DEPARTMENT OF AGRICULTURAL ECONOMICS

Academic Regulations and Syllabi

MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS

Under Choice Based Credit System (CBCS) With Outcome Based Education

2023-24 Onwards

1. Short Title and Commencement

1.1 These rules and regulations shall govern the post graduate studies leading to the award of degree of M.Sc. (Ag.) in IART.

1.2 They shall come into force with effect from the academic year 2023 – 24.

2. Academic Year and Registration

2.1 An academic year shall be normally from July to June of the following calendar year otherwise required under special situations. It shall be divided into two academic terms known as semesters. The academic calendar will be developed by the University from time to time and notified accordingly by the Registrar in advance.

2.2 An orientation program shall be organized by the Dean, IART for the benefit of the newly admitted students immediately after commencement of the semester.

2.3 On successful completion of a semester, the continuing students shall register for subsequent semester on the date specified in the academic/semester calendar or specifically notified separately. Every enrolled student shall be required to register at the beginning of each semester till the completion of his/ her degree programs.

3. Registration Card

3.1. A student shall register the courses offered in a semester by writing all the courses in registration card in quadruplicate. (one copy to department, one copy to library and one copy to student)

3.2. The Chairperson, PG coordinator and Head of the Department are responsible to furnish the registration particulars of the students with their signature and also the concerned course teacher signature in the registration card to the Dean, IART.

3.3. The Dean shall approve the registration card.

3.4. The approved registration card shall be maintained by the Dean, Head of the Department, Chairperson and the student concerned.

3.5. The list of courses registered by the students in each semester shall be sent by the Head of the Department to the Controller of Examinations/University for preparation of report cards through Dean.

4. Definitions

4.1 Semester means an academic term consisting of 110 working days including final theory examinations.

4.2 Subject means a unit of instruction to be covered in a semester having specific number, title and credits.

4.3 Credit hour means, one hour lecture plus two hours library or homework in a semester.

4.4 Grade Point of a subject means the value obtained by dividing the percentage of marks earned in a subject by 10 and the grade point is expressed on a 10 point scale.

4.5 Credit Point means the grade point multiplied by credit hours.

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

4.7 Overall Grade Point Average (OGPA) means the quotient of cumulative credit points obtained by a student in all the subjects taken from the beginning of the first semester of the year divided by the total credit hours of all the subjects which him/her 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.

5. Program Offered

M.Sc. (Ag.) Agricultural Economics

6. Eligibility for Admission

Candidates for admission to the M.Sc. (Ag.) program should satisfy the following requirements:

6.1. Candidates seeking admission to the M.Sc. (Ag.) Degree program should have completed any one of the following four year degree programs from Universities/Colleges

Program of study	Eligibility
M.Sc. (Ag.) Agricultural Economics	B.Sc. (Hons.) Agriculture / B.Sc. (Hons.) Horticulture /B.Sc. (Ag.)/ B.Sc. (Hort.) / Forestry / Sericulture of four years duration.

6.2 The candidates under 4 point grade systems should possess a minimum OGPA of 2.5 out of 4.00 and 2.75 out of 4.00 in the subject concerned. For those under 10 point system a minimum OGPA of 6.50 out of 10.00 and 7.00 out of 10.00 in the subject concerned is required.

6.3. An entrance test will be held separately for the degree program. Selection of candidates shall be based on OGPA, subject OGPA, entrance test and interview.

7. Program Requirements

7.1. Residential Requirements

The duration for the M.Sc. (Ag.) be of two years with four semesters. A student registered for M.Sc. (Ag.) should complete the course within four academic years from the date of him/her admission. In case a student fails to complete the degree program within the maximum duration of residential requirement, his/ her admission shall stand cancelled.

7.2. Credit Grade Point Requirements

A student enrolled for the Master's degree program to earn eligibility for the degree is required to complete 70 credits as detailed below.

Course work	Credit
Major CoursesMinor Courses	20
Supporting CoursesCommon	08
Courses	06
Seminar	05
	01
Thesis Research	30
Total credits	**70**

7.3 Major Courses: From the discipline in which a student takes admission. Among the listed courses, the core courses compulsorily to be taken will be given *mark

7.4 Minor Courses: From the courses closely related to a student's major subject, minor courses shall be chosen by the students in consultation with the Head of the Department and the Chairperson based on their research specialization.

7.5 Supporting Courses: The subjects not related to the major subject. It could be any subject considered relevant for student's research work (such as statistical methods, design of experiments, *etc*.) or necessary for building his/ her overall competence.

a. List of supporting courses for M.Sc. (Ag.) Agricultural Economics,
   1. STA 502 Statistical Methods for Social Sciences 3 (2+1)
   2. COM 502 Computer Application for Agricultural Economics 3 (2+1)

7.6 Common Courses: There will be five common courses (one credit each) will be offered to all students undergoing Master's degree program. Among the five common courses, the following four courses will be offered in the Master's degree program:

1. PGS 501-Agricultural Research, Research Ethics and Rural Development programs (1+0)
2. PGS 502 - Technical Writing and Communications Skills (0+1)
3. PGS 504- Library and Information Services (0+1)
4. PGS 505- Intellectual Property and its Management in Agriculture (1+0)

The fifth common course for Master's degree program in M.Sc.(Ag.) Agricultural Economics will be

- PGS 503 – Basic Analytical Techniques (0+1)

Some of these courses are already in the form of e-courses/ MOOCs. The students may be allowed to register these courses/ similar courses on these aspects, if available online on SWAYAM or any other platform. If a student has already completed any of these courses during UG, his/ her may be permitted to register for other related courses with the prior approval of the Head of Department (HoD)/ Board of Studies (BoS).

7.7 Value Added Course

A student can register for VAC in third semester. A student cannot register for a Value Added Course offered by his/her parent department. Choose the department offering the VAC and the VAC course title only from the VAC listed by the University.

7.8 Minimum Grade Point Requirement

A post graduate student should maintain a minimum Grade Point of 7.00 out of 10 to secure a degree.

8. Attendance Requirement

8.1. One hundred per cent attendance is expected of each student. A student, who fails to secure a minimum of **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 will be required to repeat the subject when ever offered. In case of new admission, who are permitted to join late due to administrative reasons, the attendance will be calculated from the date of joining of the student. However, for genuine reasons, condonation of attendance deficiency may be considered by the Vice-Chancellor on the recommendation of the Head of the Department and the Dean, IART on payment of condonation fee prescribed by the University.

8.2. Students absenting from the classes with prior permission of the Head of the Department and Dean, IART on official University business shall be given due consideration in computing attendance.

9. Advisory Committee

Each post-graduate student shall have an advisory committee to guide him/her in person or through hybrid mode whichever is possible in carrying out the research program. The advisory committee shall comprise a major advisor from internal (Chairperson) and external member. The advisory committee shall be constituted within four weeks from the date of commencement of the first semester.

9.1. For interdisciplinary research requiring expertise from teaching staff of other faculties, due permission need to be obtained from the Dean, IART to nominate them as technical advisors. An official letter in this regard needs to be communicated to the individual concerned through the respective Head of the Department and Dean.

9.2. Major advisor (Chairperson)

Every student shall have a major advisor who will be from him/her major field of studies. The appointment of major advisor (Chairperson) shall be made by the Head of the Department concerned. The chairperson in consultation with the Head of the Department will nominate the other members. In the event of the major advisor being away on other duty/leave for a period of more than three months, the member of the advisory committee from the same department will officiate as the major advisor.

9.3 Advisor/ Co-guide/ Member, Advisory committee from other collaborating university/ Institute/ Organization

• In order to promote quality post-graduate research and training in cutting edge areas, the University may permit the scholar to conduct research in other university/ research institute/

organization. While constituting an advisory committee of a student, if the Chairperson, advisory committee feels the requirement of involving of a faculty member/ scientist of such partneringuniversity/ institute/ organization, he/ she may send a proposal to this effect to the Dean, IART along with the proposal for consideration of student's advisory committee.

- The proposed faculty member from the partnering institution can be allowed to act as Chairperson/ Co-guide/ Member, Advisory Committee, by mutualconsent, primarily on the basis of intellectual input and time devoted for carrying out the research work at the particular institution.

9.4 Allotment of students to the retiring persons

Normally, retiring faculty may not be allotted with M.Sc. Student if he/ she are left with less than 2 years of service.

9.5 Changes in the Advisory Committee:

i. Change of the Chairperson or member of the advisory committee is not ordinarily permissible. However, in exceptional cases, the change may beeffected with approval of the Dean, IART.

ii. Normally, staff members of the University on extra ordinary leave or on study leave or who leave the University service will cease to continue to serve as advisors of the post-graduate students of the University. However, the Dean, IART may permit them to continue to serve as advisor subject to the following conditions:

a) The concerned staff member must be resident in India and if he/ she agrees to guide research and must be available for occasional consultations;

b) An application is made by the student concerned duly supported by the Advisory Committee;

c) The Head of the Department and the Dean, IART agree to the proposal;

iii. In case the Chairperson/ member of advisory committee retires, he/ she shall be allowed to continue provided that the student has completed him/her course work and minimum of 10 research credits and the retiring Chairperson/ member stays at the Headquarters of the College, till the thesis is submitted.

iv. The change shall be communicated to all concerned by the Head of the Department.

9.6 Guidelines on the duties of the advisory committee

- Guiding students in drawing the outline of research work
- Guidance throughout the program of study of the students.
- Evaluation of research and seminar credits.
- Correction and finalization of thesis draft.
- Conduct of final viva-voce examination.
- The proceedings of the advisory committee will be sent to the Head of the Department concerned within 10 working days.
- Periodical review of the advisory committee proceedings will be made by the Head of the Department concerned.

10. Program of Study

10.1. The student's plan for the post-graduate work, drawn up by the advisory committee, shall be finalized before the end of the first mid semester.

10.2. The program shall be planned by the advisory committee taking into account him/her previous academic training and interest.

10.3. Program of research work.

The outline of research work of the student, in the prescribed manner and as approved by the advisory committee, shall be forwarded by the Chairperson to the Head of the Department concerned by the end of the first mid semester.

11. Evaluation of Student's Performance

Multiple levels of evaluation (First Test, Midterm and Final semester) will be conducted.

11.1. First Test (FT)

Every teacher handling a subject shall conduct First Test (FT) as per the scheme drawn by the Head of the Department concerned /PG coordinator on the fourth week from the date of registration of the course, and evaluate. The evaluation process will be based on objective type questions and short concepts.

11.2. Mid-Semester Examination (MSE)

11.2.1. Every teacher handling a subject shall conduct Mid-Semester Examination (MSE) as per the scheme drawn by the Head of the Department concerned /PG coordinator, on the eighth week from the date of registration of the course and evaluate. The evaluation process will be of descriptive type.

11.2.2. The answer scripts of both FT and MSE will be shown to the student after valuation, and returned to the course teacher. The Head of the Department will be responsible to ensure the distribution of answer papers to the students. The marks obtained by the students should be sent to the Controller of Examinations through the Head of the Department and Dean concerned within fifteen working days.

11.2.3. Writing the First Test and Mid-Semester Examination is a pre-requisite for writing the final theory and practical examinations. If a student does not appear for FT/MSE, him/her is not eligible to appear for the final examinations. Such candidate has to reappear for the FT/MSE as and when the respective examinations are conducted only after getting permission from the Head of the Department concerned.

11.2.4. The FT and MSE marks will not be shown separately in the grade sheet but will be combined with the respective final theory and practical marks. FT and MSE marks awarded in a course will be added to the supplementary examinations also.

11.2.5. The FT and MSE marks will be furnished to the Head of the Department within 10 days after the conduct of FT and MSE. If the student is not satisfied withthe award of the marks, him/her shall appeal to the Dean, through Head of the Department within three working days after the announcement of marks. The appeal will be considered and the results reviewed by a cell consisting of the Dean and the Head of the Department concerned. The decision of the review cell shall befinal. If the Head of the Department himself is the course teacher, one senior member of the department concerned shall be nominated by the Dean.

11.2.6. The first test will be of one hour duration and MSE of theory will be of two hours duration.

11.2.7. If the student is not able to write the FT/ MSE due to deputation by the University, him/her may be permitted to take up missing FT/MSE. Such examination should be completed ordinarily within 15 working days after the respective FT/MSE.

11.2.8. A student who fails to attend a first test and mid-semester examination due to unavoidable circumstances shall be permitted with prior approval of the Head of the Department to take up missing examination of the particular course. Such tests should be completed ordinarily within 15 working days after the respective FT/MSE.

The distribution of marks will be as indicated below:

Test	Subjects with Practical	Subjects without Practical	Subjects without Theory
First Test	10	20	20
Mid-Semester	20	30	30
Final theory	30	50	-
Final practical	40	-	50
Total	**100**	**100**	**100**

The question paper model and distribution of marks for Mid-Semester Examinations is as follows.

First Test with Practical (One hour duration) (Total Marks: 10)

1. Objective Type	10 out of 12	10 x 0.5 marks	5 Marks
2.Definitions/Short concepts	5 out of 7	5 x 1 marks	5 Marks

First Test without practical (One hour duration) (Total Marks: 20)

1. Objective Type	10 out of 12	10 x 0.5 marks	5 Marks
2.Definitions/Short concepts	10 out of 12	10 x 1.5 marks	15 Marks

Mid-Semester Examination

For Subjects with Practical (Two hours duration) (Total Marks: 20)

1. Objective Type	10 out of 12	10 x 0.5 marks	5 Marks
2.Definitions/ Concepts	5 out of 7	5 x 1 marks	5 Marks
3. Short Notes	2 out of 3	2 x 2 ½ marks	5 Marks
4. Essay Type	1 out of 2	1 x 5 marks	5 Marks

For Subjects without Practical (Two hours duration) (Total Marks: 30)

1. Objective Type	10 out of 12	10 x 0.5	5 Marks
2.Definitions/Concepts	5 out of 7	5 x 1	5 Marks
3. Short Notes	4 out of 5	4 x 2 ½	10 Marks
4. Essay Type	2 out of 3	2 x 5	10 Marks

11.3. Final Examination

11.3.1.   The final theory examination will be of three hours duration and practical examination will be of three hours duration, both conducted separately by the University. The question paper for the theory examination will be set as per Bloom's taxonomy by the external. The final theory and practical examinations will be evaluated by two examiners (Internal & External).

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

Final Theory Examination with Practical (3 hours duration) (Total marks: 30)

1. Definitions	5 out of 7	5 x1 marks	5 marks
2. Short Notes	2 out of 3	2 x2½ marks	5 marks
3. Essay Type	Either or type (one question from each unit)	5 x 4 marks	20 marks

For Subjects without Practical (3 hours duration) (Total marks: 50)

1. Definitions	6 out of 8	6 x1 marks	6 marks
2. Short Notes	3 out of 5	3 x 3 marks	9 marks
3. Essay Type	Either or type (one question from each unit; At least two questions must represent K6 level of Bloom's taxonomy)	5 x 7 marks	35 marks

11.3.3 Practical Examination

Practical examinations will be conducted with the plan of separate schedule after the theory examination. Proper maintenance and regular submission of practical records are required. Those who do not bring with them the certified practical records/ assignments will not be allowed to appear for the practical examination. The marks awarded for assignments shall be noted in the record, at the time of first appearance and will be taken into account for subsequent appearances.

If a student secures a 'pass' in the practical examination of a particular course and fails in the theory examination, then, the practical examination marks obtained in the first attempt will be added to the supplementary examinations also and him/her doesn't require to reappear for practical examination.

Assignment

Each student will be assigned a topic by the concerned course teacher. Such topic should cover a one of the objectives in the research topic and should submit the paper.

The distribution of marks for **final practical examination** for courses with theory and practical and only practical is as follows:

S. No.	Particulars	Courses with Theory and Practical	Courses only with Practical
1	Practical part	25	35
2	Assignment	5	5
3	Record	5	5
4	Viva voce	5	5
	Total	**40**	**50**

a. Grading

1. The student should secure 65 per cent marks separately in theory and practical and 70 per cent marks in aggregate to secure a pass in the subject. Students who secure marks below 70 per cent in a subject will be treated as Reappearance (RA). However, in order to get a degree, the student should secure 70 percent. An OGPA of 7.00 shall be the minimum requirement for the award of degree.

2. Each subject shall carry a maximum of 100 marks for purpose of grading. The grading shall be done as grade point, i.e., the percentage of marks earned in a subject is divided by ten. The grade point is expressed on a 10 point scale up to two decimals.

3. The reappearance examinations for the candidates who fail in a subject or subjects will be held in the subsequent semester.

4. Students who did not fulfill the required minimum attendance of **80 per cent** will be awarded 'E' grade and has to repeat the subject.

b. Percentage Equivalence and Class Ranking

In calculation of percentage and class equivalent for OGPA the following formula shall be adopted.

$$\text{Percentage Equivalent for OGPA} = \frac{\text{Sum of Marks obtained by the Candidates in all the Courses}}{\text{Sum of Maximum Marks in all the Courses}} \times 100$$

In calculation of percentage and class equivalent for OGPA, the following classification shall be adopted.

