information technology in purchasing
21. Organizing Logistics function
22. Measurement of performance of logistics functions
23. Logistics operation, its importance and effectiveness
24. Integrated Logistics management - Third Party Alliance
25. Multimodal transport system in India
26. Warehousing- classes of warehouse - Functions and operations of a warehouse - consolidation, break-bulk, cross - docking, mixing, assembly
27. Third Party Logistics - 4PL service providers
28. Performance modelling of supply chains using different techniques
29. Mathematical programming models for supply chain planning, design and optimization
30. Best practice supply chain solutions
31. Internet-enabled supply chains, e-marketplaces, e-procurement, e-logistics
32. Customer relationship management
33. Supply chain automation and integration
34. Current streams of thought.

## Course Outcomes

At the end of the course students will be able to

**CO1:** Understand basic concepts of SCM.

**CO2:** Compare the relationship between trade, investment and economic growth.

**CO3:** Identify structural models of SCM.

**CO4:** Analyze value chain models in agri business sector.

**CO5:** Understand export procedure and way to improve the share of agriculture in total export.

**CO -PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | 3 | | 2 |
| **CO3** | | | 3 |
| **CO4** | | 2 | |
| **CO5** | | | 2 |

**Suggested Readings**


1. Altekar, R.V., (2006), *Supply Chain Management: Concepts and Cases*, PHI Learning Pvt. Ltd., New Delhi, India.
2. Chase, Jacobs, and Aquilano, (2004), *Operations Management for Competitive Advantage*, Tata Mc Graw –hill, New Delhi.

3. Chopra, S., and Meindl, P., (2007), *Supply Chain Management – Strategy, Planning and Operation*, 3rd Ed, Pearson/PHI Learning Pvt. Ltd., New Delhi, India.
4. Donald J., Bowesox, David J., Closs, and B. Cooper, (2008), *Supply Chain Logistics Management*, The Mc Graw -Hill, Companies Inc, New York.
5. Finch, J. B., (2008), *Operations Now: Supply Chain Management and Performance*, Tata Mc- Graw Hill, New Delhi.
6. Gopalakrishnan, P., and Sundaresan, M., (2000), *Materials Management: An Integrated Approach*, Prentice Hall of India Ltd., New Delhi.
7. Joel D. Wisner, G. Keong Leong, Keah-Choon Tan, (2005), *Principles of Supply Chain Management: A Balanced Approach*, Cengage Learning India Pvt Ltd., New Delhi.
8. Li, X., and Wang, Q., (2007), Coordination mechanisms of supply chain systems, *European journal of operational research*, *179*(1), 1-16.
9. Sunil C and Peter Meindl, (2007), *Supply Chain Management-Strategy, Planning and Operation*, 3rd edition, Pearson/PHI, New York.
10. William J. Stevenson, (2002), *Operations Management*, Tata Mc Graw-hill, New Delhi.

**Suggested Websites**

1. www.supplychainmarket.com
2. www.logisticsonline.com
3. www.managementhelp.org

## ABM 610 Agri - Entrepreneurship and Corporate Governance (2+0)

### Objectives

The objective of the course to expose the scholars to advanced entrepreneurial theories, principles and their applications. Also, to train the research scholars in entrepreneurial development and agribusiness plans. To learn about corporate governance and its importance in success of the company.

### Theory

**Unit I: Entrepreneurship Basics**

Nature of entrepreneurship - Concept, knowledge, skills requirement and functions - Characteristic of successful entrepreneurs -Scenario in India and abroad -Entrepreneurship process -Factors impacting emergence of entrepreneurship -Managerial vs. entrepreneurial approach and emergence of entrepreneurship - Risk reduction strategies.

**Unit II: Theories of Entrepreneurship**

Theories of entrepreneurship - Innovation theory by Schumpeter and Imitating Entrepreneur Theory of Hoselitz - Theory of high achievement by McClelland - X-Efficiency theory by Leibenstein - Theory of profit by Knight -Behavioral approach theory - Spill Over theory - Entrepreneurial Learning - Heuristics and Venture creation theory - Theory of Social change by Everett Hagen.

**Unit III: Business Support System**

Business incubators - Cluster approach - Industrial estate. Starting the venture -Generating business idea- Feasibility study- Competitor and industry analysis - Preparing business plan - Organization plan and financial plan - Government schemes for promoting entrepreneurship - Government policies - Role of financial institutions and venture capital.

**Unit IV: Business Ethics**

Necessity for business ethics- Salient issues in ethics and commerce- Shadow economy- Basic principles in ethics - Corporate climate and corporate climate audits - Political issues - Nature and theory of ethics.

**Unit V: Corporate Governance**

Corporate governance- Historical perspective and issues of corporate governance - Corporate governance mechanisms - Corporate governance models - The confederation of Indian Industry's initiative - Corporate social responsibility. Current streams of thought.

### Theory Lecture Schedule

1. Nature of entrepreneurship -concept, knowledge, skills requirement and functions
2. Characteristic of successful entrepreneurs - scenario in India and Abroad
3. Entrepreneurship process
4. Factors impacting emergence of entrepreneurship
5. Managerial vs. entrepreneurial approach and emergence of entrepreneurship
6. Risk reduction strategies
7. Innovation theory by Schumpeter
8. Imitating entrepreneur theory of Hoselitz
9. Theory of High Achievement by McClelland
10. X-Efficiency theory by Leibenstein
11. Theory of profit by Knight
12. Behavioral Approach Theory
13. Heuristics and Venture creation theory -Spill Over theory
14. Entrepreneurial learning

15. Theory of social change by Everett Hagen
16. Business incubators - Cluster approach - Industrial estate
17. Starting the venture- generating business idea
18. Feasibility study- competitor and industry analysis

**17. First test**

18. Preparing business plan, organization plan and financial plan
19. Government schemes for promoting entrepreneurship
20. Government policies -role of financial institutions and venture capital
21. Necessity for business ethics-salient issues in ethics and commerce- shadow economy
22. Basic principles in ethics
23. Corporate climate and corporate climate audits
24. Political issues - nature and theory of ethics
25. Corporate governance
26. Historical perspective and issues of corporate governance
27. Corporate governance mechanisms
28. Corporate governance Models
29. The confederation of Indian Industry's initiative
30. Corporate social responsibility - Current streams of thought.

## Course Outcomes

At the end of the course students will be able to

**CO1:** Understand basic concepts in entrepreneurship developments.
**CO2:** Identify different type of entrepreneurship related agri business sector.
**CO3:** Assess opportunities and constraints for new business ideas.
**CO4:** Understand the systemic process to select and screen a business idea.
**CO5:** Discuss various schemes implemented by government for promotion of entrepreneurship.

**CO -PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | 2 | | |
| **CO3** | | 3 | 3 |
| **CO4** | | 2 | 3 |
| **CO5** | 3 | | 2 |

**Suggested Readings**


1. Badi, R.V., and N.V., Badi, (2007), *Entrepreneurship*, Delhi: Vrinda Publication (p) Ltd.
2. Balachandran, V and Chandrasekaran, V, (2009*), Corporate Governance & Social Responsibility*, PHI, New Delhi.
3. Colin Fisher and Alan Lovell (2009), *Business Ethics and Values: Individual, Corporate and International Perspectives*, 2nd Ed, Pearson Education Limited Edinburgh Gate Harlow Essex, England.
4. David, H. Holt, (2008*), Entrepreneurship*, New Venture Creation, New Delhi:PHI.
5. Desai, V., (2001), *Dynamics of Entrepreneurship Development*, Himalaya Publishers, New Delhi.
6. Lall, M., and S. Sahai, (2006), *Entrepreneurship*, New Delhi: Excel books.
7. Mishra, and R. K., Gitarani, (2012*), Corporate Governance*, Excel Books, New Delhi.
8. Peter, F. Drucker, (2006*), Innovation and Entrepreneurship: Practice and Principles*, Harper Collins, London.
9. Robert, D. Hisrich, Michael P. Peters, and Shepherd, (2006*), Entrepreneurship*, Mc-Graw Hill, New York.
10. Sahay, A., and M. S Chhikara, (2007), *New Vistas of Entrepreneurship Challenges and Opportunities*, Excel Books, New Delhi.


**Suggested Websites**

1. https://www.europeanentrepreneurship.com/
2. https://www.startupindia.gov.in/content/sih/en/reources/l -d-listing.html
3. https://ocw.m it.edu/courses/entrepreneurship/

## ABM 611 International Food and Agri Business (2+0)

**Objectives**

The objective of the paper is to acquaint the students with the fundamentals of international business, its environment and complexities. The paper provides exposure to multiple dimensions of the field and imparts international perspective to business decisions

**Theory**

**Unit I: International Business**

Global trends in international trade and finance - dimensions and modes of IB -Structure of IB environment- Risk in IB -Organizational structure for IB -World trading system and impact of WTO -Exchange rate systems -Global financial system -Barriers to IB -International business information and communication.

