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

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

(2010-2011)

DEPARTMENT OF AGRONAMY

REGULATIONS AND SYLLABUS

REGULATIONS

1. SYSTEM OF EDUCATION

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

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

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

2. DEFINITIONS

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

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

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

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

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

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

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

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

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

3. PROGRAMMES OFFERED

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

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

4. ELIGIBILITY FOR ADMISSION

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

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

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

Table – 1: Eligibility Criteria

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

5. SELECTION PROCEDURE

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

Applications which fulfils the above conditions (mentioned in the Prospectus) will be scrutinized by a Doctoral Committee consisting of the proposed guide, the Head of the Department and two or three senior staff members (not more than five). The candidate will have to appear for a written test and an interview (75 marks + 25

marks). The marks and the evaluation report will be placed before the Vice-Chancellor who in consultation with the Dean of the Faculty and Head of the Department will select and admit the applicant to work under the guide proposed.

5.1. PART TIME PROGRAMME

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

5.2. EXTERNAL REGISTRATION

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

1. The candidates must register under a guide who is a member of the Faculty of this University
2. The candidate should be working as Lecturer/Reader/Professor or on equivalent positions on permanent basis in a recognized college where facilities for carrying out research work are available and have post graduate departments for Agrl. subjects or working as research assistants in private or government institutions having research and development facilities and who fulfill the eligibility conditions.
3. However such colleges/ research institutes should be recognized by Annamalai University for this purpose. The colleges/ research institutes/ organization should apply for recognition to the University in the prescribed format with recognition fee as specified by the University in the relevant subjects or department from which they wish to depute candidates for the Ph.D. programme. At the discretion of the Vice chancellor, a committee may be appointed to visit the college/Institution to inspect the infrastructure facilities available for pursuing Ph.D. research. Based on the recommendations of the committee, the university may permit a candidate from the department to be sponsored by the institution. This clause is not applicable to those institutions/ organizations that have been recognized already for external registration.
4. The candidate should have a recognized co-guide in parent department of the organization. The co-guides may be from other colleges / organization located from the same place if such persons are not available in the parental organizations.
5. Other regulations relating to Ph.D research in the University shall be applicable to these candidates also, except the clause relating to the period of residence.
6. The candidate shall undergo the course and research of the required credits during I year of the programme. He / She shall carryout the research at his / her parental organization for the rest of period of the programme.
7. i. NOC (No Objection Certificate) is to be produced from the employer of the institution / Organization where he / she is working and attached along with the application.

ii. Co-guide acceptance letter should be also be enclosed with the application form.

6. CREDIT GRADE POINT REQUIREMENTS

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

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

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

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

7. ATTENDANCE REQUIREMENT

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

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

7.3 In case of new admission, for calculating 80% attendance in the first semester, the number of working days will be calculated from the date of joining of the students who are permitted to join late due to administrative reasons. However, for genuine reasons, condonation of attendance deficiency may be considered by the vice chancellor on the recommendation of the Advisory committee, HOD and Dean, Faculty of Agriculture on payment of condonation fee prescribed by the university.

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

7.5. In respect of students who had absented for the mid-semester examination on University business with prior permission of the HOD and Dean, Faculty of Agriculture the make up mid-semester examination should be conducted ordinarily within 15 working days from the date of conduct of the mid-semester examination.

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

8. ADVISORY COMMITTEE

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

8.2. Major Adviser (Chairman)

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

8.3. Members

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

8.4. Changes in advisory committee

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

8.5. Change of Guide and Topic

If a change of guide becomes necessary, the reason for such change should be indicated, which will be examined by a committee compressing of Head of the Department, one senior faculty of the Department and Dean, to be approved by the Vice Chancellor. The research scholars will be permitted to continue to work and submit their thesis under the guidance of a retired person only up to a maximum period of six months from the date of retirement of the guide. On such occasions, the Head of the Department concerned will ascertain the progress of the scholar in consultation with the guide and find whether the scholar will be able to submit his / her thesis within six month from the date of retirement of his / her guide. If not, the Head of the Department will suggest the change of guide for the scholar in consultation with the guide (about-to- retire) through the concerned Dean. If a guide goes abroad/ within India to attend any training or on leave for

more than one year, the Chairman of the Advisory Committee has to be changed immediately. The same conditions will apply to members also.