OGPA	Percentage	Class
9.00 and above	90 and above	Distinction
8.00 to 8.99	80.00 to 89.99	I Class
7.00 to 7.99	70.00 to 79.99	II Class

12. Credit Seminar

Seminar is compulsory for all the students and each student should present a non- gradial seminar in the first and second semester and gradial seminar of 0+1 credit in the third semester.

The seminar topic should be only from the major field of him/her research. The seminar topics are to be assigned by the students in consultation with the Chairperson of the advisory committee with the Head of the Department concerned within four weeks after the commencement of the semester.

12.1. Under the guidance and supervision of the Chairperson of the advisory committee, the student will prepare the seminar paper after reviewing all the available literature and present mid-term review of the seminar two weeks after completion of mid-semester examination in the presence of the Head of the Department, advisory committee, staff members and PG students. The final presentation will be done before the practical exam.

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

12.3. The Chairperson will monitor the progress of the preparation of the seminar paper and correct the manuscript containing not less than 25 typed/printed pages with a minimum number of 50 references covering the recent ten years' time. The student will submit two copies of the corrected manuscript to the Head of the Department concerned through the Chairperson before presentation.

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

12.5. The performance of the student has to be evaluated for 100 marks and Grade point will be awarded by advisory committee. The Grade Point may be given based on the following norms.

Mid-term Evaluation	Final Evaluation
40	60

which should cover,

Coverage of Literature & Presentation
Capacity to Participate in the Discussion and answer the Questions
Innovative Proposal Submission, submission of seminar for publications

13. Absence of Advisory Committee Member during Final viva-voce Examination:

13.1 Conducting final viva voce examination in the absence of advisory Committee members is not allowed.

13.2 Under extra-ordinary circumstances if the final viva-voce examination to postgraduate student has to be conducted in the absence of one or two advisory committee members, permission to conduct the examination by co-opting another member in such contingencies should be obtained from the Dean in advance through the Head of the Department. The Chairperson of the advisory committee in consultation with the concerned member and Head of the Department will co-opt another member.

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

13.4. In the absence of the Chairperson of advisory committee, respective Heads of Department should act as Co-chairperson with prior permission of Dean.

14. Research Work

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

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

I Semester	0+ 4
II Semester	0+ 8
III Semester	0+ 8
IV Semester	0+ 10
Total	0 + 30

(* In the fourth semester, out of 10 credits, 6 credits will be for evaluation of research and remaining 4 credits for evaluation of viva voce)

In the Evaluation of Research:

Mid-term Evaluation	Final Evaluation
40	60

15. Evaluation of Thesis Research

15.1. Attendance register must be maintained in the Department by HOD /major advisor for all the students to monitor whether the student has 80% of attendancein research.

15.2. The student has to submit him/her research observation note book to the major advisor. The major advisor 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. After completion of 80% attendance for research and on or before the last day of the semester, the advisory committee should evaluate the progress of research work as per the approved program and monitoring register and award **MARKS** out of 100 depending upon quantity and quality of work done by the student during the semester.

15.4. The procedures for evaluating research credits under different situations are explained hereunder.

Situation - I

The student has completed the research credits as per the approved program and awarded **MARKS** by the advisory committee. Under the said situation, the student can be permitted to register fresh credits in the subsequent semester. If the student is awarded **'FAIL',** him/her has to register a fresh the same block of the research credits in the subsequent semester.

Situation - II

The student who does not satisfy the required **80 per cent** attendance shall be awarded grade **'E'**.

Situation-III

The student who could not complete the research work as per the approved program of work for reasons beyond him/her control such as

• Any impeding/ unfavourable situation for satisfying the advisory committee.

• Under the situations II&III, grade 'E' should be awarded. The student has to re- register the same block of research credits for which 'E' grade was awarded in the following semester. The student should not be allowed to register for fresh (first time) research credits.

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

Situation – IV

The student who fails to complete the research work after repeating the registration for the second time will be awarded '**FAIL'**.

• For the registration of research credits for the third time, permission has to be obtained from the Dean, IART.

• Re-registration of further research credits shall be decided by the University based on the recommendation of the advisory committee, Head of the Department concerned and the Dean, IART.

16. Submission of Thesis

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

16.2. The research credits registered in the last semester of post graduate programs should be evaluated only at the time of the submission of thesis, by the advisory committee. Students can submit the thesis at the end of the final semester. If a post graduate student has completed the thesis before the closure of the final semester, the chairperson can convene the advisory committee meeting and take decision on the submission of thesis provided the student satisfies 80 per cent attendance requirement. Three hard bound copies of thesis should be submitted to the HOD for evaluation.

16.3. The thesis shall contain a certificate from the supervisor 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, associateship, fellowship or similar title. A statement from the supervisor indicating the extent to which the thesis represents independent work on the part of the candidate should also be made including free from plagiarism above the specified level.

16.4. The thesis shall also contain a declaration by the candidate that the work reported in the thesis has been carried out by the candidate him/her and that the material from other sources, if any, is duly acknowledged and no part of the thesis is plagiarized more than 25 percent.

17. Grace Period

17.1. Students can avail a grace period up to a month for submission of thesis/project report after the closure of final semester by paying necessary fine as prescribed by the University. If a student is not able to submit the thesis within a month (grace period), the student has to re-register the credits in the forthcoming semester. The student who re- register the credits after availing the grace period willnot be permitted to avail grace period.

17.2. Based on the recommendation of advisory committee and the Head of the Department, the Dean, can sanction the grace period. A copy of the permission letter along with the receipt for payment of fine as prescribed by the University should accompany the thesis while submission.

18. Submission of Thesis after Re-registration

The minimum of 80 per cent attendance requirement for submitting the thesis after, re-registration need not be insisted for those students who have fulfilled the minimum academic and residential requirement i.e. 2 years (4 semesters) and completed the minimum credit requirements for getting Degree.

19. Publication of Articles

Part of the thesis may also be published in advance with the permission of the HOD. If any part is published, the fact should be indicated in the certificate given by the chairperson that the work has been published in part/full in the scientific or popular journals, proceedings, etc. The copies are to be enclosed in the thesis at the time of submission. It should be reputed journal at NAAS rated @ 2 or 3.

20. Evaluation of Thesis

20.1. The thesis submitted in partial fulfillment of a Master's degree shall be evaluated by an external examiner. The external examiner shall be a specialist inthe student's major field of study from outside NMV University and shall be appointed by the University as per the panel submitted by the Head of the Department.

20.2. The external examiner will send the evaluation report in duplicate, one marked to the controller of examinations and another to the Head of the Department along with the corrected copy of the thesis. If the report is favourable, viva-voce will be arranged by the Head of the Department concerned and conducted by the advisory committee along with the external examiner. The chairperson of the advisory committee shall send the recommendations of the examining committee to the controller of examinations through Head of the department after the student duly carries out the corrections/ suggestions mentioned by the external examiner (a certificate to be enclosed along with the recommendation). On the unanimous recommendation of the committee and with the approval of the University, the degree shall be awarded to the candidate.

20.3. In case of rejection of the thesis by the external examiner, the Head of the Department concerned and advisory committee shall refer the thesis for evaluation by a second external examiner. If the second external examiner recommends the thesis for acceptance, viva-voce will be conducted.

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

20.5. After incorporating the suggestions of the examiners and those received at the time of viva-voce, three hard bound copies of thesis should be submitted to the department (one to the registrar, one to the chairperson and one to the department library) and one soft copy in CD to the Department. Along with twocopies of the thesis, two copies of abstract of thesis (in 10-15 lines) and summary of the findings both in Tamil and English and soft copy both in a C.D. shall be submitted. At the time of final submission, the Chairperson of the advisory committee should certify that the corrections and suggestions have been carried out as indicated by the examiners.

21. Revision of Thesis

If an examiner recommends for revision of thesis, the following norms willbe adopted.

21.1. For revision of draft, the thesis should be resubmitted after a minimum of one month from the date of communication from the controller of examinations.

21.2. At the time of submission, the advisory committee should give certificate for carrying out the corrections/recommendations. The resubmitted copies of thesis should be got corrected after carrying out the necessary corrections indicated by the external examiner and necessary certificates shall be obtained from the chairperson and HOD before the conduct of the final viva-voce.

21.3. A fine prescribed by the University to be collected from the students at thetime of re-submission of thesis.

22. Failure to Appear for Final viva-voce/ non Submission of thesis after viva-voce

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

22.2. The re-viva-voce must be completed within two years, amount of fine prescribed by the University must be charged to the candidate.

22.3. After successful completion of thesis final viva-voce, if a student fails to submit the corrected version of the thesis within 15 days, him/her will be levieda fine prescribed by the University at the time of sending the proposal for result declaration.

23. Internship during Master's Program
Internship for Development of Entrepreneurship in Agriculture (IDEA)

Currently, a provision of 30 credits for dissertation work in M.Sc. programs helps practically only those students who aspire to pursue their career in academic/ research. There is hardly any opportunity/ provision under this system to enhance the entrepreneurship skills of those students who could start their own enterprise or have adequate skills to join the industry. Therefore, in order to overcome this gap, an optional internship/ in-plant training (called as IDEA) in lieu of thesis/ research work is recommended which will give the students an opportunity to have a real- time hands-on experience in the industry. It is envisaged that the internship/ in- plant training would enhance the interactions between academic organizations and the relevant industry. It would not only enable the development of highly learned and skilled manpower to start their-own enterprises but also the industry would be

benefitted through this process. This pragmatic approach would definitely result in enhanced partnerships between academic and industry.

The main objectives of the program:

1. To promote the linkages between academia and industry.
2. To establish newer University – Cooperative R&D together with industry for knowledge creation, research and commercialization.
3. Collaboration between Universities and industries through pilot projects.
4. To develop methods for knowledge transfer, innovation and networking potential.
5. To enhance skill, career development and employability.

Following criteria for IDEA will be taken into consideration:

- Major emphasis will be given for the students to pursue under IDEA.
- Major advisor will be from academia and Co-advisor or advisory committee member from industry.
- Total credits (30) will be divided into 20 for internship/ in-plant training and 10 for writing the report followed by viva-voce, similar to thesis research.
- Work place will be industry; however, academic/ research support would be provided by the University or both. MoU may be developed.
- The IPR, if any, would be as per the University policy.

24. Result Notification

24.1. After the completion of each semester, the student will be given the statement of marks by the controller of examinations.

24.2. The transcript will be prepared by controller of examinations. The various subjects taken by a student along with the credits and the grade obtained shall be shown on him/her transcript. Based on the total credits admitted, the final grade point average shall be calculated and given.

25. Award of Medals

Medal should be awarded only if the student is a rank holder and secures atleast 8.5 OGPA, clears all courses in first attempt and in the program having a batch of atleast three students.

26. Transitory Regulations

Separate time table of course work under old semester system will be arranged by the HOD for students with attendance deficiency in a course/courses provided such course/courses are not currently offered due to the introduction of the revised syllabus with effect from the academic year 2023-24. The candidates under old semester system will, however, complete all the examinations within a period of four academic years from the year of admission.

27. Removal of Difficulties

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

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M.Sc. (Ag.) Agricultural Economics

Courses with Credit

I) Course work	Credit
Major Courses	**20**
Minor Courses	**08**
Supporting Courses	**06**
Common Courses	**05**
Seminar	**01**
II) Thesis Research / IDEA	**30**
Total credits	**70**

Distribution Pattern of Courses and Credit (Research)

Semester	Major Courses	Minor Courses	Supporting Courses	Common Courses	Seminar	Research	Credit
I	8	-	6	2	-	4	20
II	12	-	-	2	-	8	22
III	-	6	-	1	1	8	16
IV	-	2	-	-	-	10	12
Credit Load	**20**	**8**	**6**	**5**	**1**	**30**	**70**

Distribution Pattern of Courses and Credit (IDEA)

Semester	Major Courses	Minor Courses	Supporting Courses	Common Courses	Seminar	IDEA	Credit
I	8	-	6	2	-	-	16
II	12	-	-	2	-	-	14
III	-	6	-	1	1	10	18
IV	-	2	-	-	-	10 +10	22
Credit Load	**20**	**8**	**6**	**5**	**1**	**30**	**70**

DISTRIBUTION OF COURSES

M.Sc. (Ag.) in Agricultural Economics

Major Courses: 20 credits

S. No.	Course No.	Title	Credit Hours T+P
1.	AEC 501*	Micro Economic Theory and Applications	2+1
2.	AEC 502*	Agricultural Production Economics	1+1
3.	AEC 503*	Agricultural Marketing and Price Analysis	2+1
4.	AEC 504*	Macro Economics and Policy	2+0
5.	AEC 505*	Econometrics	2+1
6.	AEC 506	Agricultural Development and Policy Analysis	2+0
7.	AEC 507*	Agricultural Finance and Project Management	2+1
8.	AEC 508	Linear Programming	1+1
9.	AEC 509*	Research Methodology for Social Sciences	1+1
10.	AEC 510	Indian Economy: History and Contemporary Issues	2+0
11.	AEC 511	International Economics	2+0

*courses to be taken compulsorily

Minor Courses: 08 credits

S. No.	Course No.	Title	Credit Hours T+P
1.	AEC 512	Institutional Economics	2+0
2.	AEC 513	Natural Resource and Environmental Economics	1+1
3.	AEC 514	Commodity Future Trading	2+0
4.	AEC 515	Development Economics	2+0
5.	AEC 516	Rural Marketing	2+0
6.	AEC 517	Evolution of Economic Thought	2+0

Supporting Courses: 06 credits

S. No.	Course No.	Title	Credit Hours T+P
1.	STA 502	Statistical Methods for Social Sciences	2+1
2.	COM 502	Computer Application for Agricultural Economics Research	2+1

Common Courses: 05 credits

Course code	Course Title	Credit hours
PGS 501	Agricultural Research, Research Ethics and Rural Development Programmes	1+0
PGS 502	Technical Writing and Communications Skills	0+1
PGS 503	Basic Analytical Techniques	0+1
PGS 504	Library and Information Services	0+1
PGS 505	Intellectual Property and its Management in Agriculture	1+0
AEC 591	**Seminar**	0+1
AEC 599	**Research**	0+30

SEMESTER-WISE DISTRIBUTION OF COURSES (RESEARCH)

Sl. No.	Course Title	Credit
	I Semester	
1.	AEC 501 - Micro Economic Theory and Applications	2+1
2.	AEC 503 - Agricultural Marketing and Price Analysis	2+1
3.	AEC 509 - Research Methodology for Social Sciences	1+1
4.	STA502 - Statistical Methods for Applied Sciences	2+1
5.	COM 502 - Computer Application for Agricultural Economics Research	2+1
6.	PGS 501 - Agricultural Research, Research Ethics and Rural Development Programmes	1+0
7.	PGS 502 - Technical Writing and Communications Skills	0+1
8.	AEC 591* - Seminar I	-
9.	AEC 596 - Research	0+4
	Total	**20**
	II Semester	
1.	AEC 502 - Agricultural Production Economics	1+1
2.	AEC 504 - Macro Economics and Policy	2+0
3.	AEC 505 - Econometrics	2+1
4.	AEC 507 - Agricultural Finance and Project Management	2+1
5.	AEC 508 - Linear Programming	1+1
6.	PGS 503 - Basic Analytical Techniques	0+1
7.	PGS 504 - Library and Information Services	0+1
8.	AEC 592* - Seminar II	-
9.	AEC 597 - Research	0+8
	Total	**22**
	III Semester	
1.	AEC 513 - Natural Resource and Environmental Economics	1+1
2.	AEC 514 - Commodity Future Trading	2+0
3.	AEC 515 - Development Economics	2+0
4.	PGS 505 - Intellectual Property and its Management in Agriculture	1+0
5.	NGC 511 - Disaster Management (Contact hour 1+ 0)*	-
6.	NGC 512 - Constitution of India (Contact hour 1+ 0)*	-
7.	AEC 593 - Seminar III	0+1
8.	AEC 598 - Research	0+8
9.	VAC 501 - Value Added Course (Contact hour 3+0)*	-
	Total	**16**
	IV Semester	
1.	AEC 516 – Rural Marketing	2+0
2.	AEC 599 - Research	10(6+4)
	Total	**12**

* Non Gradial

SEMESTER-WISE DISTRIBUTION OF COURSES (IDEA)

Sl. No.	Course Title	Credit
	I Semester	
1.	**Major Courses**	8
	Supporting courses	
2.	STA502 - Statistical Methods for Applied Sciences	3
3.	COM 502 - Computer Application for Agricultural Economics Research	3
	Common courses	
4.	PGS 501 - Agricultural Research, Research Ethics and Rural Development Programmes	1
5.	PGS 502 - Technical Writing and Communications Skills	1
6.	AEC 591* - Seminar I	-
7.	AEC 596 - IDEA	-
	Total	**16**
	II Semester	
1.	**Major Courses**	12
	Common Courses	
2.	PGS 503 - Basic Analytical Techniques	1
3.	PGS 504 - Library and Information Services	1
4.	AEC 592* - Seminar II	-
5.	AEC 597 - IDEA	-
	Total	**14**
	III Semester	
1.	**Minor Courses**	6
	Common Courses	
2.	PGS 505 - Intellectual Property and its Management in Agriculture	1
3.	NGC 511 - Disaster Management (Contact hour 1+ 0)*	-
4.	NGC 512 - Constitution of India (Contact hour 1+ 0)*	-
5.	AEC 593 – Master's Seminar III	1
6.	AEC 598 - IDEA	10
7.	VAC 501 - Value Added Course (Contact hour 3+0)*	-
	Total	**18**
	IV Semester	
1.	Minor Courses	2
2.	AEC 599 - IDEA	10+10
	Total	**22**

* Non Gradial

AEC 501 Micro Economic Theory and Applications (2+1)

Objectives

- The course envisages the concepts and principles embodying micro-economics.