**Unit II: Foreign Investment**

Foreign market entry strategies -Country evaluation and selection -Factors affecting foreign investment decisions -Impact of FDI on home and host countries -Types and motives for foreign collaboration -Control mechanisms in IB.

**Unit III: Global Marketing Decisions**

Decisions concerning global manufacturing and material management -Outsourcing factors -Managing global supply chain - International product life cycle - Product and branding decisions - Managing distribution channels -International promotion mix and pricing decisions.

**Unit IV: Export Import**

Counter trade practices -Mechanism of international trade transactions - EXIM policy of India - Export costing and pricing - Export procedures and export documentation - Export assistance and incentives in India.

**Unit V: Cross Country Issues**

Harmonizing accounting difference across countries -Currency translation methods for consolidating financial statements - the LESSARD-LORANGE Model -Cross cultural challenges in IB - International staffing decisions -Compensation and performance appraisal of expatriate staff -Ethical dilemmas and social responsibility issues. Current streams of thought.

**Theory Lecture Schedule**

1. Global trends in international trade and finance
2. Dimensions and modes of IB - structure of IB environment
3. Structure of IB environment
4. Risk in International Business
5. Organizational structure for IB
6. World trading system and impact of WTO
7. Exchange rate systems
8. Global financial system
9. Barriers to international business
10. International business information and communication
11. Foreign market entry strategies -country evaluation and selection
12. Factors affecting foreign investment decisions
13. Impact of FDI on home and host countries
14. Types and motives for foreign collaboration
15. Control mechanisms in IB
16. Decisions concerning global manufacturing and material management
17. **First Test**

18. Outsourcing factors - managing global supply chain
19. International product life cycle
20. Product and branding decisions
21. managing distribution channels
22. International promotion mix and pricing decisions
23. Counter trade practices
24. Mechanism of international trade transaction.
25. EXIM policy of India
26. Export costing and pricing
27. Export procedures and export documentation
28. Export assistance and incentives in India
29. Harmonizing accounting difference across countries
30. Currency translation methods for consolidating financial statements
31. LESSARD-LORANGE model
32. Cross cultural challenges in IB
33. International staffing decisions - compensation and performance appraisal of expatriate staff
34. Ethical dilemmas and social responsibility issues - Current streams of thought.

## Course Outcomes

At the end of the course students will be able to

**CO1:** Understand basic concepts of international trade.

**CO2:** Compare the relationship between trade, investment and economic growth.

**CO3:** Identify empirical tests of trade models.

**CO4:** Analyze foreign trade policy related to agri business sector.

**CO5:** Understand export procedure and way to improve the share of agriculture in total export.

**CO -PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | | 3 | 3 |
| **CO3** | | 2 | |
| **CO4** | 3 | 3 | |
| **CO5** | | | 2 |

**Suggested Readings**


1. Baldwin, R., (2016), "The World Trade Organization and the future of multilateralism", *Journal of Economic Perspectives*, *30*(1), 95-116.
2. Cavusgil, S. T., Knight, G., Riesenberger, J. R., Rammal, H. G., and E.L Rose, (2014), *International business*, Pearson, Australia.
3. Charles, W.L.Hill, (2013), *International Business Competing in the Global MarketPlace*.
4. Chandar, S. K., Sumathi, M., and S. N Sivanandam, (2015), "Forecasting of foreign currency exchange rate using neural network", *International Journal of Engineering and Technology*, *7*(1), 99-108.
5. Harzing, A. W., and M. Pudelko, (2016), "Do we need to distance ourselves from the distance concept? Why home and host country context might matter more than (cultural) distance", *Management International Review*, *56*(1), 1-34.
6. Hill G.W.L., (2013), *International Business Computing in the Global Market Place, McGraw Hill, US.*
7. Heinz, M. (2015), "Why choose teaching? An international review of empirical studies exploring student teachers' career motivations and levels of commitment to teaching," *Educational research and evaluation*, *21*(3), 258-297.
8. Kusiak, A. (2018), Smart manufacturing. *International Journal of Production Research*, *56*(1-2), 508-517.
9. Sharma, P., Leung, T. Y., Kingshott, R. P., Davcik, N. S., and S. Cardinali, (2020), "Managing uncertainty during a global pandemic: An international business perspective", *Journal of business research*, *116*, 188-192.
10. Wild, J. Land K.L Wild, (2019), *International Business: The Challenges of Globalization*, Pearson.


**Suggested Websites**

1. https://www.jstor.org
2. https://www.sciencedirect.com

## ABM 612 Natural Resource Management (2+0)

**Objectives**

The course will provide in-depth knowledge to the participants to look for ways to make responsible natural resource management decisions, which will have an impact on all stakeholders.

**Theory**

**Unit I: Natural Resources**

Types and classification of natural resource -Concept of economic value -Relevance of environmental economics -Ecosystems services -Direct and indirect economic benefit from forest ecosystems -Mountain ecosystems -Mineral and water resources-Ecotourism. Valuation and accounting - Supply and demand -Conservation and management -Cost / benefit analysis -Methods of costing -Cost criteria -Evaluating alternative projects -Operational vs. total costs -Determining benefiting Vs. comprehensive stakeholders - Application of resource accounting - Methods of pricing resources- example forest and mineral resources.

**Unit II: Economic Resource Theory and Applications**

Concept of CPR -Open access - Ecological economics - Methodology - Economic valuation of non-market benefits -Environmental accounting - Population resources and the environment - Command and control Vs. emission trading -Emission trading vs. exposure trading -Hoteling principle -Future strategies for mineral resources.

**Unit III: Natural Resource Management**

Initial concept of market and marketing - NRM sectors product marketing and their roles - Promoting NRM products- NTFPs, livestock, watershed, fisheries, agriculture and medicinal plants and Ecotourism - Role of national and international organizations in the promotion of sustainable natural resource use and management.

**Unit IV: Concept of Environmental Services**

Concept of environmental services - definitions-Ecotourism -Alternative examples - Development of ecotourism in India and outside. Threats due to large scale ecotourism. Payment for ecosystem services - the ecotourism dilemmas - High value may also be high impact - Bulk ecotourism and problems -Stakeholder challenges -Tourist carrying capacity.

**Unit V:Ecotourism**

Ecotourism policy and practices - National policy frame work - Madhya Pradesh and Uttarakhand State case. Successful ecotourism initiative - Criteria and indicators for sustainable Ecotourism -Current streams of thought.

**Theory Lecture Schedule**

1. Natural resources - Types and classification of natural resource
2. Concept of economic value, relevance of environmental economics, ecosystems services
3. Direct and indirect economic benefit from - forest ecosystems, mountain ecosystems mineral and water resources, ecotourism
4. Valuation and accounting - Supply and demand
5. Conservation and management
6. Cost / benefit analysis
7. Methods of costing, cost criteria, evaluating alternative projects, operational vs. totalcosts
8. Determining benefiting vs. comprehensive stakeholders
9. Application of resource accounting methods of pricing resources
10. Resource accounting methods of forest and mineral resources
11. Economic resource theory
12. Applications of economic resource theory

13. Concept of CPR, open access
14. Ecological economics-methodology
15. Economic valuation of non-market benefits
16. Environmental accounting
17. **First Test**
18. Population resources and the environment
19. Command and control vs. emission trading
20. Hotelling principle, future strategies for mineral resources
21. Natural Resource Management - Initial concept of market and marketing
22. NRM sectors product marketing and their roles
23. Promoting NRM products- NTFPs, livestock, watershed, fisheries, agriculture and medicinal plants and ecotourism
24. Role of national and international organizations in the promotion of sustainable natural resource use and management
25. Concept of environmental services -definitions, ecotourism, alternative examples
26. Development of ecotourism in India and outside
27. Threats due to large scale ecotourism
28. Payment for ecosystem services
29. Ecotourism dilemmas - High value may also be high impact - bulk ecotourism and problems
30. Stakeholder challenges, tourist carrying capacity
31. Ecotourism policy and practices - National policy frame work, example -Madhya Pradesh & Uttarakhand State case
32. Successful ecotourism initiatives
33. Criteria and indicators for sustainable ecotourism
34. Current streams of thought.