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

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

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

9. PROGRAMME OF STUDY

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

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

9.3. Programme of Research Work

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

10. EVALUATION OF STUDENT'S PERFORMANCE

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

10.1. Examinations

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

10.2. Grading

- The duration of mid semester examination will be of one hour and final examinations in theory and practical will be conducted for three hours each.
- The mid semester examinations will be conducted by course teachers during the ninth week of the semester in common examination hall as per the scheme drawn by HOD, evaluate and send the marks obtained by the students to the Controller of Examinations through HOD within seven working days.

- There will be final theory examination separately for theory and practical which will be conducted by the University. Each final theory and practical examinations will be evaluated by two examiners (one will be the course teacher and another will be the senior faculty of the Department).
- The distribution of marks will be as indicated below:

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

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

Mid semester :

1	Objective Type	10 out of 12	(10 x 0.5)	5 marks
2	Definitions/concepts	5 out of 7	(5 x 1)	5 marks
3.	Short notes	5 out of 7	(5 x 2)	10 marks
4	Essay type	2 out of 3	(2x5)	10 marks

Final Theory:

Courses without practicals (70 marks)

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

Courses with practicals (40 marks)

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

10.3. MINIMUM MARKS FOR PASS

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

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

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

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

10.4. MINIMUM GPA REQUIREMENT

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

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

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

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

10.5. RE-EXAMINATION

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

examination. The registration for the re-examination shall be done after mid-semester examination on the date specified by the Controller of Examinations. Each registration is considered as an attempt even if the student absents for the examination.

10.6. RETURN OF VALUED ANSWER PAPERS

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

11. CREDIT SEMINAR

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

11.1. Credit Seminar

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

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

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

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

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

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

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

Coverage of literature	:	40
Presentation	:	30
Use of audio visual aids	:	10
Capacity to participate to discussion and answer the questions:		20
Total :		100

12. QUALIFYING EXAMINATION

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

12.1. Minimum requirement for Qualifying Examination

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

12.2. Selection of Examiner

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

12.3. Written Examination

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

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

Qualifying marks for passing the examination will be 60.

12.4. Qualifying viva-voce Examination

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

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

12.6. Communication of Results of Qualifying Examination

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

12.7. Failure /Absence in Qualifying Examination

When a student fails or absents for the qualifying examination, he/she may apply again for permission to appear for re-examination to the Controller of Examination with the recommendation of the chairman of the advisory committee and Head of the Department. A student, who apply for re-examination should attend written examination and viva-voce. Re-examination shall not take place earlier than three months after the first examination and it

will be conducted by the advisory committee as previously indicated. If a student fails in the re-examination further re-examination will be considered on the recommendation of the Advisory Committee, HOD and Dean, Faculty of Agriculture.

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

13. THESIS RESEARCH

13.1. Selection of Topic

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

13.2. Research Proposal

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

The distribution of research credit will be as follows

I Semester 0+1

II Semester 0+2

III Semester 0+12

IV Semester 0+12

V Semester 0+12

VI Semester 0+9

Total 0+48

13.3. Evaluation of Thesis Research

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

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

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

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

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

SITUATION – I

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

SITUATION – II

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

SITUATION – III

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

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

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

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

SITUATION – IV

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

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

14. SUBMISSION OF THESIS

The research credits registered in the last semester should be evaluated only at the time of the submission of thesis, by the advisory committee. Students can submit the thesis at the end of the final semester. The list of enclosures to be submitted along with the thesis is furnished. If a student has completed the thesis before the closure of the final semester, the chairman can convene the advisory committee meeting and take decision on the submission of the thesis provided the student satisfies 80 per cent attendance requirement.