- The economic problems, functioning of price mechanism, theory of household behaviour and consumer's demand function.

- Theory of firm, supply determinants, determination of price under different market structures and factor pricing (microeconomic components).

Theory

Unit I: Basic Concepts: A Review

Scarcity and choice; Production possibility frontier, Positive and normative economics; Concepts of opportunity cost. Demand and supply: Determinants of individual demand/supply; Demand/ supply schedule and demand/ supply curve; Market versus individual demand/ supply; Shifts in the demand/ supply curve.

Unit II: Consumer Choice

Cardinal utility approach – Ordinal utility approach -Budget sets and preferences under different situations – Hicks and slutsky income and substitution effects – Applications of indifference curve approach – Revealed preference hypothesis –Consumer surplus – Derivation of demand curve – Elasticity of demand – Demand and supply together; How prices allocate resources; Controls on prices – Price floor and price ceiling – Applications in agriculture.

Unit III: Market Firms

Behaviour of profit maximizing firms and the production process- Perfect competition: Equilibrium of the market. Long run industry supply, applications effects of taxes and subsidies; Monopoly: Equilibrium; Supply; Multiplan firm monopoly power; Deadweight loss; Price discrimination. Monopolistic competition: Product differentiation; Equilibrium of the firm in the industry- with entry of new firms and with price competition. Comparison with pure competition. Duopoly: Cournot model and reaction curves; Stackelberg's model, Bertrand model; Oligopoly. Ratchet effect.

Unit IV: Factor Markets

Labour and land markets - Basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); Demand for labour; Input demand curves; Shifts in input demand curves; Competitive labour markets; Economic rent and quasi rent.

Unit V: General Equilibrium and Welfare Economics

General Equilibrium Theory – 2 X 2 X 2 general equilibrium model. Derivation of general equilibrium conditions using Edgeworth box approach and mathematical approach. Welfare economics - Pareto optimality – Social welfare criteria- Uncompensated and compensated consumer welfare - Arrow's general possibility theorem- Amartya Sen's capability approach to wellbeing.

Practical

Theory of consumer behaviour - Discussion and exercises in demand analysis - Derivation of elasticity of demand - Estimation of various demand functions - Equilibrium price analysis - Production function analysis - Analysis of short run and long run costs - Profit function - Analysis and discussions of market structure - Performance under various parameters of imperfection through graphical and mathematical means - Cost function - economies of size and scale - Price discrimination - Factor pricing analysis - Income distribution analysis - Discussion of economic rent - Pareto optimality concept - Models on partial and general equilibrium.

Theory schedule

1. Scarcity and choice.
2. Production possibility frontier.
3. Positive and normative economics.
4. Concepts of opportunity cost.
5. Demand and supply.
6. Determinants of individual demand/supply.
7. Demand/ supply schedule and demand/ supply curve.
8. Market versus individual demand/ supply.
9. Shifts in the demand/ supply curve - **First Test.**
10. Cardinal utility approach – Ordinal utility approach.
11. Budget sets and preferences under different situations.
12. Hicks and slutsky income and substitution effects.
13. Applications of Indifference curve approach – Revealed preference hypothesis.
14. Consumer surplus – Derivation of demand curve – Elasticity of demand.
15. Demand and supply together: how prices allocate resources; controls on prices.
16. Price floor and price ceiling – applications in agriculture.
17. **Mid- Semester Examination**
18. Behaviour of profit maximizing firms and the production process.
19. Perfect competition: equilibrium of the market.
20. Long run industry supply, applications: effects of taxes and subsidies.
21. Monopoly: equilibrium; supply; multiplant firm; monopoly power; deadweight loss.
22. Price discrimination; monopolistic competition: product differentiation
23. Equilibrium of the firm in the industry-with entry of new firms and with price competition.
24. Comparison with pure competition. Duopoly: cournot model and reaction curves; Stackelberg's model, Bertrand model; Oligopoly, Ratchet effect.
25. Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product).
26. Demand for labour; input demand curves.
27. Shifts in input demand curves; competitive labour markets.
28. Economic rent and quasi rent.

29. 2 X 2 X 2 general equilibrium model.
30. Derivation of general equilibrium conditions using Edgeworth box approach and Mathematical approach.
31. Welfare Economics - Pareto Optimality
32. Social welfare criteria- Uncompensated and compensated Consumer
33. Welfare - Arrow's General possibility theorem.
34. Amartya Sen's capability approach to wellbeing.

Practical schedule

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

Course Outcomes

At end of the course students will be able to:

1. Understand the basic concepts related to consumer behaviour.
2. Identify the way to maximize profit through cost minimization.
3. Know the different market structures and to identify long run and short run equilibrium.
4. Analyse factor pricing methods under perfect and imperfect market situation.
5. Apply micro economic principles for the welfare of farming community.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	2	2
CO2	3	3	0	0	3
CO3	2	3	0	3	2
CO4	0	0	0	2	3
CO5	3	0	3	2	3

Reference Books

1. Ahuja, H.L., 2017. *Principles of Micro Economics*, S.Chand Publication, New Delhi.
2. Barthwal, R.R., 2005. *Microeconomic Analysis*, Wiley Eastern, New Delhi.
3. Dewitt, K.K., 2002. *Modern Economic Theory*, Sultan Chand and Co., New Delhi.
4. Hal R. Varian, 1999. *Microeconomic Analysis*, W.W. Norton and Company, New York.
5. Henderson, J.M. and R.E. Quandt, 2000. *Microeconomic Theory: A Mathematical Approach*, Tata McGraw Hill, New Delhi.
6. Koutsoyiannis, A., 2003. *Modern Microeconomics*, The Mac Millan Publication, London.
7. Mas Colell, 2012, *Microeconomic Theory*, Oxford University Press, United Kingdom.
8. Chauhan, S.P.S, 2008. *Microeconomics Theory and Applications*, Prentice Hall India Learning Private, New Delhi.
9. Choudhury, K.R, 2010. *Principles of Micro Economics*, Khosla Publishing House, New Delhi.
10. Anindya, S, 2006. *Microeconomics Theory and Applications*, Oxford University Press, New Delhi.

E-resources:

1. http://ocw.mit.edu/courses/economics/
2. http://jgc-econ.intrasun.tcnj.edu/Micro%20Links.htm
3. http://www.oswego.edu/~kane/eco101.htm
4. http://catalog.flatworldknowledge.com/bookhub/13
5. http://microeconomic.edu.in

AEC 502   Agricultural Production Economics (1+1)

Objectives

- To expose the students to develop the concept, significance and uses of production economics.
- To understand the relationships between factors and output.
- To learn how to decide the combination of inputs to be used as per the resources available.

Theory

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

Unit II: Factors and Theory of Production
Factors of production, classification, interdependence, and factor substitution- Determination of optimal levels of production and factor application –Optimal factor combination and least cost combination of production - Theory of product choice; Selection of optimal product combination.

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

Unit IV: Dynamics of Economic Assessment
Technology in agricultural production, nature and effects and measurement -Measuring efficiency in agricultural production; Technical, allocative and economic efficiencies - Yield gap analysis-Concepts-Types and measurement.

Unit-V: Risk and Uncertainty
Elements of risk and uncertainty in agriculture - Measurement of risk and adjustment to risk - Incorporation of weather uncertainty in decision making -Nature and sources of risk, modelling and coping strategies. - Current trends in production economics.

Practical

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

Theory Schedule

1. Nature, scope and significance of agricultural production economics.
2. Agricultural production processes, character and dimensions-spatial, temporal -
3. Centrality of production functions.
4. Assumptions of production functions - commonly used forms -Properties, limitations, specification.
5. Estimation and interpretation of commonly used production functions.
6. Factors of production, classification, interdependence, and factor substitution-
7. Determination of optimal levels of production and factor application.
8. Optimal factor combination and least cost combination of production.
9. Mid Semester examination
10. Theory of product choice; selection of optimal product combination.
11. Cost functions and cost curves, components, and cost minimization -Duality theory.
12. Cost and production functions and its applications.
13. Derivation of firm's input demand and output supply functions.
14. Economies and diseconomies of scale.
15. Technology in agricultural production, nature and effects and measurement.
16. Measuring efficiency in agricultural production; technical, allocative and economic efficiencies- yield gap analysis-concepts-types and measurement. Elements of risk and uncertainty in agriculture.
17. Measurement of risk and adjustment to risk - incorporation of weather uncertainty in - decision making -Nature and sources of risk, modelling and coping strategies. Current trends in production economics.

Practical schedule
1. Principle of diminishing marginal returns.
2. Estimation of different forms of production functions using farm level data.
3. Cobb-Doughlas production function.
4. Estimation of elasticity of production.
5. Estimation of isoquant and least cost combinations of factors.
6. Factor - Factor relationship.
7. Principle of variable proportions.
8. Cost function analysis.
9. Factor share analysis.
10. Decomposition analysis.
11. Technical efficiency estimation and frontier production functions.
12. Product-Product relationship.
13. Equi-marginal returns and Opportunity cost.
14. Farm business analysis and efficiency measures.
15. Estimation of cost and returns of agricultural crops.
16. Yield gap analysis.
17. Practical Examination.

Course Outcomes

At end of the course students will be able to:

1. Know the physical and economic optimum point of output.
2. Suggest efficient way of usage of agricultural resources.
3. Make decision on individual farm production effectively.
4. Analyse agricultural production function using programming techniques.
5. Identify the policy measures to enhance profit through risk management.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	2	2	3	3	2
CO3	1	3	3	2	3
CO4	2	3	2	1	3
CO5	3	1	1	2	3

Reference Books:

1. Baumol, WG. 1973. *Economic Theory and Operations Analysis*. Practice Hall of IndiaPrivate Limited, New Delhi.
2. David, L., Debertin, 2012. *Agricultural Production Economics*, (Second edition), Macmillan Publishing Company, New York.
3. Doll, John P. and Frank Orazem, 1978. *Production Economics - Theory and Applications*, John Wiley and Sons, New York.
4. Gardner BL & Rausser GC. 2001. *Handbook of Agricultural Economics* Vol. I Agricultural Production. Elsevier, India.
5. Heady EO & Dillon JL. 1961. *Agricultural Production functions.* Kalyani Publishers, Ludhiana, India.
6. Heady. E.O. 1964, *Economics of Agricultural Production and Resources Use*, New Delhi.
7. Olajuwon Olayide, S and Earl Orel Heady 1982, Introduction to *Agricultural Production Economics*, Ibadan University Press, University of Ibadan.
8. Palanisami, K., P. Paramasivan and C.R. Ranganathan, 2002. *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 Pvt. Limited, New Delhi.

E-resources:

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%20Production%20Econ%20Analysis.pdf
5. https://economics.ubc.ca/files/2014/05/pdf_course_erwin-diewert-ECON594Ch3.pdf

AEC 503 Agricultural Marketing and Price Analysis (2+1)

Objectives

- The course is designed to acquaint the students about the basics of dynamics of agricultural marketing.

- The content includes supply, demand and marketing of farm production, marketing functions and channels, marketing costs, margins and efficiency, agricultural prices, new marketing formats like e-marketing, e-NAM future trading, supply chain management, market intelligence etc.

Theory

Unit I: Introduction to Agricultural Marketing

New concepts in agricultural marketing - Characteristics of agricultural product and production – Problems in agricultural marketing from demand and supply and institutions sides, market intermediaries and their role - Need for regulation in the present context - marketable & marketed surplus estimation. Marketing efficiency - structure conduct and performance analysis - Vertical and horizontal integration - Integration over space, time and form-Vertical co-ordination.

Unit II: Aspects of Agricultural Marketing

Different forms of marketing: co-operative marketing – APMC – Regulated marketing - Direct marketing, farmer producer companies, e-nam and marketing under e-nam, e-marketing. Contract farming and retailing, organized retailing -supply chain management - state trading, warehousing and other government agencies -performance and strategies - market infrastructure needs, performance and government role - Value chain finance.

Unit III: Future Marketing and Government

Introduction to commodities markets and future trading - Basics of commodity futures - Operation mechanism of commodity markets – Price discovery – Hedging and basis - Fundamental analysis - Technical analysis – Role of government/SEBI in promoting commodity trading and regulatory measures.

Unit IV: Use of Information Technology

Role of Information Technology and Market Intelligence in marketing of agricultural commodities, -Electronic auctions (e-bay), e-Chaupals, Agmarknet, Domestic and Export Market Intelligence Cell (DEMIC) & Tamil Nadu Food Processing & Agri Export Promotion (TNAPEx).

Unit V: Dynamics of price

Price forecasting – Time series analysis – Time series models – Spectral analysis. Price policy and economic development – Non-price instruments.

Practical

Supply and demand elasticities in relation to problems in agricultural marketing. Price spread and marketing efficiency analysis. Supply Chain Analysis - quantitative estimation of supply chain efficiency. Market Intelligence – Characters and Accessibility. Price forecasting. Online searches for market information sources and interpretation of market intelligence reports – commodity outlook, e-NAM. Technical analysis for important agricultural commodities. Fundamental analysis for important agricultural commodities. Presentation of the survey results and wrap-up discussion. Co-integration analysis. Visit to FPO. Block chain technology. Agri export policy. Analysis of commodity future trading.

Theory Schedule

1. New concepts in agricultural marketing.
2. Characteristics of agricultural product and production.
3. Problems in agricultural marketing from demand and supply and institutions sides.
4. Market intermediaries and their role.
5. Need for regulation in the present context.
6. Marketable & Marketed surplus estimation.
7. Marketing efficiency.
8. Structure conduct and performance analysis.
9. Vertical and horizontal integration.
10. Integration over space, time and form.
11. Vertical co-ordination.
12. Different forms of marketing.
13. Co-operative marketing.
14. APMC.
15. Regulated marketing.
16. Direct marketing.
17. **Mid Semester Examination.**
18. Farmer producer companies.
19. e-NAM and marketing under e-NAM, e-marketing.
20. Contract farming and retailing, organized retailing.
21. Supply chain management.
22. State trading, warehousing and other government agencies.
23. Performance and strategies -market infrastructure needs, performance and government role - value chain finance.
24. Introduction to commodities markets and future trading - Basics of commodity futures.
25. Operation mechanism of commodity markets – price discovery.
26. Hedging and basis - fundamental analysis - Technical analysis.
27. Role of Government/SEBI in promoting commodity trading and regulatory measures.
28. Role of Information technology and Market intelligence in marketing of agricultural commodities.
29. Electronic auctions (e-bay), e-Chaupals, Agmarknet and Domestic and Export market Intelligence Cell , TNAPEx.
30. Price forecasting.
31. Time series analysis.
32. Time series models.
33. Spectral analysis- Price policy and economic development.
34. Non-price instruments.

Practical schedule:

1. Supply and demand elasticities in relation to problems in agricultural marketing.
2. Price spread and marketing efficiency analysis.
3. Supply chain analysis - quantitative estimation of supply chain efficiency.
4. Market intelligence – characters and accessibility.
5. Price forecasting.
6. Online searches for market information sources and interpretation of market intelligence reports commodity outlook.
7. Technical analysis for important agricultural commodities.
8. Estimation of index number - price index – WPI.
9. Visit to FPO.
10. Co-integration analysis.
11. Block chain technology.
12. ARIMA model.
13. Agri export policy.
14. Analysis of commodity future trading.
15. Agmarknet & e- National Agriculture Market.
16. DEMIC & TNFP&AE
17. Practical Examination.

Course Outcomes

At end of the course students will be able to:

1. Estimate the marketing efficiency.
2. Know the role of ICT in agricultural marketing.
3. Forecast the price, demand and supply.
4. Discuss the ways to minimize market risk.
5. Identifying the role of different organizations in international trade and the share of agriculture in total export.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	1	3
CO2	3	1	2	2	1
CO3	2	3	2	1	3
CO4	1	2	3	2	3
CO5	3	2	3	1	3

Reference Books

1. Acharya, S.S. and N.L. Agarwal, 2004. *Agricultural Prices - Analysis and Policy*, Oxford and IBH, New Delhi.
2. Acharya, S.S. and N.L. Agarwal, 2008. *Agricultural Marketing in India,* Oxford and IBH, New Delhi.
3. Bailey Norwood, F and Jayson L.Lusk, 2008. *Agricultural Marketing and Price analysis*, Pearson/Prentice Hall, New Delhi.
4. Dhal, C. Dale and Hammond W. Jerome, 1997. *Market and Price Analysis - The Agricultural Industries*, McGraw Hill Book Company, New York.
5. Francis Cherunilam, 2006. *International Trade and Export management*, Himalaya Publishing House, Mumbai.
6. Gulati, Ashok, 1996. *Agricultural Price Policy in India - An Econometric Approach,* Concept Publishing Company, New Delhi.
7. Kahlon, A.S and Mammootil Varughese George,1985. *Agricultural Marketing and Price Policies*, Allied Publishers, New Delhi.
8. Mohan Raj, J. 2009. *Agricultural Marketing Strategies in India*, Abhijeet Publications, New Delhi.
9. Nilabja Ghosh, 2013. *India's Agricultural Marketing*: *Market Reforms and Emergence of New Channels (India Studies in Business and Economics),* Springer edition, New Delhi.
10. Richard L. Kohls and Joseph N. Uhl (1980). *Marketing of Agricultural Products* MacMillan Publishing company, Mumbai.