## Course Outcomes

At the end of the course students will be able to

**CO1:** Understand the importance of natural resource management.
**CO2:** Identify the current environmental concepts.
**CO3:** Demonstrate the different performance measuring techniques.
**CO4:** Understand role and status of economic resources.
**CO5:** Identify the various welfare measures of ecotourism.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | 2 | |
| **CO2** | 2 | | |
| **CO3** | | 3 | 2 |
| **CO4** | | | |
| **CO5** | | 3 | |

**Suggested Readings**


1. Anderson, D. A., (2013), *Environmental Economics and Natural Resource Management*, Rotledge Publisher, USA.
2. Barber, E., (1989), *Economics: Natural Resource Scarcity and Development, Earthscan.*
3. Conrad, J. M., (1999), *Resource Economics*, Cambridge University Press, London.
4. Gupta, Anil. K., (2016), *Land Use and Environment Resources, Methods and Management*, Associated Publishing Company, New Delhi.
5. Field and Barry C., (2008), *Natural Resource Management: An Introduction,* Waveland Press-Long Grove, USA.
6. Haikesh, N. Misra, (2014), *Managing Natural Resources Focus on Land and Water*, Prentice Hall India Learning Pvt. Ltd., New Delhi.
7. Harris, J.M, (2006), *Environmental and Natural Resource Economics: A Contemporary Approach*, 2nd Ed, Houghton Mifflin, US.
8. Kelley, B., (2017), *Natural Resource Conservation and Management*, Larsen and Keller Education, London.
9. Pandey, B.W., (2005), *Natural Resource Management*, Mittal Publication, New Delhi.
10. Philip, A. Neher, (1990), *Natural Resource Economics Conservation and Exploitation*, Cambridge University Press, New York.


**Suggested Websites**

1. https://ehaconnect.org
2. https://ecotourism.org

## ABM 613 Knowledge Management (2+0)

**Objectives**

The objective of the course is to provide the basics of the emerging area of Knowledge Management to students. This course throws light on few important concepts as Knowledge management and information technology, knowledge process, etc.

**Theory**

**Unit I: The Knowledge Economy**

Knowledge management -Introduction and meaning. Leveraging knowledge. Data- Information -Knowledge- Wisdom relationship - Perspective on knowledge- Objectivist and practice based perspective. Knowledge creation and organization -Unlearning organizational knowledge -Characteristics and components of organizational knowledge - Organizational knowledge measurement techniques -Building knowledge societies- Measures for meeting the challenges of implementing - KM programmes.

**Unit II: Knowledge Management and Information Technology Role**

Information technology in knowledge management systems - Knowledge management tools -Creative effective knowledge management systems through information technology - ERP and BPR -Data warehousing and data mining.

**Unit III: Future of Knowledge Management and Industry Perspective**

Companies on the road to knowledge management - Knowledge management in manufacturing and service industry -Challenges and future of knowledge management.

**Unit IV: The Knowledge Process**

Universal appeal - Stages of KM process - Knowledge Capital vs physical capital - Customer relationship management - Business ethics and KM -The Promise of Internet and the imperatives of the new age. Knowledge intensive firms and knowledge workers. Knowledge management technologies and systems - Socio cultural issues to managing and sharing knowledge.

**Unit V: Implementation of Knowledge Management**

Discussion on roadblocks to success - Business intelligence and internet platforms -Web Portals - Information Architecture -A three-way balancing act - KM the Indian experience - Net Banking in India. Role of knowledge management in organizational restructuring. -The Mystique of a Learning organization. Future of knowledge management. Current streams of thought.

**Theory Lecture Schedule**

1. Knowledge Management- Introduction and meaning
2. Leveraging knowledge, data- information -knowledge- wisdom relationship
3. Perspective on knowledge- Objectivist and practice-based perspective
4. Knowledge creation and organization unlearning
5. Organizational knowledge, characteristics and components of organizational knowledge
6. Organizational knowledge measurement techniques
7. Building knowledge societies
8. Measures for meeting the challenges of implementing
9. KM programmes
10. Role Information Technology in knowledge management systems
11. Knowledge management tools
12. Creative effective knowledge management systems through Information Technology
13. ERP and BPR
14. Data warehousing -Data mining
15. Companies on the road to knowledge management
16. **First Test**
17. Knowledge management in manufacturing and service industry
18. Challenges and future of knowledge management
19. Universal appeal - Stages of KM process

20. Knowledge Capital vs physical capital
21. Customer relationship management
22. Business ethics and KM
23. The Promise of Internet and the Imperatives of the new age
24. Knowledge intensive firms and knowledge workers
25. Knowledge Management Technologies and Systems
26. Socio cultural issues to managing and sharing knowledge
27. Discussion on roadblocks to success
28. Business intelligence and internet platforms -Web Portals - Information Architecture
29. A three-way Balancing Act
30. KM - the Indian experience
31. Net Banking in India
32. Role of knowledge management in organizational restructuring
33. The Mystique of a Learning Organization- Future of Knowledge management
34. Current streams of thought.

## Course Outcomes

At the end of the course, the students will be able to
**CO1:** Express their views and ideas without any hindrance.
**CO2:** Do Net Banking in India.
**CO3:** Identify business ethics and KM.
**CO4:** Build knowledge societies.
**CO5:** Understand customer relationship management.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | 2 | 3 |
| **CO2** | 2 | | |
| **CO3** | | | 2 |
| **CO4** | | | |
| **CO5** | | 3 | 3 |

**Suggested Readings**


1. Barnes, (2009), *Knowledge Management systems*, Cengage, America.
2. Debowski., (2007), *Knowledge Management*, Wiley Student Edition, Wiley India.
3. Fernandez, B., (2009), *Knowledge management: An Evolutionary view*, PHI, New Delhi.
4. Fernando, (2009), *Knowledge Management*, Pearson, Web Warehousing & Knowledge: Management Mattison - Tata McGraw-Hill, New Delhi.
5. Mattison, (2009), *Web Warehousing and Knowledge Management*, Tata McGraw-Hill, New Delhi.
6. Panda, T. K., (2009), *Knowledge Management*, Excel, New Delhi.
7. Reddy, R. B., (2009), *Knowledge management*, Himalaya.
8. Sislop, (2009), *Knowledge Management*, Oxford University Press, New Delhi.
9. Tiwana, (2009), *The Knowledge Management tool kit*, 2nd Ed, Pearson Education, Tata McGraw-Hill, New Delhi.
10. Warier, (2009), *Knowledge Management*, Vikas Publishing House, India.


**Suggested Websites**

1. https://www.kmworld.com
2. https://www.openkm.com

## ABM 614 Communication for Management Teachers (2+0)

**Objective**s

Communication in management education is not limited to classroom teaching. Lot of innovative techniques to make teaching and learning interesting, practical and effective. Various researches are done for methodological and effectiveness aspects. This course will be dealt to expose the scholars, all the methods of communication for management teaching in learning by doing method and presenting the various researches done in this field.

**Theory**

**Unit I: Management Education**

Action gaps in education and latest developments and required skills.

**Unit II: Communication**

Active listening - Group communication - Language process - Presentation on readings- Recorded and grade - Oral presentation -Computer assisted presentations.

**Unit III: Theory and Techniques**

Didacticism - Group work and discussion method- Simulation - Facilitation skills and styles for experiential learning - Emotional perspective in teaching.

**Unit IV: Learning in Management Education**

Experiential learning - Action Learning - Group learning - Simulation and games - Role Play - Teaching and learning through electronic media.

**Unit V: Personal Learning Style**.

Developing programme schedule - Programme objectives - Basics for developing curriculum - Case method of teaching - Writing a case and teaching note - Critiquing a research article -Current streams of thought.

**Theory Lecture Schedule**

1. Management education- An introspection
2. Action gaps in education and latest developments and required skills
3. Communication for teaching
4. Active listening
5. Group communication
6. Language process
7. Presentation on readings
8. Oral presentation
9. Computer assisted presentations
10. Theory and techniques of teaching
11. Didacticism-I
12. Didacticism-II
13. Group work & discussion method
14. Facilitation skills and styles for experiential learning
15. Emotional perspective in teaching
16. Learning in management education
17. **First Test**
18. Experiential learning
19. Action learning
20. Group learning
21. Simulation and games-I
22. Simulation and games-II

23. Role Play-I
24. Role Play-II
25. Teaching and learning through Electronic Media-I
26. Teaching and learning through Electronic Media-II
27. Personal Learning Styles
28. Developing programme schedule - programme objectives
29. Basics for developing course curriculum-I
30. Basics for developing course curriculum-II
31. Case method of teaching
32. Writing a case and teaching note
33. Critiquing a research article
34. Current streams of thought.