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

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

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

15. VALUATION OF THE THESIS

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

viva-voce board. The guide will send the consolidated report with his remarks to the controller of examinations through the Head of the Department. On the satisfactory reports of the evaluation, viva-voce examination will be arranged.

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

15.2. Revision and Resubmission of Thesis

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

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

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

15.3. Grace Period

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

15.4. Re-registration and Submission of Thesis

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

15.5. Extension of Time

a. The minimum residential requirement for Ph.D degree shall be three academic years (six semesters) within a maximum period of five academic years (10 semesters) from the date of admission.
b. Scholars who do not submit the thesis within the stipulated period of five years should apply for extension of time three months before the completion of five years. Extension of time and the fees to be paid will be considered by the Deans Committee, if the extension is duly recommended by the Advisory committee, Head of the department, and the Dean of the Faculty, such candidates will be eligible for extension of time for a maximum period of three years.
c. The scholar will have to enroll as fresh candidates if he/she fails to submit the thesis within the maximum extension period of three years when granted.
d. If a scholar requires a few more months after the expiry of the maximum extension period of three years for the submission of the thesis as per the evaluation of the Advisory committee, duly recommended by the Head of the Department and the Dean of the Faculty, as an exceptional case the Deans committee may consider for re-registration to enable the scholar to submit the thesis. In any case the time granted shall not exceed six/ twelve months.

15.6. Number of Chances

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

16. DISCONTINUANCE AND READMISSION

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

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

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

17. PUBLICATION OF THE THESIS

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

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

Ph.D. AGRONOMY (BY COURSE WORK)
(FULL TIME / PART TIME / EXTERNAL) (2010-2011)
SCHEME OF EXAMINATIONS

FIRST SEMESTER

Major Courses		
AGR - 811	Advances in crop growth and productivity	2+1
AGR - 812	Current trends in Agronomy	3+0
AGR - 813	Weed management	2+0
Minor Course		
AGR - 814	Soil conservation and watershed management	2+1
Supporting Course		
COM 811	Advances in Computer Applications	1+1
Seminar – I		0+1
Research		0+1
Total		**15 credits**

SECOND SEMESTER

Major Courses		
AGR - 821	Farming Systems and Sustainable Agriculture	3+0
AGR - 822	Irrigation Management	2+1
Minor Course		
AGR - 823	Stress Crop Production	2+1
Supporting course		
STA.821	Advance in Design of Experiments.	2+1
Seminar – II		0+1
Research		0+2
Total		**15 credits**

THIRD SEMESTER

Research	0+12

FOURTH SEMESTER

Research	0+12

FIFTH SEMESTER

Research	0+12

SIXTH SEMESTER

Research	0+9
Total	**75 Credits**

SYLLABUS

AGR 811 : ADVANCES IN CROP GROWTH AND PRODUCTIVITY (2+1)

Objective

- To study the physiology of vegetative and reproductive growth in relation to productivity of different crops in various environments.

Theory

Unit–I

Plant density and crop productivity; plant and environmental factors, yield, plant distribution, strategies for maximizing solar energy utilization; leaf area; interception of solar radiation and crop growth; photosynthesis: the photosynthetic apparatus, factors essential for photosynthesis; difference in photosynthetic rates among and within species; physiological limitations to crop yield; solar radiation concept and agro-techniques for harvesting solar radiation.

Unit–II

Growth analysis: concept, CGR, RGR, NAR, LAI, LAD, LAR; validity and Limitations in interpreting crop growth and development; growth curves: sigmoid, polynomial and asymptotic; root systems; root-shoot relationship.

Unit–III

Principles involved in inter and mixed cropping systems under rainfed and irrigated conditions; concept and differentiation of inter and mixed cropping; criteria in assessing the yield advantages.