E-resources

1. https://lss.at.ufl.edu/.
2. http://www.oerafrica.org.
3. https://www.waveland.com
4. https://agmarknet.gov.in
5. https://reeis.usda.gov.in

AEC-504 Macro Economics and Policy (2+0)

Objectives

- The course envisages the concepts and principles of macroeconomics from classical to Keynesian theories.
- The other component deals with the monetary system - money, credit and banking system, value of money and economic activities, national income accounting and approaches to estimate national income theory of income and employment determination and inflation.

Theory

Unit I: Introduction: Measurement and Concepts

Basic concepts and scope of macro-economics, National Income Accounting: Methods of measurement of key macro-economic aggregates, Relationship of national income and other aggregates (with numerical exercises), Real and nominal income.

Unit II: Classical Macroeconomics

Say's Law, Quantity theory of money, Aggregate labour supply and demand of labour, Classical theory of determining output, wages and prices.

Unit III: Income and Spending: Keynesian Framework

Simple Keynesian model of income determination; Keynesian multiplier- Aggregate spending, taxation, transfer payments, foreign spending, balanced budget; budget surplus (with numerical exercises).

Unit IV: Money, Interest and Income

Goods market equilibrium-IS curve; Demand for money, the liquidity preference theory – liquidity Trap; asset market equilibrium- LM curve; simultaneous equilibrium in goods and asset market- effect of fiscal and monetary policy.

Unit V: Theories of Aggregate Consumption and Inflation

Absolute income hypothesis, relative income hypothesis, fisher's inter-temporal choice model, life-cycle and Permanent Income Hypotheses; profits and accelerator theory. Inflation: nature, effects and control; Types of inflation – demand pull, cost push - stagflation, core inflation, hyperinflation; Phillips curve. Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs) & National Institute for Transforming India (NITI Aayog). Current streams of thought.

Theory schedule

1. Basic concepts and scope of macro-economics.
2. National income accounting.
3. Methods of measurement of key macro-economic aggregates.
4. Relationship of national income and other aggregates (with numerical exercises).
5. Real and nominal income.
6. Say's Law.
7. Quantity theory of money.
8. Aggregate labour supply and demand of labour.
9. Classical theory of determining output, wages and prices.
10. Simple keynesian model of income determination.
11. Keynesian multiplier.
12. Aggregate spending.
13. Taxation.
14. Transfer payments.
15. Foreign spending.
16. Balanced budget.
17. **Mid Semester Examination.**
18. Budget surplus (with numerical exercises).
19. Goods market equilibrium.
20. IS curve & LM curve.
21. Demand for money.
22. The liquidity preference theory.
23. Liquidity trap.
24. Asset market equilibrium.
25. Simultaneous equilibrium in goods and asset market.
26. Effect of fiscal and monetary policy.
27. Absolute income hypothesis.
28. Relative income hypothesis.
29. Fisher's inter-temporal choice model.
30. Life-cycle and permanent income.
31. Hypotheses; profits and accelerator theory- Inflation.
32. Nature, effects and control; types of inflation – demand pull, cost push - stagflation, core inflation, hyperinflation.
33. Phillips curve- current streams of thought.
34. MDG's, SDG's & NITI Aayog.

Course Outcomes

At end of the course students will be able to:

1. Understand the concepts of national income and methods for measurement of national income.
2. Analyse the relationship between consumption, saving and investment.
3. Understand the nature of inflation and ways to control it.
4. Analyze monetary and fiscal policies.
5. Identify barriers in international trade.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	1	1
CO2	3	1	1	3	3
CO3	2	3	2	1	1
CO4	1	1	3	2	3
CO5	3	3	1	1	3

Reference Books

1. Ahuja, H.L., 2007. *Macro Economics - Theory and Policy,* S. Chand and Co. Ltd., New Delhi.
2. Branson, H. William, 1986. *Macroeconomic Theory and Policy*, Harper Collins, New Delhi.
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5. Gardner Hugh Ackley, 1961. *Macroeconomic Theory,* Macmillan, New York.
6. Robert L. Heilbroner, 1972. *Understanding Macroeconomics,* Prentice Hall; 4th edition, New Delhi.
7. Shapiro, Edward, 1989. *Macroeconomic Analysis*, Galgotta Publications, New Delhi.
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9. Stonier, W. Alfred and Douglas C. Hague 2004. *A Textbook of Economic Theory* 5th Edition, Pearson, New Delhi.
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AEC 505 Econometrics (2+1)

Objectives

- The course provides knowledge of the econometric methods like time series analysis, linear regression models and their application in economic analysis.

- The course provides an insight into the econometric problems in analyzing time series and cross section data.

Theory

Unit I: Introduction

Econometrics - Definition -Relationship between economic theory, mathematical economics, models and econometrics, methodology of econometrics-Regression analysis. PRF and SRF - linearity of regression model - Significance of stochastic error term.

Unit II: Classical linear regression

Basic two variable regression – Assumptions, estimation and interpretation approaches to estimation – OLS and their properties –Gauss-Markov theorem. Goodness of fit - Coefficient of determination- Extensions to multi-variable models-Multiple regression estimation and interpretation- Regression through origin- Test for structural stability of regression model.

Unit-III: Hypothesis Testing

Hypothesis - Null, alternative - R^2 and adjusted R^2 - Inference in multiple regression analysis. Hypothesis testing - Individual regression coefficient - Overall significance of the model - F-test, t-test and z test. ANOVA, ANOCOA and chi-square test.

Unit IV: Breaking down of Classical Assumptions

Violation of assumptions – Identification, consequences and remedies for multicollinearity, heteroscedasticity, autocorrelation – Data problems and remedial approaches -Durbin-Watson test. – Model misspecification- Tests of specification errors.

Unit V: Qualitative Variables and Simultaneous Equation Models

Dummy variable regression models - Intercept and slope dummy - Estimation and interpretation. Dummy dependent variable models. Linear probability models - Logit and probit models - Estimation and interpretation. Simultaneous equation models - Structural equations - Reduced form equations - Identification and approaches to estimation.

Practical

Single equation two variable model - specification and estimation - Hypothesis testing - Restrictions on parameters - Transformations of functional forms and OLS application - Estimation of multiple regression model - Hypothesis testing - Testing and correcting specification errors - Testing and managing multicollinearity - Testing and managing

heteroscedasticity - Testing and managing autocorrelation - Estimation of regressions with dummy explanatory variables - Intercept and slope dummy variable models. Estimation of regression with limited dependent variable - Logit and probit models. Identification of equations in simultaneous equation models. Two Stage Least Square (2SLS) & Three Stage Least Square (3SLS) models.

Theory Schedule
1. Econometrics definition.
2. Relationship between economic theories.
3. Mathematical economics.
4. Models and econometrics.
5. Methodology of econometrics.
6. Regression analysis.
7. PRF and SRF.
8. Linearity of regression model.
9. Significance of stochastic error term.
10. Basic two variable regressions.
11. Assumptions, estimation and interpretation approaches to estimation.
12. OLS and their properties.
13. Gauss-Markov theorem.
14. Goodness of fit.
15. Coefficient of determination.
16. Extensions to multi-variable models-multiple regression estimation and interpretation-regression through origin- test for structural stability of regression model.
17. Mid Semester Examination
18. Hypothesis - null, alternative.
19. R^2 and adjusted R^2 - inference in multiple regression analysis.
20. Hypothesis testing - individual regression coefficient.
21. Overall significance of the model.
22. F-test, t-test and z test. ANOVA, ANOCOA and chi-square test.
23. Violation of assumptions – identification, consequences and remedies for multicollinearity.
24. Heteroscedasticity, autocorrelation – data problems and remedial approaches.
25. Durbin-Watson test. – model misspecification- tests of specification errors.
26. Dummy variable regression models.
27. Intercept and slope dummy.
28. Estimation and interpretation.
29. Dummy dependent variable models.
30. Linear probability models - logit and probit models - estimation and interpretation.
31. Simultaneous equation models.
32. Structural equations.
33. Reduced form equations.
34. Identification and approaches to estimation.

Practical schedule
1. Single equation two variable model - specification and estimation.
2. Hypothesis testing.
3. Restrictions on parameters.
4. Transformations of functional forms - OLS application.
5. Estimation of multiple regression model.

6. Hypothesis testing.
7. Testing and correcting specification errors.
8. Testing and managing multicollinearity.
9. Testing and managing heteroscedasticity.
10. Testing and managing autocorrelation.
11. Estimation of regressions with dummy explanatory variables.
12. Intercept dummy variable model.
13. Slope dummy variable model.
14. Estimation of regression with limited dependent variable.
15. Logit model & Probit model.
16. Identification of equations in simultaneous equation models.
17. 2 SLS & 3 SLS models.

Course Outcomes

At end of the course students will be able to:

1. Deduct the problems in relaxing the assumptions of classical regression model.
2. Formulate and estimate non-linear models.
3. Identify the variables for regression.
4. Run the dummy variable regression models independently.
5. Test the hypothesis and interpret the results.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	1	2	3
CO2	1	2	3	3	3
CO3	1	3	1	3	1
CO4	3	1	3	1	3
CO5	1	2	1	3	3

Reference Books

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3. Dorfman R. 1996. *Linear Programming and Economic Analysis*. McGraw Hill, New Delhi.
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9. Robert, S. Pindyck and Daniel L. Rubinfeld, 1991. *Econometric Models and Economic Forecasts*, Mc-Graw-Hill Inc., New Delhi.

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4. http://www.stata.com/features/
5. http://www.oswego.edu/~economic/econsoftware.htm

AEC-506 Agricultural Development and Policy Analysis (2+0)

Objectives

- Concept of economic development and policy, theories of development, performance of Indian agriculture.

- The process and implementation of policies over a period of time.

Theory

Unit I: Introduction

Role of agriculture in economic/ rural development – Evolution of thinking on agriculture and development; agricultural development – Meaning, stages and determinants – Population and food supply – Criteria for under development - Obstacles to economic development - Economic and non-economic factors of economic growth- Need for sound agricultural policies

Unit II: Theories of Agricultural Development

Resource exploitation model- Conservation model- location (urban impact) model- Diffusion model- High pay-off input model-Induced innovation model- Agricultural R&D and linkages -Recent experiences of developing country - Economies in transition - Role of state in economic development - Government measures to promote economic development - Introduction to development planning.

Unit III: Performance of Indian Agriculture

Agrarian structure and land relations; trends in performance and productivity; agrarian structure and technology; credit, commerce and technology; capital formation; subsidies; pricing and procurement; Post Green Revolution agriculture; Production and productivity crisis in agriculture; Regional differences; Food Security, PDS system and Malnutrition.

Unit IV: Agricultural Policy: Process and Implementation

Instruments of Agricultural Policy; process of agricultural policy formulation, implementation, monitoring and evaluation in India; global experiences in participatory approach to agricultural policy process; critical review of various elements of Indian agricultural policy-Resource policies – Credit policies – Input and product marketing policies – Price policies.

Unit-V: Agricultural Development and Free Trade

Globalization and the relevance of development policy analysis - The dilemma of free trade - Free trade versus protectionism - Arguments for protection - Arguments against protection- Role of protection in developing countries. WTO – agreement on agriculture; planning models. Planning for utilization of resources and Indian Five Year Plans - Contradictions of free trade - Proponents and opponents policies in vulnerable sectors like agriculture - Lessons for developing countries. Current streams of thought.

Theory schedule

1. Role of agriculture in economic/ rural development.
2. Evolution of thinking on agriculture and development.
3. Agricultural development – meaning, stages and determinants.
4. Population and food supply – criteria for under development.
5. Obstacles to economic development.
6. Economic and non-economic factors of economic growth- need for sound agricultural policies.
7. Resource exploitation model- conservation model.
8. Location (Urban impact) model.
9. Diffusion model.
10. High pay-off input model-induced innovation model.
11. Agricultural R&D and linkages.
12. Recent experiences of developing country - economies in transition - role of state in economic development.
13. Government measures to promote economic development - introduction to development planning.
14. Agrarian structure and land relations.
15. Trends in performance and productivity.
16. Agrarian structure and technology; credit, commerce and technology.
17. **Mid Semester Examination**
18. Capital formation; subsidies; pricing and procurement.
19. Post green revolution agriculture.
20. Production and productivity crisis in agriculture; regional differences; food security, PDS system and malnutrition.
21. Instruments of agricultural policy.
22. Process of agricultural policy formulation, implementation, monitoring and evaluation in India.
23. Global experiences in participatory approach to agricultural policy process.
24. Critical review of various elements of Indian agricultural policy-resource policies – credit policies.
25. Input and product marketing policies – price policies.
26. Globalization and the relevance of development policy analysis - the dilemma of free trade.
27. Free trade versus protectionism - arguments for protection - arguments against protection.
28. Role of protection in developing countries. WTO – agreement on agriculture.
29. Planning models.
30. Planning for utilization of resources and Indian Five Year Plans.
31. Contradictions of free trade.
32. Proponents and opponents policies in vulnerable sectors like agriculture
33. Lessons for developing countries.
34. Current streams of thought.

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Course Outcomes

At end of the course students will be able to:

1. Understand economic growth and development.
2. Analyze indicators of economic development.
3. Know the role of agriculture in economic development.
4. Discuss various development issues and identify the policy options for sustainable agricultural development.
5. Identify the impact of globalization on economic development.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	1	3
CO2	3	1	1	1	3
CO3	1	3	3	2	3
CO4	3	3	1	3	1
CO5	1	1	3	3	3

Reference Books
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2. Das Gupta AK. 1965. *Planning and Economic Growth.* London George Allen and Unwin.
3. Dhindsa, K.S, 2001, *Dynamics of Agricultural Development*, Concept Publishing Company, New Delhi.
4. Ellis Frank, 1992, *Agricultural Policies in Developing Countries*, Cambridge University Press, New York.
5. Ghatak S and Ingersent K., 1984. *Agriculture and Economic Development*, Select Book Service Syndicate, New Delhi.
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7. John W. Mellor, 1970, The Economics of Agricultural Development, Cornell University Press, New York.
8. Naqvi Syed Nawab Haider, 2002, *Developemnt Economics - Nature and Significance*, Sage Publication, New Delhi.
9. Robert E. Baldwin 1966. *Economic Development and Growth.* John Willey, New York.
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AEC 507 Agricultural Finance and Project Management (2+1)

Objectives

- This course is designed with an objective to deliver knowledge of the principles, procedures, problems and policies relating to financing agricultural firms.

- In addition to this, the students are also given knowledge about the research developments in the subject. The approach is analytic.

Theory

Unit I: Basic concepts: A Review

Role and importance of agricultural finance. Financial institutions and credit flow to rural/priority sector. Agricultural lending – direct and indirect financing -Financing through Co-operatives, NABARD, commercial banks and RRBs. District credit plan and lending to agriculture/priority sector. Micro-financing and role of MFI, NGO, and SHG.

Unit II: Credit and its aspects

Lending to farmers – The concept of 5 C's, 7 P's and 3 R's of credit. Estimation of technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions – credit widening and credit deepening.

Unit III: Financial Analysis

Financial decisions – Investment, financing, liquidity and solvency. Preparation of financial statements - Balance sheet, Cash flow statement and Profit and loss account. Ratio analysis and assessing the performance of farm/ firm.

Unit IV: Project Overview

Project approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects. Project appraisal techniques – undiscounted measures. Time value of money – use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Network techniques – PERT and CPM. Pradhan Mantri Fasal Bima Yojana (PMFBY), Pradhan Mantri Jan Dhan Yojana (PMJDY) & Entrepreneurship Development Institute of India (EDII).

Unit V: Risk and its Management

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

Practical

Visit to commercial bank, co-operative bank, SHG, NGO and RRB - An overview, Rural Lending Programmes of Commercial Banks, Lead Bank Scheme; Preparation of District Credit Plan, Rural Lending Programmes of Co-operative Lending Institutions; Preparation of financial statements using farm/firm level data, Farm credit appraisal techniques and farm financial analysis through financial statements; Performance of Micro Financing Institutions; NGO and Self-Help Groups, Identification and formulation of investment projects; Project appraisal techniques – Undiscounted Measures and their limitations; Project appraisal techniques – Discounted Measures; Network techniques – PERT and CPM for project management; Case Study Analysis of an Agricultural project; Financial Risk and risk management strategies – Crop insurance schemes; Financial instruments and methods – E banking, Kisan Cards and core banking.