## Course Outcomes

At the end of the course students will be able to
**CO1:** Understand the ethical, international, social and professional constraints.
**CO2:** Understand the current resources for locating secondary information.
**CO3:** Understand the strategies of effective primary data gathering.
**CO4:** Develop professional work habits, including those necessary for effective collaboration and cooperation with others.
**CO5:** Understand different pedagogical methods.

**CO - PO Mapping**

| | PO1 | PO2 | PO3 |
|---|---|---|---|
| **CO1** | 3 | | |
| **CO2** | 3 | 2 | 3 |
| **CO3** | | 3 | |
| **CO4** | | 2 | 2 |
| **CO5** | 2 | | |

**Suggested Readings**


1. Ahmadi, D., and M. Reza, (2018), "The use of Technology in English language learning: A literature review", *International Journal of Research in English Education*, *3*(2), 115-125.
2. Harima, A., Gießelmann, J., Göttsch, V., and L. Schlichting, (2021), "Entrepreneurship? Let us do it later: Procrastination in the intention–behavior gap of student entrepreneurship", *International Journal of Entrepreneurial Behavior & Research*.
3. Harima, A., Gießelmann, J., Göttsch, V., and L. Schlichting., (2021), "Entrepreneurship. Let us do it later: Procrastination in the intention–behavior gap of student entrepreneurship", *International Journal of Entrepreneurial Behavior & Research*.
4. Jahromi, V. K., Tabatabaee, S. S., Abdar, Z. E., and M. Rajabi, (2016), "Active listening: The key of successful communication in hospital managers", *Electronic physician*, *8*(3), pp 21-23.
5. Joshi, A., andN. F. Habidin, (2016), *World Class Manufacturing (WCM) Practices: An Introspection.*
6. Kilkarani, R.R., Patil, S.R.,Navalag, R.R., and R. K Yaraddy, (2018), *Management case - studies, A students Hand Book*, Notion Press.

7. Maulina, M., Ladjagang, R., Nasrullah, R., Esteban Jr, A. M., Hastianah, H., and H. Herianah (2022), "Research Methods in Teaching Listening Skills Utilizing Technology Media", *Journal of Education and Teaching (JET)*, *3*(1), pp 69-83.
8. Redpath, L. (2012), "Confronting the bias against on-line learning in management education", *Academy of Management Learning & Education*, *11*(1), pp 125-140.
9. Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., Vandenbroucke, J. P., and Strobe Initiative. (2014), "The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies", *International journal of surgery*, *12*(12), pp 1495-1499.
10. Vinales, J. J. (2015), "The learning environment and learning styles: a guide for mentors", *British Journal of Nursing*, *24*(8), pp 454-457.

**Suggested Websites**

1. https://www.hbs.edu

## ABM 615 Advanced Operations Research (2+1)

### Objectives

The objective is to acquaint the learner with the applications of some important operations research techniques. To gain elementary knowledge of solving problems and decision making for managing farming and organization in resource constraint in order to achieve the objective.

### Theory

**Unit I: Concepts**

Elementary concepts and objectives of Operations Research - Review of Linear programming - Assumptions and methods - Non-linear programming problem -Quadratic programming - Multi Objective Programming (MOP).

**Unit II: Inventory- A Review**

Inventory control models -Costs involved in inventory management -Types of inventories - Economic order quantity model - Waiting line models - Waiting line problem - Characteristics of a waiting line system - Single channel model.

**Unit III: Models**

Markov Chains - Sequencing, Replacement models - Transportation and Assignment problems.

**Unit IV: Decision Making**

Decision making under risk and uncertainties -Decision problem - Maximax criterion - Maximin criterion -Minimax regret criterion - Laplace criterion - Pay off tables - Decision trees - Expected value of perfect information.

**Unit V: Game Theory**

Game Theory - Two-person Zero sum game - Simulation - Network Analysis- PERT and CPM. Current streams of thought.

### Practical

Linear and Non-linear programming problem - Quadratic programming - Multi objective programming- Goal programming- Lexicographic - Weighted Sum. Determining economic order quantity - Reorder levels of EOQ model. Waiting line problem - Problems on Markov Chains - Sequencing and Replacement models. Formulating and solving transportation type problems - Assignment problems as a special type of transportation problem. Solving deterministic and probabilistic queuing models - Structuring and solving decision trees for optimal decisions - Game theory - Simulation - Developing network(PERT/CPM) diagrams and determining the critical path.

### Theory Lecture Schedule

1. Elementary concepts and objectives of operations research
2. Review of Linear programming
3. Assumptions and methods
4. Non-linear programming problem
5. Quadratic programming
6. Multi Objective Programming (MOP)
7. Inventory control models
8. Costs involved in Inventory management
9. Types of inventories
10. Economic order quantity model
11. Waiting line models

12. Waiting line problem
13. Characteristics of a waiting line system
14. Single channel model
15. Markov Chains
16. Sequencing
17. **First Test**
18. Replacement models
19. Transportation problems
20. Assignment problems
21. Decision making under risk and uncertainties
22. Decision problem
23. Maximax criterion
24. Maximin criterion
25. Minimax regret criterion
26. Laplace criterion
27. Pay off tables
28. Decision trees
29. Expected value of perfect information
30. Game Theory
31. Two-person Zero sum game
32. Simulation analysis
33. Network analysis- PERT and CPM
34. Current streams of thought.

**Practical Schedule**

17. Linear programming problem
18. Non-linear programming problem
19. Quadratic programming
20. Multi objective programming
21. Goal programming, Lexicographic, Weighted Sum.
22. Determining economic order quantity, reorder levels of EOQ model
23. Waiting line problem
24. Problems on Markov Chains
25. Sequencing and replacement models
26. Formulating and solving transportation type problems
27. Assignment problems as a special type of transportation problem
28. Solving deterministic and probabilistic queuing models
29. Structuring and solving decision trees for optimal decisions
30. Game theory -Simulation
31. Developing network(PERT/CPM) diagrams
32. Determining the critical path
33. **Final practical Examination**

**Course Outcomes**

At the end of the course students will be able to

**CO1:** Develop a general understanding of the Operational Research (OR) approach to decision making.

**CO2:** Gain expertise in formulating problems of management into mathematical form and work out optimal solutions.

**CO3:** Apply the knowledge of different models in better decision making and controlling of the firms.

**CO4:** Solve the problems using special solutions algorithms.

**CO5**: Set up decision models and use some solutions methods for nonlinear optimization problems.

**CO - PO Mapping**

| | **PO1** | **PO2** | **PO3** |
|---|---|---|---|
| **CO1** | | | 3 |
| **CO2** | 2 | 3 | 3 |
| **CO3** | | | 2 |
| **CO4** | 3 | | |
| **CO5** | | 2 | 3 |

**Suggested Readings**


1. Gupta, P. K. and D. S. Hira, (2004), *Operations Research*, Sultan Chand and Sons, New Delhi.
2. Hamdy A. Taha, (2018), *Operations Research - An Introduction*, Dorling Kindersley, India Pvt. Ltd., New Delhi.
3. Hillier, F., and G. Lieberman, (2005), *Introduction to Operations Research*, McGraw Hill, New Delhi.
4. Jensen, P. A., and J.F. Bard, (2008), *Operations Research Models and Methods*, Willey Blackwell, UK.
5. Ralph, B. R., Michael, S., and E. Hanna, (2008), *Quantitative Analysis for Management*, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
6. Swarup, P.K. Gupta, and Manmohan, (2014), *Introduction to Operations Research*, Sultan Chand and Sons, New Delhi.
7. Taha, H.A., (2005), *Operations Research- An Introduction*, Prentice Hall, New Delhi.
8. Taha, H.A., (1982), *Operations Research - An Introduction*, Macmillan India Ltd., New Delhi.
9. Vohra, N.D., (2006), *Quantitative Techniques in Management*, McGraw Hill, New Delhi.
10. Wagner, H.M., (2005), *Principles of Operation Research*, Prentice Hall, New Delhi.

# ANNEXURES

**Annexure - 1**

**ANNAMALAI UNIVERSITY**
**DIRECTORATE OF ACADEMIC RESEARCH (DARE)**
**Annamalainagar – 608002**

## REQUEST FOR EXTENSION OF TIME

| | | |
|---|---|---|
| Name of the Scholar | : | |
| Roll No. | : | |
| Programme | : | Ph.D. |
| Department | | |
| Faculty | : | |
| Mobile No. | : | |
| Email id | : | |
| Date of Registration of the Programme | : | |
| Supervisor Name & Address | : | |

Reason for Extension of time :

Synopsis Submitted : Submitted/ Not submitted

Extension of time : 1 year / months* from … to …..