Theory Schedule:
1. Role and importance of agricultural finance.
2. Financial institutions and credit flow to rural/priority sector.
3. Agricultural lending.
4. Direct and indirect financing.
5. Financing through Co-operatives, NABARD, Commercial Banks and RRBs.
6. District credit plan and lending to agriculture/priority sector.
7. Micro-financing and role of MFI, NGO, and SHG.
8. Lending to farmers.
9. The concept of 5 C's, 7 P's and 3 R's of credit.
10. Estimation of technical feasibility.
11. Economic viability and repaying capacity of borrowers and appraisal of credit proposals.
12. Understanding lenders and developing better working relationship and supervisory credit system.
13. Credit inclusions.
14. Credit widening and credit deepening.
15. Financial decisions.
16. Investment, financing, liquidity and solvency.
17. **Mid Semester Examination**
18. Preparation of financial statements.
19. Balance sheet, cash flow statement and profit and loss account.
20. Ratio analysis and assessing the performance of farm/ firm.
21. Project approach in financing agriculture.
22. Financial, economic and environmental appraisal of investment projects.
23. Identification, preparation, appraisal, financing and implementation of projects.
24. Project appraisal techniques.
25. Undiscounted measures. Time value of money.
26. Use of discounted measures.
27. B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects.
28. Network techniques- PERT and CPM.
29. PMFPY, PMJDY & EDII.
30. Risks in financing agriculture.
31. Risk management strategies and coping mechanism.
32. Crop Insurance programmes.

33. Review of different crop insurance schemes.
34. Yield loss and weather based insurance and their applications.

Practical schedule
1. Demand and supply of institutional agricultural credit.
2. District credit plan.
3. Preparation of scale of finance for selected crops.
4. Preparation of financial statements using farm/firm level data.
5. Farm credit appraisal techniques.
6. Farm financial analysis through financial statements.
7. Financial instruments and methods - E banking, kisan cards and core banking.
8. Time value of money.
9. Identification and formulation of investment projects.
10. Project appraisal techniques - undiscounted measures and their limitations.
11. Discounted measures.
12. Sensitivity analysis.
13. Network techniques - PERT and CPM for project management.
14. SWOC analysis.
15. Decision tree analysis.
16. Social cost and benefit analysis.
17. Evaluation of Agri insurance methods.

Course Outcomes

At end of the course students will be able to:

1. Understand nature and scope of financial management in agribusiness.
2. Identify the tools for credit, repayment and down payments.
3. Assess the performance of farm using financial ratios.
4. Do the appraisal of projects by measurement of costs benefits and sensitivity analysis.
5. Assess yield loss and to identify risk management strategies.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	3	3	1	1	1
CO3	1	3	3	1	3
CO4	3	1	1	2	3
CO5	3	2	2	3	3

Reference Books

1. Chanona C. 1969. *Agricultural Finance in India: Role of Commercial Banks*. Marketing and Economics Research Bureau, New Delhi.
2. Dhubashi, P.R., 1986. *Policy and Performance - Agricultural and Rural Development in Post Independent India*. Sage Publ. New Delhi.
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6. Hopkins A Barry, Peter Jo and Baker CB. 1995. *Financial Management in Agriculture*. The University of Wisconsin, Madison, United States.
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AEC 508 Linear Programming (1+1)

Objectives

- The course deals with basic concepts of LP and applications of various LP model in agriculture.

Theory

Unit I Introduction

Decision making – Introduction to linear programming – Use of LP in different fields – Formulation of problem – Slack and surplus variables – Basic assumptions – Graphical solution– Initial basic feasible solution.

Unit II Theory of Simplex Method

Concepts – Solving profit maximization and cost minimization problems – Special casesof simplex method application – Optimality conditions.

Unit III Duality Theory

Definition – Fundamental properties of dual problem – Construction of dual problem – Relationship between primal & dual problems – Economic interpretation of duality – Changes affecting feasibility and optimality.

Unit IV LP Models

Variable resource and price programming, recursive programming, dynamic programming, transportation model – Definition, methods to solve transportation problem, assignment model – Hungarian method, special cases in assignment problem, network model – Simulation model.

Unit V Game Theory

Concepts – Two person constant sum, zero sum game, saddle point, solution to mixed strategies.

Practical

Farm survey, formulation of problem using farm situations, graphical solution of maximization model, graphical solution of minimization model, solving maximization problem using simplex method, solving minimization problem using simplex method, solving dual problem, transportation model, assignment model, network model (PERT, CPM), dynamic programming, recursive programming, variable resource and price programming, simulation model, decision making under risk & uncertainty, Minimization of Total Absolute Deviations (MOTAD), Game theory & Goal Programming.

Theory

1. Decision making.
2. Introduction to linear programming.
3. Use of LP in different fields.
4. Formulation of problem.

5. Slack and surplus variables.

6. Basic assumptions – graphical solution.

7. Initial basic feasible solution.

8. Concepts – Solving profit maximization and cost minimization problems.

9. Mid Semester Examination.

10. Special cases of simplex method application.

11. Optimality conditions.

12. Definition – fundamental properties of dual problem.

13. Construction of dual problem.

14. Relationship between primal & dual problems.

15. Economic interpretation of duality.

16. Changes affecting feasibility and optimality.

17. Concepts – two person constant sum, zero sum game, saddle point, solution to mixed strategies.

Practical Schedule
1. Formulation of problem using farm situations.
2. Graphical solution of maximization model.
3. Graphical solution of minimization model.
4. Solving maximization problem using simplex method.
5. Solving minimization problem using simplex method.
6. Solving dual problem.
7. Transportation model.
8. Assignment model.
9. Network model (PERT, CPM).
10. Dynamic programming.
11. Recursive programming.
12. Variable resource and price programming.
13. Simulation model.
14. MOTAD.
15. Decision making under uncertainty.
16. Goal Programming.
17. Game theory.

Course Outcomes:

After end of the course, the students will be able to:

1. Suggest the best decision for allocating production resources.
2. Understand choice in situations among competing players and improve their decision-making skills.
3. Obtain the most optional solution for a problem with given constraints.
4. Learn to applying LP for real world problem.
5. Learn to apply LP for product mixture and blending.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	3
CO2	2	2	3	3	2
CO3	1	3	3	2	3
CO4	2	3	2	1	3
CO5	3	1	1	2	3

Reference Books

1. Hamdy A, 2002. *Operations Research – Problems & Solutions* – V.K. Kapoor Sultan Chand & Sons, New Delhi.
2. Hadley G, 1962. *Linear Programming*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
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AEC 509 Research Methodology for Social Sciences (1+1)

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Objectives

- The course deals with scientific methods of research, the initiation of an inquiry, formulation of research problems and hypotheses.
- The role of induction and deduction in research, collection and analysis of date and interpretation of results

Theory

Unit I: Concepts of Research Methodology

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

Unit II: Hypothesis: Framing and Testing

Hypothesis – Meaning – Characteristics – Types of hypothesis – Review of literature– Setting of course objective and hypotheses – Testing of hypothesis.

Unit III: Sampling

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

Unit IV: Data Collection

Data collection – Assessment of data needs – Sources of data collection – Discussion of different situations. Mailed questionnaire and interview schedule – Structured, unstructured, open ended and closed-ended questions. Scaling techniques. Preparation of schedule – problems in measurement of variables in agriculture. Interviewing techniques and field problems - Methods of conducting survey –Reconnaissance survey and pre testing.

Unit V: Data Analysis

Data coding, tabulation, cleaning. –Multivariate analysis –Factor analysis' PCA'cluster analysis. Universal procedures for preparation of bibliography – Writing of research articles. National Academy of Agricultural Sciences (NAAS), Google Citation Index & Content writing.

Theory Schedule:

1. Importance and scope of research in agricultural economics.
2. Types of research –fundamental vs. applied.
3. Concept of researchable problem – research prioritization– selection of research problem.

4. Approach to research – research process.
5. Hypothesis – meaning – characteristics. Types of hypothesis – review of literature– setting of course objective and hypotheses – testing of hypothesis.
6. Sampling theory and sampling design – sampling error - methods of sampling – probability and non-probability sampling methods - criteria to choose.
7. Project proposals – contents and scope – different types of projects to meet different needs– trade-off between scope and cost of the study.
8. Mid Semester Examination
9. Research design and techniques– types of research design.
10. Data collection – assessment of data needs – sources of data collection – discussion of different situations.
11. Mailed questionnaire and interview schedule – structured, unstructured, open ended and closed-ended questions.
12. Scaling techniques. Preparation of schedule – problems in measurement of variables in agriculture.
13. Interviewing techniques and field problems - methods of conducting survey.
14. Data coding, tabulation, cleaning.
15. Multivariate analysis –factor analysis ' PCA' cluster analysis.
16. Universal procedures for preparation of bibliography – writing of research articles.
17. NAAS, Google Citation Index & Content writing.

Practical

1. Exercises in problem identification.
2. Project proposals – contents and scope.
3. Formulation of objective and hypotheses.
4. Assessment of data needs – sources of data – methods of collection of data.
5. Methods of sampling – criteria to choose – discussion on sampling under different situations.
6. Scaling techniques – measurement of scales.
7. Preparation of interview schedule.
8. Field testing. Method of conducting survey.
9. Exercise on coding & editing.
10. Exercise on tabulation.
11. Exercise on validation of data.
12. Hypothesis testing – parametric and non-parametric tests.
13. Exercises on format for thesis/ report writing.
14. Research gate and LinkedIn.
15. National Academy of Agricultural Sciences (NAAS)
16. Google citation Index and Content writing.
17. Practical Examination.

Course Outcomes

At end of the course students will be able to:

1. Understand the role and importance of research in the social science.
2. Identify the appropriate research design for different research problem.
3. Know the different methods to collect data and selection of variables.
4. Use econometric software in data analysis.
5. Interpret the results and write research report & research articles.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	1	2	1	3	3
CO3	3	3	2	3	1
CO4	2	2	1	3	3
CO5	1	2	1	3	3

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2. Creswell, J.W., 1999. *Research Design - Qualitative and Quantitative Approaches,* SAGE Publication, California.
3. Dhondhyal SP. 2018. *Social Science Research and Thesis Writing,* Jain Brothers Publisher, New Delhi.
4. Kothari, C.R., Gaurav Gang, 2014. *Research Methodology - Methods and Techniques*, New Age International Publication, New Delhi.
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AEC 510   Indian Economy: History and Contemporary Issues (2+0)

Objectives

- To introduce the students to the economic history over a period of time.
- It also highlights the contemporary issues of Indian economy.

Theory

Unit I: India from Independence to Liberalization

An overview of the economic developments during the period 1947-1980; objectives and strategies of planned economic development and the role of the State; sectoral growth performance; savings and investment; demographic trends and issues; education; health and malnutrition; trends and policies in poverty; inequality and unemployment.

Unit II: India Since 1980's (Liberalization and Beyond): Overview

Policy changes since 1980s. The 1990 crisis. Causes and effects of liberalization. Regional differences: infrastructure, primary, secondary and tertiary sector.

Unit III: Macro Trends Since 1990

Growth; savings and investment, employment; productivity; diversification; agro based industries; competition policy; foreign investment, regional differences.

Unit IV: Contemporary Issues -Expenditure

Monetary and financial trends- Areas of government spending in India, capital expenditure, revenue expenditure, plan expenditure, non-plan expenditure, deficits (fiscal, primary, revenue), impact of fiscal deficit on economy.

Unit V: Contemporary Issues –Revenue

Capital receipts, revenue receipts, tax and non-tax revenue, direct and indirect taxes, need to rationalize tax structure. Goods and Services Tax (GST). Union budget, zero base budgeting, gender budgeting, fiscal devolution and centre state financial relations in India, WPI, CPI implicit deflators. Foreign trade policy.

Theory Schedule

1. An overview of the economic developments during the period 1947-1980.
2. Objectives and strategies of planned economic development and the role of the State.
3. Sect oral growth performance; savings and investment.
4. Demographic trends and issues; education; health and malnutrition.
5. Trends and policies in poverty.
6. Inequality and unemployment.
7. Policy Changes since 1980s.
8. The 1990 Crisis.

9. Causes and Effects of liberalization.
10. Regional differences: infrastructure, primary, secondary and tertiary sector.
11. Growth; Savings and Investment, Employment.
12. Productivity; diversification.
13. Agro based industries.
14. Competition policy.
15. Foreign investment.
16. Regional differences.
17. **Mid Semester Examination.**
18. Monetary and Financial trends.
19. Areas of government spending in India.
20. Capital expenditure.
21. Revenue expenditure.
22. Plan expenditure.
23. Non plan expenditure.
24. Deficits (fiscal, primary, revenue).
25. Impact of fiscal deficit on economy.
26. Capital receipts.
27. Revenue receipts, tax and nontax revenue.
28. Direct and indirect taxes, need to rationalize tax structure.
29. Goods and Services Tax (GST). Union Budget, Zero base budgeting.
30. Gender budgeting.
31. Fiscal devolution and centre state financial relations in India.
32. WPI.
33. CPI implicit deflators.
34. Foreign Trade policy.

Course outcomes

After end of the course the student will be able to:

1. Visualize how the Indian economy has evolved.
2. Get acquainted with the basic steps involved in the working of the national economy.
3. Understand the macro trends since 1990.
4. To explore the contemporary issues of revenue and expenditure.
5. To know the foreign trade policy

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	1	2	1	3	3
CO3	3	3	2	3	1
CO4	2	2	1	3	3
CO5	1	2	1	3	3

Reference Books

1. Agrawal, A.N., 1990. *Indian Economy*, New Age International Publications Pvt. Ltd, New Delhi.
2. Soni A, 2020. *Indian Economy*, Disha Publication, New Delhi.
3. Datt G and Mahajan A, 2015. *Indian Economy*, Sultan Chand, New Delhi.
4. Gupta, K.R. 2018. *Indian Economy: Issues and Concerns,* Atlantic Publishers and Distributors Pvt. Ltd., New Delhi.
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AEC 511 International Economics (2+0)

Objectives

- The major objective of this course is to give an insight of the interactions between national economies.
- What are the theories governing the trade across national boundaries.
- The methods involved to regulate the international trade and institutions involved.

Theory

Unit I: Concepts of International Economics

Scope and significance of International economics –Features of global economy-Global trade - General equilibrium in a closed economy (Autarky equilibrium) – Equilibrium in a simple open economy - Possibility of world trade - Trade gains, problems of trade and trade equilibrium - Mill's doctine.

Unit II: Theories of Trade

Production possibility curve - Offer curves -Ricardian model of trade- Absolute cost theory comparative cost theory - Opportunity cost theory-Specific factors model- Heckscher - Ohlin model - Trade creation and trade diversion – Export supply elasticity and import demand elasticity -Competitive advantage of nations.

Unit III: Barriers to Trade

Globalisation -Tariff barriers- NTB - Producer subsidy, export subsidy, quotas- Import quota and export voluntary restraints- The case of small country and large country case.

Unit IV: Rates and Terms of Trade

Official exchange rate and shadow exchange rate - Walra's law and terms of trade – Trade blocks - Economic integration -Benefits and disadvantages- Features of NAFTA.

Unit V: Trade Institutions

IMF and development organisations -Functions - World bank - purposes- IDA, IFC, ADB – UNCTAD- International trade agreements – Uruguay round – GATT – WTO -IPR - Anti-dumping measures.

Theory schedule:

1. Scope and significance of international economics.
2. Features of global economy-global trade.
3. General equilibrium in a closed economy (Autarky equilibrium).
4. Equilibrium in a simple open economy.
5. Possibility of world trade - trade gains.
6. Problems of trade and trade equilibrium.

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7. Mill's doctrine.
8. Production possibility curve.
9. Offer curves.
10. Ricardian model of trade.
11. Absolute cost theory.
12. Comparative cost theory.
13. Opportunity cost theory.
14. Specific factors model- Heckscher - ohlin model.
15. Trade creation and trade diversion.
16. Export supply elasticity and import demand elasticity.
17. Mid-Semester Examination.
18. Competitive advantage of nations.
19. Globalisation.
20. Tariff barriers- NTB.
21. Producer subsidy, export subsidy.
22. Quotas- import quota and export.
23. Voluntary restraints.
24. The case of small country and large country case.
25. Official exchange rate.
26. Shadow exchange rate - Walra's law.
27. Terms of trade – Trade blocks.
28. Economic integration -benefits and disadvantages.
29. Features of NAFTA.
30. IMF and development organisations –Functions.
31. World Bank, purposes- IDA, IFC, ADB – UNCTAD.
32. International trade agreements.
33. Uruguay round – GATT.
34. WTO -IPR -anti-dumping measures.

Course Outcomes

After end of the course the student will be able to:
1. Understand how trade take place between nations.
2. Be able to work out strategies to maintain favourable trade balance.
3. Understand how the institutions play role in regulating the cross-country trade and deal with the issues.
4. To understand the theories of trade
5. To know the trade institutions and impact of WTO

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	1	2	1	3	3
CO3	3	3	2	3	1
CO4	2	2	1	3	3
CO5	1	2	1	3	3

Reference Books

1. Brouwer F. 2016. *International Trade and Food Security*, CABI Publishing, New Delhi.
2. Salvatore D, 2013. International Economics, John Wiley & Sons Inc, New Delhi.
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AEC 512 Institutional Economics (2+0)

Objectives

- To develop critical and inform
- d understanding about institutions, their role in the working of economy.

- Exposure of issues, policies & regulations and its application in agricultural system

Theory

Unit I: Basics of Institutional Economics

Old and new institutional economics – Institutional economics Vs neo-classical economics. Definition of institutions – Distinction between institutions and organizations – Institutional evolution.

Unit II: Institutional Changes & Resource Allocation

Institutional change and economic performance - National and international economic institutions. Transaction cost economics – Transaction costs and the allocation of resources. Transaction costs and efficiency. Asymmetric information - Moral hazard and principal-agent problem.

Unit III: Group and Collective Approach

Free rider problem – Path dependency – Interlinked transactions. Collective action and the elimination of free-rider problem - The logic of collective action and its role in reducing free rider problem – Theory of groups. Rent seeking – Interest groups and policy formulation.

Unit IV: Property Rights

Economic analysis of property rights- Property rights regimes – Private property –State property - Common property Resources (CPRs) – Public goods and club goods.

Unit V: Agrarian Institutions

Special features of institutional arrangements in agriculture – Transaction costs in agriculture - Case Studies - Theories of agrarian institutions - Tenancy institutions.

Theory Schedule

1. Old and new institutional economics.
2. Institutional economics Vs neo-classical economics.
3. Definition of institutions.
4. Distinction between institutions and organizations.
5. Institutional evolution.
6. Institutional change and economic performance.
7. National and International economic institutions.
8. Transaction cost economics.

9. Transaction costs and the allocation of resources.
10. Transaction costs and efficiency.
11. Asymmetric information.
12. Moral hazard and principal.
13. Agent problem.
14. Free rider problem – path dependency.
15. Interlinked transactions.
16. Collective action.
17. **Mid Semester Examination**
18. Elimination of free-rider problem.
19. The logic of collective action.
20. Role in reducing free rider problem.
21. Theory of groups.
22. Rent seeking.
23. Interest groups and policy formulation.
24. Economic analysis of property rights.
25. Property rights regimes.
26. Private property.
27. State Property.
28. Common property Resources (CPRs).
29. Public goods and club goods.
30. Special features of institutional arrangements in agriculture.
31. Transaction costs in agriculture.
32. Case Studies.
33. Theories of agrarian institutions.
34. Tenancy institutions.

Course outcomes

After end of this course the student will be able to:

1. Understand institutions and their roles in economic development.
2. Know about the policies and their issues in an institution.
3. To understand about the Transaction costs and the allocation of resources
4. To know about Common property Resources (CPRs).
5. Understand the Special features of institutional arrangements in agriculture

CO–PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	1	3
CO2	2	3	3	3	2
CO3	1	1	2	1	3
CO4	1	2	1	2	2
CO5	1	2	3	2	3

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1. Brourse E and Glachant J., 2008. *New Institutional Economics - A Guidebook*, Cambridge University, England.
2. Volgt S., 2019. *Institutional Economics - An Introduction,* Cambridge University Press, England.
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AEC 513 Natural Resource and Environmental Economics (1+1)

Objectives

- To understand about economics of environment and social costs incurred due to economic development.
- Work out methods to maintain environment quality and reduce social costs.

Theory

Unit I: Basic Foundation

Concepts, classification and problems of natural resource economics – Economy environment interaction – The material balance principle, entropy law-resources scarcity - Limits to growth - Measuring and mitigating natural resource scarcity– Malthusian and recardian scarcity – Scarcity indices - Resource scarcity and technical change.

Unit II: Theories and Economics of Natural Resources

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

Unit III: Environmental Issues

Market failures - Externalities – Types - Property rights– Transaction costs – Coase's theorem and its critique - Public goods – Common property and open access resource management - Collective action. Environmental perspectives - Biocentrism, sustainability, anthropocentrism -Environmental problems and quality of environment - Sources and types of pollution-air, water, solid waste, land degradation – Environmental and economic impacts-Economics of pollution control - Efficient reduction in environmental pollution.

Unit IV: Environmental Regulations

Environmental regulation – Economic instruments - Pollution charges – Pigovian tax - tradable permits – Indirect instruments – Environmental legislations in India.

Unit V: Sustainability Aspects

Concept of sustainable development – Economic perspective – Indicators of sustainability relation between development and environment stress-Environmental kuznet's curve environmental accounting – Resource accounting methods –International environmental issues – Climate change – Likely impacts – Mitigation efforts and international treaties.

Theory Schedule

1. Concepts, classification and problems of natural resource economics – economy environment interaction.
2. The material balance principle, entropy law -resources scarcity - limits to growth - measuring and mitigating natural resource scarcity.
3. Malthusian and ricardian scarcity – scarcity indices.
4. Resource scarcity and technical change and theory of optimal extraction renewable resources.
5. Economic models of oil extraction efficiency- time path of prices and extraction - hotelling's rule, solow-harwick's rule.
6. Theory of optimal extraction exhaustible resources – economic models of forestry and fishery.
7. Market failures - externalities – types - property rights.
8. Transaction costs – coase's theorem and its critique.
9. **Mid Semester Examination**
10. Public goods – common property and open access resource management - Collective action.
11. Environmental perspectives - biocentrism, sustainability, anthropocentrism.
12. Environmental problems and quality of environment.
13. Sources and types of pollution-air, water, solid waste, land degradation environmental and economic impacts.
14. Economics of pollution control - efficient reduction in environmental pollution.
15. Environmental regulation – economic instruments.
16. Pollution charges – pigovian tax.
17. Tradable permits – indirect instruments – environmental legislations in India.

Practical schedule

1. Exhaustible resource management – optimum rate of oil extraction.
2. Renewable resource management – optimum harvest of Forestry/fishery.
3. Exercise on pollution abatement-I.
4. Exercise on pollution abatement-II.
5. Concepts in valuing the environment.
6. Taxonomy of valuation techniques.
7. Productivity change method – substitute cost method.
8. Hedonic price method.
9. Travel cost method.
10. Contingent valuation methods.
11. Discount rate in natural resource management.
12. Environment impact assessment.
13. Visit to pollution control board.
14. Case study on air and water pollution.
15. Case study on solid waste management.
16. Case study on pollution charges.
17. Final Practical Examination.

Course Outcomes

After end of this course, the student will be able to:

1. Gain knowledge on basic concepts of environmental economics.
2. Identify the optimal extraction level of renewable resources using economic models.

3. Assess the ways to manage common property resources.
4. Understand environmental legislations in India.
5. Analyse economic problems related to natural resource use including climate change problems.

CO–PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	3
CO2	2	2	3	1	1
CO3	1	1	2	2	3
CO4	1	1	1	1	2
CO5	2	2	1	2	3

Reference Books

1. Conard J.M., and Collin W., 1987. *Natural Resource Economics*, Notes and

   Problems, Cambridge University Press, London.
2. Kerr J.M., Marothia D.K., Katar Singh, Ramasamy C. and Bentley W.R., 1997. N*atural Resource Economics: Theory and Applications in India*, Oxford and IBH, New Delhi.
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AEC 514 Commodity Future Trading (2+0)

Objectives

- To disseminate the knowledge about risk mitigating measures especially future trading.

- The future trading in agricultural commodities is increasing day by day therefore the role of SEBI, functioning of commodity exchanges are discussed.

Theory

Unit I: Concepts of Commodity Future Trading

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

Unit II: Technical Aspects

Transaction and settlement – Delivery mechanism - Role of different agents - Trading strategies -Potential impact of interest rate, Foreign exchange, FDI in commodity markets.

Unit III: Risk and its Management

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

Unit IV: Commodity Exchange – A review

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

Unit V: Analysis of Commodity Market

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

Theory Schedule
1. History and evolution of commodity markets.
2. Terms and concepts: spot, forward and futures Markets.
3. Factors influencing spot and future markets.
4. Speculatory mechanism in commodity futures.
5. Transaction and settlement.
6. Delivery mechanism.
7. Role of different agents.
8. Trading strategies.

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9. Potential impact of interest rate.
10. Foreign exchange.
11. FDI in commodity markets.
12. Risk in commodity trading.
13. Importance for risk management measures.
14. Need for risk management measures.
15. Managing market price risk.
16. Hedging.
17. Mid Semester Examination.
18. Speculation.
19. Arbitrage.
20. Swaps.
21. Pricing and their features.
22. Important global and Indian commodity exchanges.
23. Contracts traded.
24. Special features.
25. Regulation of Indian commodity exchanges.
26. FMC and its role.
27. Fundamental Vs technical analysis.
28. Construction of charts.
29. Interpretation of charts.
30. Chart patterns for analyzing the market trend.
31. Market indicators.
32. Back testing.
33. Introduction to technical analysis software.
34. Analyzing trading pattern of different commodity groups.

Course Outcomes

After end of this course, the student will be able to:

1. The basic concepts of commodity markets.
2. FDI in Commodity markets
3. FMC and its role
4. Risk management measures - hedging and swaps
5. The national and international commodity markets.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	1	2	1	3	3
CO3	3	3	2	3	1
CO4	2	2	1	3	3
CO5	1	2	1	3	3

Reference Books

1. Clenow A.F., 2012. *Following the Trend Diversified Managed Futures Trading*, Wiley, Hoboken, New Jersey (U.S.).
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AEC 515 Development Economics (2+0)

Objectives

To develop concept of growth and development. Methods and theories of measuring development. Study of different developed economies will give exposure toward measures to create economic upliftment.

Theory

Unit I: Conceptions of Development

Development economics – Scope and importance - Economic development and economic growth - divergence in concept and approach - Indicators and measurement of Economic development –GNP as a measure of economic growth.

Unit II: Welfare Measures

New measures of welfare – NEW and MEW – PQLI – HDI – Green GNP - Criteria for underdevelopment – Obstacles to economic development –Economic and non-economic factors of economic growth- Development issues, poverty, inequality, unemployment and environmental degradation.

Unit III: Theories of Economic Growth and Development- I

Classical theories- Adam smith - Ricardo- Malthus, Marx's theory of economic development; Schumpeter's theory, approaches to development- Low income equilibrium trap - Critical minimum effort- Balanced vs. unbalanced growth.

Unit IV: Theories of Economic Growth and Development- II

Rostow's stages of economic growth, choice of technique, investment criteria, big push theory. unlimited supply of labour; social and technological dualisms; roles of capital accumulation, human capital and technological change in economic development.

Unit V: Comparative Economic Development

Models of economic growth Harrod-Domar, Kaldor, Mahalanobis, Lewis, Fei Ranis, Input-Output, multisectoral models. Division of labour, organisation of work and industrial production, the role of the state in developmental transition.

Theory Schedule

1. Development economics.
2. Scope and importance.
3. Economic development.
4. Economic growth.

5. Divergence in concept and approach.
6. Indicators of economic development.
7. Measurement of economic development.
8. GNP as a measure of economic growth.
9. New measures of welfare – NEW and MEW.
10. PQLI – HDI.
11. Green GNP.
12. Criteria for underdevelopment.
13. Obstacles to economic development.
14. Economic and Non-Economic factors of economic growth.
15. Classical theories- Adam smith - Ricardo
16. Classical theories- Malthus, Marx's theory.
17. Mid Semester Examination.
18. Marxian theory.
19. Schumpeter's theory.
20. The Keynesian theory.
21. Approaches to development- low income equilibrium trap.
22. Balanced growth
23. Unbalanced growth.
24. The 'Big push' theory.
25. Choice of technique in development planning.
26. Rostow's stages of economic growth.
27. Roles of capital accumulation, human capital and technological change in economic development.
28. Harrod-Domar model of economic growth.
29. Kaldor model of growth.
30. The Mahalanobis model.
31. Lewis Theory of Unlimited Supplies of labour.
32. Fei-Ranis theory.
33. Input-Output, multi sectoral models.
34. The role of the State in developmental transition.

Course outcomes

After end of this course, the student will be able to:

1. Scope of development and indicators
2. Measure the development using different methods
3. Understand the theories of development and relate it to real world.
4. Understand the theories of economic growth
5. Understand the over view of the economic development in USA and China

CO–PO Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	1	3
CO2	2	1	3	2	2
CO3	1	1	2	1	3
CO4	1	3	1	2	2
CO5	1	2	2	2	3

Reference Books

1. Ahuja, H. L. 2016. *Development Economics*, S. Chand Publishing, A division of S. Chand& Company Pvt Ltd., New Delhi.
2. Jain T.R. 2021. *Development Economics*, VK Global Publications Pvt. Ltd., Haryana.
3. Jhingan M.L., and Jhingan B.K., 2014. *The Economics of Development and Planning*, VrindaPublications (P) Ltd., New Delhi.
4. Todaro M.P., and Smith S.C., 2017. *Economic Development*, PearsonEducation, Chennai.
5. Taneja M.L. and R.M. Myer., 2022. *Development Economics-II*, Vishal Publishing Co., New Delhi.
6. Aparajita Mukherjee and S. Chakrabarti, 2016. *Development Economics*, PHI Learning, NewDelhi.
7. Taneja M.L., and R.M. Myer., 2021. *Development Economics-I,* Vishal Publishing Co., New Delhi.
8. Thirlwall A.P., 2011. *Economics of Development*, Macmillan Publisher, London.
9. Jain T.R. and Majhi B.D., 2021. *Development Economics*, V.K. Global Publications Pvt. Ltd.,Haryana.
10. Agarwal R.C., 2022. *Economics of Development and Planning*, Laxmi Narayanan Agarwal, New Delhi.

E-resources

1. https://www.worldbank.org
2. https://www.nber.org
3. https://journals.elsevier.com
4. https://www.ise.ac.ul
5. https://www.sciencedirect.com

Learning Objectives

- To develop an understanding on the issues in rural markets and marketing environment.
- To analyse consumer behaviour, distribution channels and marketing strategies.

Theory

Unit-I: Overview of Rural Marketing

Concept and scope of rural marketing - Nature and characteristics of rural markets - Potential of rural markets in India - Rural communication and distribution.

Unit-II: Factors Affecting Rural Marketing

Environmental factors, socio-cultural, economic, demographic, technological and other environmental factors affecting rural marketing.

Unit-III: Consumer's Behaviour

Rural consumer's behaviour - Behaviour of rural consumers and farmers - Buyer characteristics and buying behaviour. Rural Vs urban markets - Customer relationship management - Rural market research - Implications of rural market research.

Unit-IV: Rural Marketing Strategy

Rural marketing strategy - Marketing of consumer durable and non-durable goods - Services in the rural markets with special reference to product planning - Product mix - Pricing policy and pricing strategy - Distribution strategy. Government e-Marketplace (GeM), Food Safety and Standards Authority of India (FSSAI), International Organisation for Standardisation (ISO) & Bureau of Indian Standards (BIS).

Unit-V: Promotion Strategy

Promotion and communication strategy - Media planning - Planning of distribution channels - Organizing personal selling in rural market in India - Innovations in rural marketing. Current streams of thought.

Theory schedule
1. Concept and scope of rural marketing.
2. Nature of rural markets.
3. Characteristics of rural markets.
4. Potential of rural markets in India.
5. Rural communication and distribution.
6. Environmental factors affecting rural marketing.
7. Socio-cultural factors affecting rural marketing.
8. Economic factors affecting rural marketing.
9. Demographic factors affecting rural marketing.
10. Technological factors affecting rural marketing.
11. Other environmental factors affecting rural marketing.
12. Rural consumer's behaviour..

13. Behaviour of rural consumers.
14. Behaviour of rural farmers.
15. Buyer characteristics and buying behaviour.
16. Rural Vs urban markets.
17. **Mid semester examination.**
18. Customer relationship management.
19. Rural market research.
20. Implication of rural market research.
21. Rural marketing strategy.
22. Marketing of consumer durable goods.
23. Marketing of non-durable goods.
24. Marketing of services in the rural markets with special reference to product planning.
25. Product mix.
26. Pricing policy and pricing strategy.
27. GEM & FSSAI
28. ISO & BIS.
29. Distribution & Promotion strategy.
30. Communication strategy.
31. Media planning.
32. Planning of distribution channels.
33. Organizing personal selling in rural market in India.
34. Case study in rural marketing.

Course outcome

At end of the course students will be able to:

1. Gain conceptual knowledge about rural marketing.
2. Understand the rural market distribution and factors affecting it.
3. Know about the consumer behavior and trend in rural marketing.
4. Know in detail about the service sector and apply the 7P's of service marketing.
5. Identify recent innovations in rural marketing.

CO –PO MAPPING

	PO1	PO2	PO3	PO4
CO1	3	2	2	3
CO2	1	2	1	2
CO3	3	3	2	3
CO4	2	2	1	1
CO5	1	2	2	3

Reference Books

1. Acharya, S.S., and Agarwal N.L., 2008. *Agricultural Marketing in India,* Oxford and IBH, New Delhi.
2. Dogra B., and K. Ghuman, 2007. *Rural Marketing: Concepts and Practices,* McGraw Hill Education, New Delhi.
3. Kashyap, 2016. *Rural Marketing,* Pearson Education India, New Delhi.