Signature of the Scholar

Signature of the Head of the Department
(Name with Seal)

Signature of the Supervisor
(Name with Seal)

Signature of the Dean
(Name with Seal)

Annexure - 2

**ANNAMALAI UNIVERSITY**
**Annamalainagar – 608002**
**Department:**

**MINUTES OF THE FIRST RESEARCH ADVISORY COMMITTEE MEETING**

The Research Advisory Committee Meeting of the Ph.D. Scholar, Mr./Ms.---------- (Roll No.----------) was held on----------at--------in the Department of ----------.

The following members were present.

1. Supervisor & Convener
2. Head of the Department
3. Member
4. Member
5. Member

Mr./Ms.---------- presented an overview of the proposed research work. The Research Advisory Committee approved the research topic as

"..... ..... ....."". The Committee has recommended the scholar to undertake the following course work examinations based on the qualification of the candidate and the proposed research area.

| Course Code | Course Title | Credits | Major / Minor/ Supportive course |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

Number of course works as applicable to the scholars

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Supervisor**
(Signature with Name, Date and Seal)

**Annexure - 2**

**Signature of Head of the Department**
(Name with Seal)

Date :

Place:

**ANNAMALAI UNIVERSITY**

**ANNAMALAINAGAR – 608002**

**DEPARTMENT:**

## MINUTES OF THE RESEARCH ADVISORY COMMITTEE MEETING FOR CONFIRMATION OF PROVISIONAL REGISTRATION

The Research Advisory Committee Meeting of the Ph.D. Scholar, ---------- (Roll. No. ----------) was held on ---------at --------a.m./p.m. in the Department of ------. The following members were present:

1. (Supervisor & Convener)
2. Head of the Department
3. (Member)
4. (Member)
5. (Member)

Mr./Ms. ---------- has successfully completed the following course work examinations recommended by the Research Advisory Committee. He/She has obtained the following grades in the course work.

| Sl. No | Course Code | Course Title | Credits | Category | Grade / Marks |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |
| 7. | | | | | |
| 8. | | | | | |
| | | | | **GPA** | |

**CoE signed result sheet of the course work duly attested by the Supervisor with seal should be enclosed along with this.**

The scholar completed the first seminar presentation on_____to the faculty members and research scholars. The attendees list is enclosed herewith. The committee also evaluated the research work carried out by the scholar and satisfied/not satisfied with the performance of the scholar. Hence, the Committee

recommends/does not recommend the confirmation of provisional registration of the scholar, and permits/does not permit the scholar to proceed with his/her research work.

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

Date:

Place:

* Strike off whichever is not applicable

Annexure - 4

**DEPARTMENT OF _____**
**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

## CHECKLIST FOR THE CONFIRMATION OF Ph.D. REGISTRATION

| | | |
|---|---|---|
| 1. | Research Advisory Committee meeting **Minutes and Research Performance Assessment** signed by all the RAC members | **YES/NO** |
| 2. | No. of Courses attended .....(not applicable for M.Phil. scholars) | **YES/NO** |
| 3. | Photocopy of mark sheets of the course works signed by COE attested by the Supervisor | **YES/NO** |
| 4. | Original copy of the certificate for the seminar presentation | **YES/NO** |
| 5. | Attendance particulars for the seminar presentation | **YES/NO** |
| 6. | Comprehensive examination result mentioned in the RAC minutes | **YES/NO** |
| 7. | Approval of Research Advisory Committee members for change of course work/ course code/course title | **YES/NO** |
| 8. | Faculty for confirmation is same as that of Provisional Registration | **YES/NO** |

**Checked and found Correct**

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Annexure – 5**

**DEPARTMENT OF _____**
**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

## Research Progress Report

(To be submitted every semester from date of Registration)

| | | | |
|---|---|---|---|
| 1. | Name and Roll No. of the Scholar | : | |
| 2. | Programme | : | Ph.D. |
| 3. | Title of research work | : | |
| 4. | Date of previous RAC meeting | : | |
| 5. | Brief report of the research work carried out between previous and present RAC meetings. Mention the objectives completed: | | |
| 6. | List research paper published/accepted for publication/communicated forpublication / patents (National /International) filed / approved: | | |
| 7. | National / International Conference/Symposia attended (Give details such asName of the Conference, venue, title, period): | | |
| 8. | Overall assessment and comments about the progress of the research scholar: | | |

| | |
|---|---|
| **Member**<br>(Signature with Name and Date) | **Member**<br>(Signature with Name and Date) |
| **Member**<br>(Signature with Name and Date) | **Supervisor**<br>(Signature with Name, Date and Seal) |
| **Head of the Department**<br>(Signature with Name, Date and Seal) | |

**Note:** Research Performance Assessment restricted to maximum 2 pages should besubmitted along with the minutes of RAC meeting duly signed by RAC members.

**Annexure – 5**

## PROFORMA FOR REGISTRATION OF RESEARCH CREDITS

(**To be given during first week of semester**)

## PART A: PROGRAMME

Semester: Year: Date of registration:

1. Name of the student and
2. Enrolment number:/Reg. No.:
3. Total research credits completed so far:
4. Research credits registered during the semester:
5. Program of work for this semester (list out the Items of research work to be undertaken during the semester):

Approval of advisory committee

| Advisory Committee | Name | Signature |
|---|---|---|
| 1. Supervisor | | |
| 2. Member | | |
| 3. Member | | |
| 4. Member | | |

Professor and Head

*Approval may be accorded within 10 days of registration*

**Annexure – 5**

## PROFORMA FOR EVALUATION OF RESEARCH CREDITS

## PART B EVALUATION

(**Evaluation to be done before the closure of Semester**)

Date of Commencement semester: Date of closure of semester:

Date of evaluation:

1. Name of the student
2. Enrolment number: Reg. No.:
3. Total research credits completed so far:
4. Research credits registered during the semester:
5. Whether the research work has been carried out as per the approved program:
6. If there is deviation specify the reasons :
7. Performance of the candidate : SATISFACTORY /NOT SATISFACTORY

**Approval of the advisory committee**

| Advisory Committee | Name | Signature |
|---|---|---|
| 1. Supervisor | | |
| 2. Member | | |
| 3. Member | | |
| 4. Member | | |

Professor and Head

**Annexure – 5**

**Annexure - 6**

**ANNAMALAI UNIVERSITY**

**ANNAMALAINAGAR – 608002**

**DEPARTMENT:**

## MINUTES OF THE RESEARCH ADVISORY COMMITTEE MEETING FOR SUBMISSION OF SYNOPSIS

The Research Advisory Committee Meeting of the Ph.D. Scholar, Mr./Ms. _____(Roll No._____) was heldon _____at a.m./p.m. in the Department of_____. The following members were present.

1. (Supervisor & Convener)
2. Head of the Department
3. (Member)
4. (Member)
5. [Member]

The Research Advisory Committee critically reviewed the research work entitled "……..." carried out by

Mr./Ms.---------- and the contents of the draft Synopsis. The scholar completed the pre-synopsis presentation on…… to the faculty members and research scholars. The attendees list is enclosed herewith. The scholar has ..... publications in the journals (NAAS/SCI/UGC listed) from his/her research work.

The scholar has the following publications in the listed journals.

1.(Accepted/Published)

2.(Accepted/Published)

It is also certified that the Paper/Papers mentioned above are withinthe scope of the Journal and the paper/papers is/are relevant to the Ph.D. work carried out by the scholar.

The Committee is satisfied with the research performance of the scholar, the quality and quantum of research work and approves the Synopsis submission. The Committee also recommends the panel of Indian and Foreign Examiners for the evaluation of the Thesis.