4. Krishnamacharyulu, C., and Ramakrishan L., 2002. *Rural Marketing*, Pearson Edu., New Delhi.
5. Changder N., 2022. *Rural Marketing*, Pearson Education India, New Delhi.
6. Kashyap P., 2011. *Rural Marketing*, Pearson Education, New Delhi.
7. Ramaswamy V.S., and Nanakumari S., 2006. *Marketing Management*. 3rd Ed., MacMillan Publications, New Delhi.
8. Sukhpal S., 2004. *Rural Marketing*, Vikas Publishing House, New Delhi.
9. Singh, A.K., and Pandey S., 2005. *Rural Marketing*, New Age Publications, New Delhi.
10. Velayudhan, S.K., 2007. *Rural Marketing: Targeting the Non-Urban Consumer*, Sage Publications Pvt. Ltd., New Delhi.

E-resources

1. http://miteshk.webs.com/ruralmarketing.pdf
2. http://www.slideshare.net/
3. http://www.ijars.in/iJARS%20506.pdf
4. http://www.rmai.in/publication.html
5. http://www.bms.co.in/rural-marketing-notes/

Objectives

- To understand about development of economic ideas, origins, interrelations and manifestations.
- Most of the economic ideas are relative by time, place and circumstances.
- It basis for comparison of different ideas.
- To know about what period the principles were enunciated

Theory

Unit- I: Introduction and Ancient Economic Thought

Nature and importance of economic thought -Theoretical approaches- Importance of economic thought. Ancient economics thought – Nature and significance- The Hebrew economic thought. The Greek thought: Plato- Aristotle- The Roman thought- The Islamic thought.

Unit -II: Medieval Economic Thought

Mercantilism -The Physiocrats- -Adam smith-Thomas Robert Malthus-David Ricardo-J.B.Say-Johan Stuart Mill. The historical school –Roscher –Hildebrand- Karl Knies – Schmoller -Christain socialism-Anarchism- Marxian socialism- Communism.

Unit - III: Neo -Classicism

Karl Marx- The Austrian school-Alfred Marshall-Indifference curve analysis – Iso-product curves. Neo classicism – Wicksell- J.B. Clark- Irving fisher- Taussig

Unit- IV: The Keynesian Revolution

The Keynesian revolution - Joseph A. Schumpeter -Neo- keynesian economics-Welfare economics- –Hobson- Pigou- Pareto-J.R. Hicks- Comparative economic systems

Unit- V: Recent Indian Economic Thought

Recent Indian economic thought- R.C. Dutt- Dadabhai Naoroji- - Gopal Krishna Gokhale- Gandhian economics- Jawaharlal Nehru- P.C. Mahalanobis –B.R. Ambedkar – C. Rajagopalachari- - D.R. Gadgil- Indira Gandhi.

Theory Schedule:

1. Nature and importance of economic thought.
2. Theoretical approaches - Importance of economic thought.
3. Ancient economics thought.
4. Nature and significance.
5. The Hebrew economic thought.
6. The Greek thought: Plato- Aristotle.

7. The Roman thought- the Islamic thought.
8. Mercantilism -the physiocrats.
9. Adam smith-Thomas.
10. Robert Malthus.
11. David Ricardo.
12. J.B.Say- Johan stuart mill.
13. The historical school.
14. Roscher –Hildebrand.
15. Karl Knies – Schmoller.
16. Christain socialism-Anarchism.
17. Marxian socialism.
18. Communism - Karl Marx.
19. The Austrian school.
20. Alfred Marshall-indifference curve analysis – iso- product curves.
21. Mid Semester Examination.
22. Neo Classicism – Wicksell- J.B. Clark- Irving Fisher- Taussig.
23. The Keynesian Revolution - Joseph A. Schumpeter.
24. Neo- keynesian economics.
25. Welfare economics- –Hobson- Pigou.
26. Pareto-J.R. Hicks.
27. Comparative economic systems.
28. Recent Indian economic thought- R.C. Dutt- Dadabhai Naoroji.
29. Gopal Krishna Gokhale.
30. Gandhian economics.
31. Jawaharlal Nehru- P.C. Mahalanobis.
32. B.R. Ambedkar.
33. C. Rajagopalachari- D.R. Gadgil.
34. Indira Gandhi.

Course outcome

At end of the course students will be able to:

1. Understand the nature and importance of economic thought
2. Know about the medieval economic thought
3. Understand the keynesian revolution
4. To know the comparative economic systems
5. Know in detail about recent Indian economic thought

CO –PO MAPPING

	PO1	PO2	PO3	PO4
CO1	3	2	2	3
CO2	1	2	1	3
CO3	3	3	2	3
CO4	2	2	1	3
CO5	1	2	1	3

Reference Books

1. Bnatia, HL, and S.Chand, 2007. *History of Economic Thought*, MacMillan Publications, New Delhi.
2. Hajela, T.N, 2008. *History of Economic Thought*, Ane Books Ltd, New Delhi.
3. Heinz D.Kurz, 2010. *Economic Thought: A Brief History*, Columbia University Press, New York.
4. Landreth H., and Colander D.C., 2002. *History of Economic Thought*, Houghton Mifflin press, New York.
5. Rubin I.L., 2007. *History of Economic Thought*, Pluto Press, New Delhi.
6. Jhingan, M.L., Girija M., and Sasikala, L. 2011. *History of Economic Thought*, Vrinda Publisher, New Delhi.
7. Backhaus J., 2011. *Handbook of the History of Economic Thought*. Springer Science & Business Media, New Delhi.
8. Robbins L., 1998. *History of Economic Thought*, Princeton University Press, New York.
9. Lokanathan, V. 2010. *A History of Economic Thought*, S. Chand & company Ltd., New Delhi.
10. Satish Y. Deodhar, 2007. *Economic Sutra Ancient Indian Antecedents to Economic Thought IIMA series*, New Age Publications, New Delhi.

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1. https://www.abebooks.com/9781441983350/Handbook-History-Economic-Thought-Insights-144198335X/plp
2. https://www.etcases.com/media/clnews/14691015651653847523.pdf
3. https://www.umass.edu/economics/sites/default/files/tonak_econ306-02-sp21.pdf
4. https://www.historyeconomic.com
5. https://welfareeconomics.in

SUPPORTING COURSES

STA 502 Statistics for Social Sciences (2+1)

Learning Objectives

- To expose the students to the concept of statistical methods
- To understand the importance of statistics
- To understand the concepts involved in computation, analysis and interpretation of research data

Theory

Unit - I: Theory of sampling

Basic concepts - Unit and frame, population and sample - Sampling and complete enumeration - Probability and non-probability sampling - Sampling and non-sampling errors - Measurement and control of non-sampling errors. Simple Random Rampling (SRS) - With and without replacement - Methods of selection of SRS - Lottery method and random number table method. Systematic sampling. Stratified random sampling - Stratification - Types of allocation - Equal, proportional allocation. Cluster sampling. Determination of sample size in SRS, tratified random sampling, systematic and cluster sampling, probability proportional to size (PPS) sampling.

Unit - II : Descriptive statistics and distributions

Measures of central value - Measures of dispersion and its relative measures - Applications of binomial, poison and normal distributions.

Unit - III: Correlation and regression analysis

Simple correlation - Meaning - Assumptions - Positive and negative correlation - Scatter diagram - Computation of correlation coefficient - Properties, testing and interpretation of correlation coefficient - Coefficient of determination. Regression theory - Simple linear regression - Meaning assumptions - Fitting of simple linear regression - Properties of regression coefficients - Interpretation of regression coefficients and intercept. Multiple linear regression - Assumptions - Standardized and partial regression coefficients - Fitting of multiple linear regression equation - Interpretation of regression coefficients - Multiple correlation - Coefficient of multiple determination (R^2) - Interpretation.

Unit - IV: Test of significance

Test of significance - Basic ideas - Type I error, Type II error - Test of significance based on small sample -'t' test - Testing the significance of single mean - Testing the significance of two means for independent samples and paired samples. Large sample tests - Testing the significance of single mean, two means. Test for regression coefficient - Chi-square - Test for homogeneity of variance. Goodness of fit tests - 'F' test - One way ANOVA and two way ANOVA.

Unit - V: Time series analysis and non-parametric test

Time series analysis - Components of time series - Trend, seasonal, cyclical and irregular movements - Elimination of trend - Moving average method - least squaremethod - Seasonal movement - Simple average and ratio to trend method - Link relative method. Non parametric tests (Distribution free tests) - Advantages - Disadvantages - Run test - Test for randomness - Median test - Sign test - Mann - Whitney U test for two samples - Kolmogrov - Smirnov one sample and two sample test, Kruskal - Walli's test.

Practical

Simple random sample - Selection - Estimation - Determination of sample size in simple random sampling. Systematic sampling - Stratified random sampling - Cluster sampling - Selection - Estimation. Multistage sampling - Selection - Estimation of parameters in two stage sampling - Determination of sample size in two stage sampling. Tests of significance based on small and large sample tests. Simple correlation - Computation of correlation coefficient and it's testing - Coefficient of determination. Rank correlation coefficient Simple linear regression - Fitting of simple linear regression equations - Testing and interpretation of regression coefficient and intercept. Multiple linear regression equation - Interpretation of regression coefficients. Forecasting using regression techniques.

Theory schedule
1. Basic concepts - unit and frame, population and sample
2. Sampling and complete enumeration - probability and non-probability sampling
3. Sampling and non-sampling errors - measurement and control of non-sampling errors
4. Simple random sampling (SRS) - with and without replacement - methods of selection of SRS - lottery method and random number table method
5. Systematic sampling. Stratified random sampling - stratification - types of allocation - equal, proportional allocation
6. Cluster sampling
7. Determination of sample size in SRS, stratified random sampling, systematic and cluster sampling - probability proportional to size (PPS) sampling
8. Measures of central value - measures of dispersion and its relative measures - applications of binomial, poission and normal distributions
9. Simple correlation - meaning - assumptions - positive and negative correlation - scatter diagram
10. Computation of correlation coefficient - properties
11. Testing and interpretation of correlation coefficient - coefficient of determination
12. Regression theory - simple linear regression - meaning assumptions
13. Fitting of simple linear regression - properties of regression coefficients - interpretation of regression coefficients and intercept

14. Multiple linear regression - assumptions - standardized and partial regression coefficients
15. Fitting of multiple linear regression equation - interpretation of regression coefficients
16. Multiple correlation - coefficient of multiple determination (R^2) - interpretation
17. Mid semester examination
18. Test of significance - basic ideas - Type I error, Type II error
19. Test of significance based on small sample - 't' test
20. Testing the significance of single mean
21. Testing the significance of two means for independent samples and paired samples
22. Large sample tests - testing the significance of single mean, two means
23. Test for regression coefficient - Chi-square - test for homogeneity of variance
24. Goodness of fit tests
25. 'F' - test, one way ANOVA and two way ANOVA
26. Time series analysis - components of time series - trend, seasonal, cyclical and irregular movements
27. Elimination of trend - moving average method - least square method
28. Seasonal movement - simple average and ratio to trend method - link relative method
29. Non parametric tests (Distribution free tests) - advantages - disadvantages
30. Run test - test for randomness
31. Median test - sign test
32. Mann-Whitney U test for two samples
33. Kolmogrov - Smirnov one sample and two sample test
34. Kruskal - Walli'stest

Practical schedule

1. Simple random sample - selection - estimation
2. Determination of sample size in simple random sampling
3. Systematic sampling - selection, estimation
4. Stratified random sampling - selection, estimation
5. Cluster sampling - selection - estimation

6. Multistage sampling - selection - estimation of parameters in two stage sampling
7. Determination of sample size in two stage sampling
8. Tests of significance based on small sample tests
9. Tests of significance based on large sample tests
10. Simple correlation - computation of correlation coefficient and it's testing
11. Co-efficient of determination
12. Rank correlation coefficient
13. Simple linear regression - fitting of simple linear regression
14. Testing and interpretation of regression coefficient and intercept
15. Multiple linear regression equation
16. Interpretation of regression coefficients
17. Forecasting using regression techniques

Course Outcomes

At the end of the course students will be able to

1. Understand the different sampling methods and its importance.
2. Fitting the regression and correlation analyses and test the significance
3. Know the time series analysis and other non-parametric tests
4. Know the interpretation of regression coefficients
5. Understand the t test and significance level

CO -PO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	-	-	-	2	3
CO 2	-	-	-	2	2
CO 3	-	-	-	2	3
CO 4	-	-	2	3	3
CO 5	-	-	2	3	3

Reference books
1. Agarwal, B.M., 1995. *Basic Statistics*, New Age International Ltd, New Delhi.
2. Gupta, S.P., 2005. *Statistical Methods*, Sultan Chand and Sons, New Delhi.
3. Kapoor, V.K., and S.C. Gupta, 2006. *Fundamentals of Applied Statistics*, SultanChand and Sons, New Delhi.
4. Rangasamy, R., 2009. *A Textbook of Agricultural Statistics*, Wiley Eastern Ltd.,New Delhi.
5. Senthamarai Kannan, K. and D. Venkatesan, 2005. *Introduction to StatisticalMethods*, Scitech Publications (India) Private Ltd., Chennai.

COM 502 Computer Application for Agricultural Economics Research (2+1)

Learning objectives

1. This is a course on Introduction to Networking.
2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet,networking and mobile computing.
3. Provide hands-on use of Microsoft Office applications Word, Excel, Access andPowerPoint. Completion of the assignments will result in MS Office applicationsknowledge and skills.
4. IT applications and different IT tools in Agriculture.

Theory

Unit I: Concept of Computers- Brief History of Computers, Generation and Its Evolution, Characteristics of Computers, Main Areas of Computers and their Applications; Classification of Computers, Input-Output Devices, Memory Types (Cache, RAM, ROM), Memory Units,

Unit-II: System Software and Application Software, Open source software, introduction to computer languages, Introduction to Operating Systems – Functions, Features and Types. ,MS - Windows and LINUX. Data Base Management System, MS Office (MS Word, MS Power Point, MS Excel, MS-Access and use of various management software Like SPSS, SAS etc.

Unit-III Internet, Intranet, extranet and Internet, Introduction to Web page design using HTML, Cloud Computing, Security and ethical challenges: Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – Software and intellectual property Health and Social Issues, Ergonomics and cyber terrorism.

Unit-IV Use of ICT in Agriculture, Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer – controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc.,

Unit-V Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc. for supporting Farm decisions, Preparation of contingent crop-planning using IT tools.

Lecture Schedule

1. Introduction to Computers, History of Computers.
2. Generation and its Evolution.
3. Classification of Computers.
4. Input-Output Devices.
5. Memory Types.
6. System Software and Application Software.
7. Introduction to computer languages and Operating systems.
8. MS Office word, Creating, Editing, Formatting a document and Saving a document.

9. **First Test**
10. MS Excel Data Presentation, Data presentation, interpretation and graph.
11. Creation MS Power Point Presentation.
12. MS Access Concepts of Database, Creating Database.
13. SPSS and SAS.
14. Database Concepts.
15. Introduction to HTML.
16. Html syntax and elements, tags.
17. **Mid Semester Examination**
18. Introduction to Web page design.
19. Static websites, dynamic websites.
20. Client Side processing.
21. Scripting languages.
22. Business value of internet & Intranet.
23. Cloud Computing.
24. Security and ethical challenges.
25. Computer Crime – Hacking.
26. Software and intellectual property.
27. Cyber Terrorism.
28. ICT in Agriculture.
29. IT application.
30. Smartphone Apps in Agriculture.
31. Applications in Agriculture.
32. Geospatial technology
33. Agriculture Expert System.
34. Soil Information Systems.

Practical Schedule
1. Study of Computer Components and accessories– Booting of Computer and its Shut Down.
2. Practice of some fundamental DOS commands – TIME, DATE, DIR,MD, CD, RD, DEL, TREE, COPY, VOL and LABEL.

3. Introduction of different operating systems such as windows, Unix, Linux.
4. MS-WORD – Creating, editing and presenting a scientific Document.
5. MS-POWER POINT – Creating, editing and presenting a scientific Document.
6. MS-EXCEL: Creating a spreadsheet, writing expressions, Entering formula expression throughthe formula tool bar and use of inbuilt statistical, mathematical functions.
7. MS-EXCEL: creating graphs, analysis of scientific data - Data **analysis -** t-test, Regression, ANOVA.
8. MS-ACCESS: Creating Database, preparing queries and reports.
9. MS-ACCESS: Demonstration of Agri-information system.
10. 10. Introduction to World Wide Web (WWW) and its components.
11. .Introduction of programming languages.
12. HTML: Creation of scientific website.
13. HTML using Agriculture Templates.

14. Internet: Presentation and management agricultural information through web.

15. ICT in Agriculture.

16. Geospatial Technology for Agriculture.

17. Final Practical Examination

Course Outcome

At the end of the course students will be able to

CO 1: Describe the usage of computers and why computers in society.

CO 2: Analyze common business problems using appropriate

CO 3: Learn categories of programs.