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Member**
(Signature with Name and Date)

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Annexure - 7**

**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**
**DEPARTMENT:**

## CERTIFICATE FOR SUBMISSION OF SYNOPSIS AFTER COMPLETION OF MINIMUM DURATION

| | | | | |
|---|---|---|---|---|
| 1. | Name of the Research Scholar | : | | |
| 2. | Roll No. | : | | |
| 3. | Date of Provisional Registration& Confirmation | : | | |
| 4. | Faculty & Department | : | | |
| 5. | Date of RAC meeting for synopsis submission | : | | |
| 6. | Break of study availed (if any) mention theperiod | : | | |
| 7. | Duration of research period from the date of submission of synopsis excluding the break of study period | : | Year | Month |
| 8. | Synopsis submitted within the minimum duration | : | Yes / No | |
| 9. | If Yes, whether the scholar has two publicationsas per the Annamalai University norms | : | Yes / No | |

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Annexure - 8**


# ANNAMALAI UNIVERSITY
## ANNAMALAINAGAR – 608002
## DEPARTMENT:


List of attendees for the Pre-Synopsis seminar Presentation of **Mr/Ms. ----------, Department of ----------,** held on --------- at ------. in the ----------, Annamalai University, Annamalainagar – 608 002.

| Sl.No. | Name | Designation & Address | Signature |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

**Member**

(Signature with Name and Date)

**Member**

(Signature with Name and Date)

**Member**

(Signature with Name and Date)

**Supervisor**

(Signature with Name and Date)

**Head of the Department**

(Signature with Name, Date and Seal)

**Annexure - 9**

# DIRECTORATE OF ACADEMIC RESEARCH(DARE)

# ANNAMALAI UNIVERSITY

# ANNAMALAINAGAR –

# 608002

## PROFORMA FOR SUBMISSION OF SYNOPSIS

I. Registration Details:

| | | | |
|---|---|---|---|
| Name of the Scholar:<br>Contact No.:<br>Email ID: | | Roll No.: | |
| Name of the Supervisor:<br>Contact No.:<br>Email ID: | | | |
| Month and Year of Registration | | Period of break of study granted, if any | |
| Date of Confirmation | | Date of Completion of minimum period | |
| Faculty and Department as per the Provisional Registration Order | | | |
| Date of completion of maximum period | | Extension of period approved (mention date) | upto: |
| Date of Research Advisory Committee meeting for approval of Synopsis | | Date of submission of Synopsis | |

II. Semester Fee Payment Details:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month and Year | | | | | | | | |
| Amount Paid | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

III. Course Work Details:

| Course Code | Course Title | Credits | Category | Grade/Marks |
|---|---|---|---|---|
| | | | | |
| | | | | |
| **CGPA** | | | | |
| **Comprehensive Examination** | | | | Pass/Fail |

IV. Progress Report:

| Period | Jan-Jun | Jul-Dec | Jan-Jun | Jul-Dec | Jan-Jun | Jul-Dec | Jan-Jun | Jul-Dec |
|---|---|---|---|---|---|---|---|---|
| Date of Submission | | | | | | | | |
| | | | | | | | | |

:

V. Proof for the Seminar Presentations (attach the Circular copies) :

VI. Publication Details:

| **Journal** | **Published** |
|---|---|
| National | |
| International | |

Enclose photo copy of the papers published.

VII. Details of Synopsis Fee:

| **Amount (Rs.)** | **D.D. No.** | **D.D. Date** | **Name of the Bank** | **Branch** |
|---|---|---|---|---|
| | | | | |

**VIII.** Whether Synopsis submitted within the maximum duration: **YES/NO**

If No, copy of the Extension order should be enclosed:

Certify that the information furnished above is true and correct to the best of myknowledge.

**Signature of the Research Scholar**

**Signature of the Supervisor**

(Name with Seal)

**Signature of the Head of the Department**

(Name and Seal)

(for Office use only) Checked and Accepted

**Annexure - 10**

# DIRECTORATE OF ACADEMIC RESEARCH(DARE)
# ANNAMALAI UNIVERSITY
# ANNAMALAINAGAR – 608002

## CHECKLIST WHILE SUBMITTING Ph.D. SYNOPSIS

| | | |
|---|---|---|
| 1. | Proforma for submission of Synopsis | **YES/NO** |
| 2. | Whether change of Supervisor is approveda.) if yes, attach a copy of the letter<br>b.) Whether the scholar has completed a minimum of one year with the new Supervisor | **YES/NO** |
| 3. | One copy of the Synopsis with soft copy as per Annamalai University Regulations | **YES/NO** |
| 4. | Original Minutes of the Research Advisory Committee signed by all themembers | **YES/NO** |
| 5. | Panel of Examiners (both Indian and Foreign) **with complete and correct postal address** including Phone No, Mobile No, Fax No and correct Official E-mail ID (**typed only**)in a closed cover | **YES/NO** |
| 6. | Recent publications list of all Foreign and Indian examiners in the last 5years in a closed cover | **YES/NO** |
| 7. | The panel of Foreign Examiners should not be of Indian origin | **YES/NO** |
| 8. | Photocopy of the Provisional Registration Confirmation order | **YES/NO** |
| 9. | Photocopies of UG and PG Degree Certificates attested by HOD | **YES/NO** |
| 10. | Synopsis fee of Rs._____may be paid in the University Cash Counter / Bank. | **YES/NO** |
| 11. | Photo copy of the Journal publications | **YES/NO** |
| 12. | Photo Copy of the fee challan for all the years till the submission of Synopsis | **YES/NO** |
| 13. | Certificate for submission of synopsis after the completion of minimumduration | **YES/NO** |
| 14. | a.) Whether the Synopsis is submitted within the maximum durationb.) If No, enclosed copy of the Extension order | **YES/NO** |
| 15. | Photo Copy of the circular for the pre-synopsis presentation | **YES/NO** |
| 16. | Attendance particulars for the pre-synopsis presentation (Applicable to all scholars irrespective of year of registration) | **YES/NO** |
| 17. | Report from "URKUND" Software attached for all Published / accepted Papers listed in Synopsis | **YES/NO** |

**Checked and found Correct**
**Signature of the Supervisor**

**Signature of the**
**Head of the Department**

**Annexure - 11**

# PANEL OF INDIAN EXAMINERS FOR Ph.D. THESIS EVALUATION

Name and Roll No. of the Scholar :

Programme : Ph.D.

Title of the Thesis :

Faculty& Dept. as per PG Qualification :

Name of the Supervisor :

| Sl. No. | Name with full postal address with pin code | Area of specialization |
|---|---|---|
| | **PANEL OF INDIAN EXAMINERS**<br>**(Preferably from IITs, NITs, Universities and Government Institutions)**<br>**(Not less than Associate Professor)** | |
| 1. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 2. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 3. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 4. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 5. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |

**Note:** For each expert, the list of publications in reputed Journals indexed with Scopus/Web of Science/Thomson Reuters/ISI with impact factor during the last five years to be enclosed.

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Dean**
(Signature with Name, Date and Seal)

**Annexure - 12**

# PANEL OF FOREIGN EXAMINERS FOR Ph.D. THESIS EVALUATION

Name and Roll No. of the Scholar :

Programme : Ph.D.

Title of the Thesis :

Faculty& Dept. as per PG Qualification :

Name of the Supervisor :

| Sl. No. | Name with full postal address with zip code | Area of specialization |
|---|---|---|
| | **PANEL OF FOREIGN EXAMINERS** | |
| 1. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 2. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 3. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 4. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |
| 5. | Name :<br>Designation :<br>Department :<br>Address :<br>Mobile : Official E-mail: | **Area of specialization**<br><br><br><br>No. of Publications: |

**Note:** For each expert, the list of publications in reputed Journals indexed with Scopus/Web of Science/Thomson Reuters/ISI with impact factor during the last five years to be enclosed.

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Dean**
(Signature with Name, Date and Seal)

**Annexure - 13**

# PROFORMA FOR SUBMISSION OF Ph.D. THESIS

## I. Registration Details:

| | | | |
|---|---|---|---|
| Name of the Scholar:<br>Contact No:<br>Email ID: | | Roll No: | |
| Name of the Supervisor:<br>Contact No :<br>Email ID : | | | |
| Month and Year of Registration | | Period of break of study granted, if any | |
| Date of confirmation | | Date of completion of minimum period | |
| Date of completion of Maximum period | | Extension of period approved (mention date) | upto: |
| Date of RAC meeting forApproval of synopsis | | Date of submission of thesis | |

**II.** Extension of time for thesis submission beyond **3 months** after the submission of synopsis (if any):

Late fee details:

| Amount (Rs.) | D.D. No. | D.D. Date | Name of the bank | Branch |
|---|---|---|---|---|
| | | | | |

**III. Whether No Dues Certificate is enclosed:**

Certified that the information furnished above is true and correct to the best of my knowledge.