CO 4: system software and applications.

CO 5: Information Technology applications and systems.

Co-Po Mapping Matrix

	PO 1	PO2	PO3	PO4	PO5	PO6
CO1	1	0	3	0	0	3
CO2	0	1	3	1	1	3
CO3	1	1	3	1	0	3
CO4	0	0	3	0	1	3
CO 5	1	1	3	0	0	3

References

1. Satish Jain, M Geetha, Kratika, (2012) *Computer Course Windows 7 with Ms Office* 2010, Bpb Publications.
2. Anupama Jain and Avneet Mehra (2012), *Computer Fundamental MS Office: Including Internet & Web Technology* 2010.
3. Meera SN 2008 *ICTs in agricultural extension: Tactical to practical.*
4. Willem Zip 1994 *Improving the transfer and use of agricultural information: A guide to information technology.*
5. Cox V,Wermers L and Reading E.E.2006.HTML Illustrated Complete,3rd Ed. Course Technology.

e-resources

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2. https://www.shobhituniversity.ac.in/caigers/caigers-course.php.
3. https://ecourses.icar.gov.in/.
4. https://www.kisangates.com/agro-informatics.html.
5. http://www.agrimoon.com

PGS 501 - Agricultural Research, Research Ethics and Rural Development

Programs (1+0)

Learning objectives

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programs and policies of Government.

Unit I

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

Unit II

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

Unit III

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

Unit IV

Research prioritization and selection of research problem – Research planning - Review of literature – Setting of objectives and hypothesis – Research design and techniques – Data collection– Analysis – Formulation of tables – Interpretation of results - Computer software in tabulation, presentation - Thesis writing – Writing of research articles - Projects and report writing – Formulation and preparation of research / scheme proposal – Impact factor and citation index - citation and references- Guidelines for oral / poster presentations – Internet in scientific research.

Unit V

Authorship and copy right – Plagiarism – Scientific misconduct – Falsification of research results, data fabrication – Peer review, informed consent attribution of authorship and adequacy of peer review publication process - Responsibility of society and self – Public interest in research, relevance to society and motivation - Conflict of interest, moral commitment – Social trends on research ethics, adequate codes of conduct to regulate research activity

Theory lecture schedule

1. History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment
2. National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR); International Agricultural Research Centres (IARC)
3. Partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.
4. Research ethics: research integrity, research safety in laboratories
5. First test
6. Welfare of animals used in research, computer ethics, standards and problems in research ethics.
7. Concept and connotations of rural development, rural development policies and strategies.
8. Rural development programs: Community Development Program, Intensive Agricultural District Program, Special group – Area Specific Program, Integrated Rural Development Program (IRDP) Panchayat Raj Institutions, Co-operatives, Voluntary Agencies/ Non- Governmental Organisations.
9. Mid semester examination
10. Critical evaluation of rural development policies and programs.
   Constraints inimplementation of rural policies and programs.
11. Research prioritization and selection of research problem – Research planning - review ofliterature – setting of objectives and hypothesis – research design and techniques
12. Data collection - analysis – formulation of tables – interpretation of results - Computersoftware in tabulation and presentation
13. Thesis writing – writing of research articles- projects and report writing – Formulation andpreparation of research / scheme proposal
14. Impact factor and citation index - citation and references- Guidelines for oral / posterpresentations – Internet in scientific research.

15. Authorship and copy right – Plagiarism – Scientific misconduct – Falsification of research results, data fabrication – Peer review, informed consent attribution of authorship and adequacy of peer review publication process
16. Responsibility of society and self – Public interest in research, relevance to society and motivation - Conflict of interest, moral commitment
17. Social trends on research ethics, adequate codes of conduct to regulate research activity

References

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

PGS 502: Technical Writing and Communication Skills (0+1)

Learning Objective

▪ To equip the students with skills *Viz.,* writing of dissertations, research papers, etc. and to communicate and articulate in English Practical Grammar - Tenses, parts of speech, clauses, punctuation marks; Error analysis - Common errors; Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers. Proof reading. Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, *etc*; Structure of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof- reading; Writing of a review article.

Practical schedule

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

COURSE OUTCOMES:

At the end of the course, the students will obtain:

CO1- Proficiency in the English language to express their views and ideas without
any hindrance

CO2- Competency in communication both written and oral

CO3- Fluency in the English language.

CO4-Word power to use the English language effectively.

CO–PO Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	-	-	-	1	1
CO2	-	-	-	2	2
CO3	-	-	-	2	3
CO4	-	-	1	2	3

References

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

PGS 503 Basic Analytical Techniques (0+1)

Learning Objective

- To provide the use of the statistical package
- To analyse agricultural research data
- To write interpretation

Practical

Use of SPSS / equivalent for frequency distribution, summarization and tabulation of data, F test, correlation, pearson correlation, spaearman correlation, ANOVA, ANCOVA. For regression: simple, multiple linear regression, estimation of regression by OLS and MLE method, logit, probit, stepwise regression, coefficient of determination. For Kolmogorov - Smirnov test, Wilcoxon signed rank test, Mann-Whitney U, Kruskal-Wallis, McNemar's test. For discriminant analysis - fitting of discriminant functions, identification of important variables, factor analysis, principal component analysis - obtaining principal component. For analysis of time series data - AR, MA, ARIMA models.

Practical schedule

1. Use of SPSS / equivalent for frequency distribution
2. Summarization and tabulation of data
3. F test
4. Correlation, pearson correlation, spearman correlation
5. ANOVA, ANCOVA
6. Regression - simple, multiple linear regression, estimation of regression by OLSand MLE method
7. Logit, probit, stepwise regression
8. Coefficient of determination
9. Kolmogorov - Smirnov test
10. Wilcoxon signed rank test, Mann - Whitney U test
11. Kruskal - Wallis, McNemar's test
12. Discriminant analysis
13. Fitting of discriminant functions
14. Identification of important variables
15. Factor analysis. Principal component analysis
16. Obtaining principal component
17. Time series data AR, MA, ARIMA models

Course Outcomes

At the end of the course students will be able to

1. Identify the methods to collect data.
2. Do different econometric analysis.
3. Forecast economic variables using AR,MA, and ARIMA models.

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	-	-	2	-
CO2	-	2	1	-	3
CO3	-	-	-	2	3

References

1. SPSS User's guide and User's manual.
2. Wetherill, G.B., 1982. Elementary Statistical Methods. Chapman & Hall.
3. Wetherill, G.B., 1986. Regression Analysis with Applications. Chapman & Hall.
4. Learning statistics: http://freestatistics.altervista.org/en/learning.php.
5. Free statistical software's: http://freestatistics.altervista.org/en/stat.php.
6. Statistics glossary http://www.cas.lancs.ac.uk/glossary_v1.1/main.html

PGS 504 LIBRARY AND INFORMATION SERVICES (0+1)

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

PRACTICAL

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

PRACTICAL SCHEDULE

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

Course Outcomes:

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

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	-	-	-	2	2
CO2	-	1	-	3	1
CO3	1	-	-	2	2
CO4	-	-	1	2	3

PGS 505 Intellectual Property and its Management in Agriculture (1+0) (e-course)

Learning Objectives
- To create awareness about intellectual property rights in agriculture
- To explain management of patents, trademark, geographical indications, copyrights, designs, plant variety protection and biodiversity protection
- To understand marketing and commercialization of intellectual properties

THEORY

Unit - I: World trade organization - Introduction

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

Unit - II: Patent document

Discovery *versus* invention - Patentability of biological inventions - Procedure for patent protection - Preparatory work - Record keeping, writing a patent document, filing the patent document - Types of patent application - Patent application under the Patent Cooperation Treaty (PCT).

Unit - III: Plant genetic resources

Plant genetic resources - Importance and conservation - Sui generic system - Plant varieties protection and farmers' rights act - Registration of extinct varieties - Registration and protection of new varieties / hybrids / essentially derived varieties - Dispute prevention and settlement - farmers' rights.

Unit - IV: Trademark

Trademark - geographical indications of goods and commodities - Copy rights- Designs - Biodiversity protection.

Unit - V: Benefit sharing

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

THEORY SCHEDULE

1. World Trade Organization - Agreement on Agriculture (AoA) and Intellectual Property Rights (IPR)
2. Importance of intellectual property management - IPR and economic growth - IPRand bio diversity
3. Major areas of concern in Intellectual property management - technology transfer and commercialization
4. Forms of different intellectual properties generated by agricultural research
5. Discovery versus invention patentability of biological inventions
6. Procedure for patent protection
7. Preparatory work - record keeping, writing a patent document, filing the patent document
8. Types of patent application - patent application under the Patent Cooperation Treaty (PCT)
9. **Mid semester examination**
10. Plant genetic resources - importance and conservation
11. Sui generic system - plant varieties protection and farmers' rights act – registration of extant varieties
12. Registration and protection of new varieties / hybrids / essentially derived varieties - dispute prevention and settlement - farmers' rights
13. Trade mark - geographical indications of goods and commodities - copy rights -designs
14. Biodiversity protection
15. Procedures for commercialization of technology - valuation, costs and pricing of technology
16. Licensing and implementation of intellectual properties - procedures for commercialization
17. Exclusive and nonexclusive marketing rights - research exemption and benefit sharing

Course Outcomes

CO1: Understand the concepts in international trade.
CO2: Understand the procedure to obtain patent rights.
CO3: Know the way to protect extinct varieties.
CO4: Create awareness about geographical indications of goods and commodities.
CO5: Identify the way to commercialize intellectual properties.

CO – PO Mapping

	PO1	PO2	PO3	PO4	PO5
CO1	-	-	-	-	-
CO2	-	-	-	-	-
CO3	-	-	-	-	1
CO4	-	1	1	1	1
CO5	1	1	1	1	1

References

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

NGC 511* DISASTER MANAGEMENT (1+ 0) (e-Course)

Learning Objectives

To introduce students to the key concepts and practices of mitigation for natural disasters and calamities and to equip them for disaster preparedness to conduct thorough assessment of hazards, risks vulnerability and capacity building strategies.

Theory

Unit I – Natural disaster

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

Unit II – Climate change

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

Unit III – Man – made disaster

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

Unit IV – Disaster warning, response and preparedness

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

Unit V – Rehabilitation

Rehabilitation – Food - Clothing - Utensils - Fuel – Shelter – Relief camp – Sanitation and Hygiene. Resilent farming concepts – Reclamation and revival of the agriculture system after natural disaster (Bio-shield). Preparedness – Emergency Operations Centres (EOCS). Fire & Rescue services. Revenue and Disaster Management.

Theory lecture schedule

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

5. Building fire, coal fire, forest fire, oil fire.
6. Air pollution, water pollution, deforestation, industrial wastewater pollution.
7. Disaster management - Efforts to mitigate natural disasters. India's key hazards, vulnerabilities and disaster response mechanism in India.
8. Concept of disaster management, national disaster management framework.
9. Financial arrangements, role of NGOs, community-based organizations and media.
10. Central, state, district and local administration.
11. Dissemination of disaster warning - response to natural disasters, national, state, district level.
12. Relief – Food and nutrition – Water – Health – Mental health services.
13. Rehabilitation – Tolerant and resistant crops - Resilient farming concepts – Bio-shields – Livelihood options – Insurance and compensation.
14. Disaster preparedness - Clothing and utensils and fuel – Shelter – Relief camp – Sanitation and hygiene.
15. Preparedness – Emergency Operations Centers (EOCS).
16. Fire & Rescue services.
17. Revenue and Disaster Management.

References
1. Gautam, D R. 2009. Community based disaster risk reduction. Mercy Corps, Lalitpur, Nepal.
2. Gupta, HK. 2003. Disaster management. Indian National Science Academy. Orient Blackswan.
3. Hodgkinson, PE and Stewart, M. 1991. Coping with Catastrophe: A handbook of disaster management.
4. Ministry of Home Affairs. 2010. Standard operating procedure for responding to natural disasters, Ministry of Home Affairs – Disaster management Division, New Delhi.
5. Sharma,VK.2001. Disaster management. National Centre for Disaster Management, India.
6. Das, H.P. 2016. Climate change and agriculture implications for global food security. BS Publications, Hyderabad.
7. Kelkar, R.R. 2010. Climate change -A Holistic view. BS Publications, Hyderabad.

E Resources
1. http:// research.un.org/en/disaster
2. https://searchworks.stanford.edu/
3. http://guodes.litrary.illinois.edu>c.php
4. http:// libguides. auu.edu.au>c.php
5. www.wcpt.org

NGC 512* CONSTITUTION OF INDIA (1+0)

Learning objectives
1.   To Understand the basic feature of Indian constitution
2.   To gain knowledge about basic rights and duties of Indian citizens
3.   To ponder over the form of Indian Political system
4.   To have broad understanding about the pivotal provision related with liberty, quality and fraternity

Theory

Unit I: Constitution of India and Basic features and Fundamental Principles

Meaning of the Constitution and Constitutionalism - Origin & Development of the Constitution of India - Salient features of the Constitution of India.

Unit II: Fundamental Rights and Duties

Fundamental Rights - Fundamental Duties - The Directive Principles of state policy

Unit III- Union Government

Executive: President, Prime Minister and Council of Ministers. – Legislature, Parliament- Judiciary: Supreme Court

Unit IV: State Government and Local Government

Executive: Governor, Chief Minister and Council of Ministers – Legislature - High Courts - Local Governments

Unit V: Constitutional Commissions

Election Commission – Union Public Service Commission (UPSC) - Finance Commission & Tamil Nadu Public Service Commission (TNPSC).

Lecture schedule
1.   Constitution of India – Definition, Basic features
2.   Fundamental principles
3.   Difference between constitution and constitutionalism
4.   First test
5.   Origin and development of constitution
6.   Salient features of constitution of India
7.   Fundamental rights and Fundamental duties
8.   Direct principles of state policy
9.   Mid Semester Examination
10.   Union government - President, Prime Minister and Council of Ministers
11.   Legislature, Parliament
12.   Judiciary: Supreme Court
13.   Executive: Governor

14.   Chief Minister and Council of Ministers and Legislature

15.   High Courts and Local Governments

16.   Election and Finance Commission.

17.   UPSC and TNPSC.

References
1.   The Constitution of India 2017 Kindle Edition- Government of India
2.   Bahkshi P. M. 2015 The Constitution of India. Universal Law Publishing Co Ltd
3.   Pylle M.V. 2018 An Introduction to the Constitution of India. Vikas Publishing
4.   Bhansali S.R.2015. Textbook on the Constitution of India. Universal LexisNexis

VAC 501-   FORMULATION OF BANKABLE AGRICULTURAL
PROJECT (3+0)

Learning Objectives
- To know about the agricultural project preparation and analysis.
- To gain knowledge on project investment and drafting of theproject proposal.

Theory

Unit-I : Agricultural projects – Introduction
Project - definition - agricultural projects - project preparation and analysis - criteria for selection of agricultural projects - Innovation, business incubation. Entrepreneurship development programmes - Government schemes and incentives - Government policy.

Unit-II : Project Identification
Project Identification - entrepreneurs' area of interest - background, land, building, water, investment. Sources of projects - resources - own and institutional. Enterprise - project cost, breakeven point,infrastructure, machinery, power, water, manpower requirement.

Unit-III : Project Appraisal
Project appraisal - meaning and scope - types of project appraisal - technical, commercial, financial, economic and management appraisal - methodological issues in financial and economic evaluation of projects - measuring intangible costs and benefits - social cost and benefits analysis
- choice among mutually exclusive projects.

Unit-IV : Project Investment and Operational Analyses
Cash flow analysis and discounting procedures - use of decision criteria NPV, BCR, Payback period and IRR in decision making. Network techniques - PERT, CPM and crash programme methods - SWOT techniques. Analyzing risk in agricultural projects - Sensitivity analysis- Decision tree analysis - Environment Impact Assessment (EIA).

Unit-V : Drafting of Project Proposal
Procedures for preparation of project proposal on crop, dairy, poultry, forestry, fisheries enterprises and agro industries - data requirements and their format. Preparation of case studies - Review of awarded projects of major banks - Current streams of thought.

Course Outcomes

At the end of the course, students will be able to
CO 1: understand the criteria for selection of agricultural projects.
CO 2: gain knowledge on project preparation and analysis.
CO 3: understand the operational and investment analysis of agriculturalprojects.
CO 4: Imbibe knowledge on drafting of project of project proposal.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5
CO 1	-	-	-	2	2
CO 2	-	1	-	3	1
CO 3	1	-	-	2	2
CO 4	-	-	1	2	3

Reference Books

1. Chandra, Prasanna, 1995. *Projects: Preparation, Appraisal, Budgeting and Implementation,* Tata Mc - Graw Hill Publications, New Delhi.
2. Gopal Krishan, P. and K.Nagarajan, 2005. *Project Management*, New Age Publishing, New Delhi.
3. Goel, B.B., 1989. *Project Management*, Deep and Deep Publications, NewDelhi.
4. Gittinger, Price J., 1982. *Economic Analysis of Agricultural Projects*, The John Hopkins University Press, London.
5. Ramamoorthy, V.E., 2005. *Textbook of Project Management*, Macmillan,New Delhi.

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