**Signature of the Scholar**

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

---

(For Office use only) Checked and Accepted

**Annexure - 14**

**DIRECTORATE OF ACADEMIC RESEARCH(DARE)**
**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

## CHECK LIST WHILE SUBMITTING Ph.D. THESIS

| | | |
|---|---|---|
| 1. | Five Copies of the Thesis (with soft copy of the Thesis in PDF format with each copy) prepared as per the guidelines of Annamalai University | **YES/NO** |
| 2. | (a) Whether the thesis is submitted within the maximum duration | **YES/NO** |
| | (b) if no, enclose copy of the extension order | **YES/NO** |
| 3. | Whether the thesis is submitted within three months from the synopsis meeting | **YES/NO** |
| 4. | Proforma for submission of thesis | **YES/NO** |
| 5. | No dues certificate (original) | **YES/NO** |
| 6. | Checked for language and grammar | **YES/NO** |
| 7. | Report from "URKUND" software attached | **YES/NO** |
| | | |

**Synopsis and Thesis titles are the same.**

**Checked and found correct**

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

Annexure - 15

**DIRECTORATE OF ACADEMIC RESEARCH(DARE)**
**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

# NO DUES CERTIFICATE

**(To be submitted along with Thesis to**

**the Director, DARE, Annamalai University, Annamalainagar)**

Name of the Scholar :
Programme : Ph.D.
Roll No :
Department and Faculty :
Month & Year of Submission of Thesis :

| Sl. No. | Details | No Dues Certificate | Signature (Name with Seal) |
|---|---|---|---|
| 1. | University Library | | |
| 2. | Department Library | | |
| 3. | D1- Section | | |
| 4. | Department of the Supervisor and Scholar | | |
| 5. | Department Store | | |
| 6. | Hostel Office | | |
| **7.** | **Project Section (G/CRD)** | | |
| **8.** | **Scholarship Section (H)** | | |
| 9. | Director, DARE **(For Office use Only)** | | |

*** Strike off whichever is not applicable**

## Declaration

I hereby declare that in the event of any due from me found at a later date, I shallpay the same to the Institution.

**Signature of the Scholar**

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**DEPARTMENT OF _____**
**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

## MINUTES OF THE RESEARCH ADVISORY COMMITTEE MEETING FOR RESUBMISSION OF THESIS

The Research Advisory Committee Meeting of the Ph.D. Scholar, Mr./Ms._____(Roll No._____) was held on_____at_____ a.m./p.m. in the Department. of_____
The following members were present:

1. (Supervisor & Convener)
2. Head of the Department
3. (Member)
4. (Member)
5. [Member]

The Comments given by the examiners have been reviewed by the Research Advisory Committee, and the committee certifies that the corrections were carried outby the scholar as suggested by the examiner(s).

He/She is permitted to resubmit the thesis.

Title of the Thesis “ ”.

**Member**
(Research Advisory Committee)

**Member**
(Research Advisory Committee)

**Member**
(Research Advisory Committee)

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

**Annexure - 17**

**DEPARTMENT OF _____**

**ANNAMALAI UNIVERSITY**
**ANNAMALAINAGAR – 608002**

# CIRCULAR

## Ph.D. Public Viva-Voce Examination

Name of the Scholar :

Roll Number :

Faculty & Department :

Title of the Thesis :

Date and Time of Viva-voce Examination :

Venue :

Name and address of the Supervisor :

Name and address of the Indian Examiner :

**All are cordially invited**

**Supervisor**
(Signature with Name, Date and Seal)

**Head of the Department**
(Signature with Name, Date and Seal)

Copy to:

1. The Controller of Examinations.
2. The Deans of Faculties.
3. The Heads of Departments with request to display in the Department NoticeBoard.
4. The Director, Directorate of Academic Research (DARE).
5. The Director, Academic Affairs.
6. The Director, Directorate Research and Development (DRD).
7. The University Librarian.
8. The Heads of Departments of other Universities/Colleges/IIT/NIT/IIM withrequest to display in their Department Notice Board.
9. P.S to Vice-Chancellor.
10. P.A to Registrar.

# GUIDELINES FOR THE PREPARATION OF SYNOPSIS AND THESIS

**Appendix – I**

## GUIDELINES FOR THE PREPARATION OF SYNOPSIS

Synopsis should outline the research problem, the methodology it and the summary and conclusion of the findings. The size of the Synopsis should not exceed 15 pages of typed matter reckoned from the first page to the last page including the list of references and list of publications of the scholar. The sequence in which the synopsis should be arranged is as follows with references and list of publications in separate pages.

1) Cover page and title page (as shown in the Annexure I)
2) Text divided into suitable headings (numbered consecutively)
3) References (not more than 12)
4) List of publications (those published/accepted for publications. Mention the impact factor of the journal- only Web of science or Scopus impact factor)

Standard A4 size (297 mm x 210 mm) bond paper may be used for preparing the synopsis. The synopsis should have the following page margins:

| | | |
|---|---|---|
| Top edge | : | 30 to 35 mm |
| Bottom edge | : | 25 to 30 mm |
| Left side | : | 35 to 40 mm |
| Right side | : | 20 to 25 mm |

The synopsis should be prepared using good quality white paper preferably not lower than 80 GSM. One and half line spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 13. One or two tables/figures may be included at appropriate places in the text of the synopsis and they should conform to the margin specification. All page numbers (Arabic numbers) should be typed without punctuation on the upper right hand corner 20 mm from top with the last digit in line with the right hand margin. Synopsis should be soft bound with black calico cloth and using flexible cover of thick white art paper. The cover should be printed in black letters and the text for printing should be identical to what has been prescribed for the title page. The references such as journals, books, E-books, conference proceedings, patents, etc should be typed following the International standard.

**Appendix – II**

## GUIDELINES FOR THE PREPARATION OF THESIS

The scholars are expected to read the guidelines carefully, and meticulously follow them in the preparation of the thesis. Non-compliance with any of these instructions may lead to the rejection of the thesis submitted.

### 1. GENERAL

This Manual is intended to provide general guidelines to the research scholars inthe preparation of the thesis. In general, the thesis shall report, in an organized and scholarly fashion, an account of original research work of the research scholar leading to the discovery of new facts or techniques or correlation of facts already known (analytical, experimental hardware oriented, etc.). Thesis shall demonstrate quality as to make a definite contribution to the advancement of knowledge and the research scholar's ability to undertake sustained research and present the findings in an appropriate manner with actual accomplishments of the work.

### 2. SIZE OF THE THESIS

The size of the thesis shall be normally between 100 and 300 pages of typed matter reckoned from the title page to the last page of thesis including the reference section.

### 3. ARRANGEMENT OF THE CONTENTS OF THE THESIS

The sequence in which the thesis material should be arranged and bound asfollows:

1) Cover page and Title page (as shown in Annexure I)
2) Certificate (as shown in Annexure II)
3) Declaration by the Scholar (Annexure III)
4) Abstract
5) Acknowledgement (one page only)
6) Table of contents (Annexure IV)
7) List of Tables (Annexure V)
8) List of Figures (Annexure VI)
9) List of Abbreviations and Symbols (Annexure VII)
10) Chapters
11) Appendices (if applicable)
12) References
13) List of Publications

The Tables and Figures should be included subsequently after referring to them in the text of the thesis. The thesis starting from chapters should be

printed on both sides.

## 4. QUALITY OF PAPER AND MARGIN SPECIFICATIONS

The thesis should be prepared using good quality white paper preferably not lower than 80 GSM. Standard A4 size bond paper may be used for preparing the thesis. The dimensions of the final bound thesis (5 copies) should be 290 mm x 205 mm.

The following page margins should be followed while preparing the thesis:

| | | |
|---|---|---|
| Top edge | : | 30 to 35 mm |
| Bottom edge | : | 25 to 30 mm |
| Left side | : | 35 to 40 mm |
| Right side | : | 20 to 25 mm |

The Tables and figures should also conform to the margin specifications. Large size figures should be photographically or otherwise reduced to the appropriate size.

## 5. MANUSCRIPT PREPARATION

While preparing the thesis manuscript, attention should be paid to ensure that all textual matter is typewritten in the same format to the extent possible. Hence, some of the information required for the final typing of the thesis is presented in this section. The headings of all items from 2 to 12 listed in section 3 should be typed in upper case letters without punctuation and centered 50 mm below the top of the page. The text should start 4 spaces below the heading. The page numbering from 1 to 8 should be done using lower case Roman numerals and the pages from 9 to 12 should be numbered using Arabic numerals.

### 1.1 Cover Page and title Page

A specimen copy of the cover page and title page for the thesis is given in Annexure II.

### 1.2 Certificate

The certificate shall be typed in double line spacing using font style Times New Roman and Font size 12 as per the format shown in Annexure III. The certificate shall be signed by the Supervisor and shall be followed by the supervisor's name academic designation, department and full address of the institution where the supervisor has guided the scholar. Signature of the co- supervisor with details should be included wherever applicable.

### 1.3 Abstract

Abstract should be an essay type of description not exceeding four pages outlining the research problem, methodology used and summary of the findings. This shall be typed in one and a half line spacing using Font style Times New Roman and Font size 12.

### 1.4 Acknowledgement

It should be very brief and restricted to one page only when typed in one and a half line spacing. The scholar's signature shall be affixed at the

bottom right end above the scholar's name typed in capitals.

### 1.5 Table of contents

The title page, certificate and acknowledgement will not find a place among the items listed in the Table of Contents, but the page numbers of which are in lower case Roman letters. One and a half line spacing should be adopted for typing the matter under this head. A specimen copy of the table of contents for the thesis is given in Annexure IV.

### 1.6 List of Tables

The list should use exactly the same captions as they are written above the tables in the text. One and a half line spacing should be used for typing under this heading.

### 1.7 List of Figures

The list should use exactly the same captions as they appear below the figures in the text. One and a half line spacing should be used for typing under this heading.

### 1.8 List of symbols and abbreviations

One and a half line spacing shall be used for typing the matter under this heading. Standard symbols, abbreviations, etc., shall be used.

### 1.9 Chapters

The chapters may be broadly classified into three parts: (i) introduction,

(ii) the main theme of the thesis and (iii) results, discussion, summary and conclusion. The main chapters may be divided into several sections, divisions and sub-divisions. Each chapter should be given appropriate title. Titles and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.

### 1.10 Appendices

Appendices are provided to give supplementary information, which if included in the main text may serve as a distraction and spoil the central theme of the thesis. Appendices shall be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc. Tables and references in appendices should be numbered and referred at appropriate places just as in the case of chapters. Appendices shall carry the title of the work reported and the same title shall be included in the table of contents.

### 1.11 List of References

Any works of other researchers, if used either directly or indirectly, the origin of the material thus referred to should be indicated at appropriate places in the thesis. Such references in the form of research articles, monographs, books, review articles, patents and proceedings shall be cited in the thesis following the international standard. A citation should be placed wherever appropriate, preferably at the end of a sentence. All the citations shall be in the same font as the main text. The list of references should be typed 4 spaces below the heading

“REFERENCES” in single line spacing using Font style Times New Roman and Font size 13.

### 1.12 List of Publications

The list of publications (those already published/accepted for publication in journals and papers presented in conferences/symposia) made by the research scholar during the period of research shall be reported in the table of contents.

### 1.13 Tables and Figures

Table means tabulated data in the body of the thesis as well as in the appendices. Others such as charts, graphs, maps, photographs and diagrams may be designated as figures. The table or figure including caption should be accommodated within the prescribed margin limits and should appear on the following page where their first reference is made. All tables and figures should be typed on the same quality paper used for the preparation of the text of the thesis. Two or more small tables or figures may be grouped and typed in a single page, if necessary. Wherever possible, the photograph(s) shall be reproduced on a full sheet of photographic paper or standard A4 size paper.

## 2. TYPING INSTRUCTIONS

**2.1 General:** The impressions on the typed/printed copies should be black in colour. One and a half line spacing should be used for typing the general text. The general text shall be typed in Font style Times New Roman and Font size

13. Long tables, long quotations, foot notes, multiline captions and references should be typed in single line spacing.

**2.2 Chapters:** The format for typing headings, division headings and sub-division headings are as follows

| | | |
|---|---|---|
| Chapter heading | | CHAPTER 1<br>INTRODUCTIO<br>N |
| Division heading | | 1.1 OUTLINE OF THESIS |
| Sub-division heading | | 1.1.1 Literature Review<br>1.1.1.1 Romanian views on archaeology |

The word CHAPTER without punctuation should be centered 50 mm down from the top of the page. Two spaces below, the title of the chapter should be typed centrally in capital letters. The text should commence 4 spaces below this title, the first letter of the text starting 20 mm inside from the left hand margin.

The division and sub-division captions along with their numbering should be left justified. The typed material directly below division or sub-division heading should commence 2 spaces below it and should start typing 20 mm from the left hand margin. Within division or sub-division paragraphs are permitted and they should also commence 3 spaces below the last line of the preceding paragraph, with offset from

the left hand margin by 20 mm.

## 3. NUMBERING INSTRUCTIONS

### 3.1 Page Numbering

All page numbers (whether it be in Roman or Arabic numbers) should be typed without punctuation on the upper right hand corner 20 mm from the top with the last digit in line with the right hand margin. The preliminary pages such as title page, acknowledgement, table of contents, etc. should be numbered in lower case Roman numerals. Pages of the main text starting with Chapter 1 should be consecutively numbered using Arabic numerals till the end of the thesis.

### 3.2 Numbering of Chapters, divisions and Sub-Divisions

The numbering of chapters, divisions and sub-divisions should be done using Arabic numerals only and further decimal notation should be used for numbering the divisions and sub-divisions within a chapter. For example sub- division 2 under division 4 belonging to chapter 3 should be numbered as

3.2.4. The caption for the sub-division should immediately follow the number assigned to it. Appendices, if any, should also be numbered in an identical manner starting with appendix 1.

### 3.3 Numbering of tables and figures

Tables and figures appearing anywhere in the thesis should have appropriate numbers. For example, if a Figure in Chapter 4 happens to be fifth, then assign 4.5 to that figure. Similar rules apply for tables. For example, if a tablein chapter 3 happens to be second, then assign 3.2 to that table. If Figures or Tables appear in Appendices, then Table 3 in Appendix 1 will be designated as Table A1.3. Similarly for Figures.

### 3.4 Numbering of Equations

Equations appearing in each chapter or appendix should be numbered serially, the numbering should commence afresh for each chapter or appendix. Thus for example, an equation appearing in chapter 3, if it happens to be the fourth equation in that chapter should be numbered as (3.4) thus:

$$y' + a(t)\, y = b(t) \qquad (3.4)$$

While referring to this equation in the body of the thesis it should be referred to as equation (3.4).

## 4. BINDING SPECIFICATIONS

Thesis side pinning/stitching, covered with wrapper printed on 300 GSM white art card and outer side gloss laminated, adhesive binding. The cover should be printed in black letters and the text for printing should be identical to what has been prescribed for the title page.

**Appendix – III**

**A typical Specimen of Cover page and Title Page**

<Font style Times New Roman>

# XXXXXXXXXXXXXX

<Font Size 18><1.5 line spacing>

**A THESIS** <Font Size14>

***Submitted by*** <Font Size 14><Italic>

**XXXXXXX** <Font Size 16>

***in partial fulfillment of the requirements for the award of the degree of***

*<Font Size 14><Italic><1.5 line spacing>*

**DOCTOR OF PHILOSOPHY** <Font size 16>


**DEPARTMENT OF ----------**

**ANNAMALAI UNIVERSITY**

**ANNAMALAINAGAR 608 002** <Font Size 16><1.5 line spacing>

**.....2021** <Font Size 14>

**Appendix – IV**

# XXXXXXXXXXX

**A THESIS**

***Submitted by***

**XXXXXXX**

***in partial fulfillment of the requirements for the award of the degree of***

**DOCTOR OF PHILOSOPHY**


**DEPARTMENT OF ----------**

**ANNAMALAI UNIVERSITY**

**ANNAMALAINAGAR 608 002**

**APRIL 2021**

**Appendix – V**

# ANNAMALAI UNIVERSITY

**Dr.----------**

Professor

Department of ----------

Annamalainagar 608 002

Tamil Nadu, INDIA

Mobile :

E-mail:

## CERTIFICATE

This is to certify that the thesis entitled "----------" is a bonafide record of research work done by **Mr/Ms. ---------- (Roll No. ----------),** Research Scholar, Department of ----------, Annamalai University, Annamalainagar, under my guidance during the period **----------,** and that this thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title to this candidate or anyother candidate.

This is also to certify that the thesis represents the independentwork of the candidate.

Place :

Date :

( ----------)

Research Supervisor

**Appendix – VI**

# DECLARATION

I, **----------,** Research Scholar in the Department of ----------, declare that the work embodied in this Ph.D. thesis entitled "----------" is the result of my own bonafide work carried out with my personal effort and submitted by me under the supervision of **Dr. ----------,** Professor, Department of ----------, Annamalai University, Annamalainagar. The contents of this thesis have not formed the basis for the award of any Degree/Diploma/ Fellowship/Titles in this University or any other University or similar Institutions of higher learning.

I declare that I have faithfully acknowledged and given credit and referred to the researchers wherever their works have been cited in the body of the thesis. I further declare that I have not willfully copied others' data/work/results, etc. reported in the journals, magazines, books, reports, dissertations, theses, Internet, etc. and claimed as my own work.

Place:

Date: Signature of the Research Scholar

Roll No.:

# TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

**Annexure – VII**

# LIST OF ABBREVIATIONS

| ABBREVIATIONS | |
|---|---|
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