Unit–IV

Competitive relationship and competition functions; biological and agronomic basis of yield advantage under intercropping; physiological principles of dry land crop production, constraints and remedial measures; heat unit concept of crop maturity: concept and types of heat units.

Unit–V

Concept of plant ideotypes: crop physiological and new ideotypes; characteristics of ideotype for wheat, rice, maize, etc.; concept and types of growth hormones; their role in field crop production; efficient use of resources.

Practical

- Field measurement of root-shoot relationship in crops at different growth stages
- Estimation of growth evaluating parameters like CGR, RGR, NAR, LAI etc., at
- different stages of crop growth
- Computation of harvest index of various crops
- Assessment of crop yield on the basis of yield attributing characters
- Construction of crop growth curves based on growth analysis data
- Computation of competition functions, viz. LER, IER aggressivity competition
- index etc in intercropping
- Senescence and abscission indices
- Analysis of productivity trend in un-irrigated areas
- Analysis of productivity trend in irrigated areas

Theory Lecture Schedule

1. Crop productivity – Soil fertility – plant density – definition – concepts
2. Agronomic significance of plant density and crop productivity

3. Factors and constraints involved in soil and crop productivity for sustainable production.
4. Importance of radiation energy – solar constant - Dispassion of solar energy – net radiation balance
5. Radiation laws such as Planck law, wavelength and frequency relationship, wein's law etc.
6. Radiation distribution in a plant and in a plant community – Monteith's equations.
7. Photosynthesis a big business – interaction between radiant energy and matter action & absorption spectra – importance – quantum yield.
8. C_3, C_4 and CAM Plants and its importance in crop productivity
9. Crop management practices for higher photosynthesis
10. Growth analysis concepts CGR, RGR & NAR for higher productivity.
11. Growth analysis concepts – LAI, LAD and LAR for higher productivity
12. Growth expressions using growth curves – sigmoid, polynomial and asymptotic
13. Root - shoot relationships
14. Resource utilization in irrigated cropping
15. Resource utilization in rainfed cropping
16. Criteria for assessing yield advantages
17. Assessment of competition and yield advantages
18. Mid semester examinations
19. Interaction in mixed crop communities
20. Competition for solar radiation & carbon dioxide
21. Competition for soil & other factors
22. Role of plant population & geometry for maximum yield under inter cropping
23. Role of sowing time & genotype selection for maximum yield under inter cropping
24. Problems of crop production in dry farming
25. Moisture stress - Development of moisture stress & effects of moisture stress.
26. Crop adaptations & water harvesting in dry areas.
27. Soil & moisture conservation measurers
28. Definition and concept of plant ideotypes
29. Factors responsible for successful cultivation of new plant types.
30. Recent approaches towards reconstructing new plant types.
31. Ideotype for advance agronomy
32. Characters of ideotype for wheat & maize
33. Characters of ideotype for rice
34. Role of growth hormones and crop production

Practical Schedule

1. Beer's law – calculation resulting
2. Seed rate & yield from vegetative as well as from reproductive growth usage of experimental data & discussing.
3. Growth analysis – Determination of CGR & RGR – experimental data from cereals & millets interpretation.

4. Growth analysis estimation LAI, NAR experimental data from cereals & millets interpretation.
5. Working out & mapping rainfall types in dry farming tracts in Tamil Nadu, India & world.
6. Working out drought indices.
7. Rainfall prediction – rainfall analysis & formulation of cropping system
8. Working out rainfall use efficiency and solar use efficiency.
9. Working out yield sustainability indices
10. Working out yield stability indices.
11. Indices for evaluation of intercropping system.
12. Working out economics of inter cropping system in dry lands
13. Working out watershed models for alfisol and vertisols
14. Visit to dry farming research stations for studying improved dry land technology
15. Crop response to growth regulators.
16. Determination of photosynthetic efficiency in crop plants
17. Estimation of soluble protein in crops to asses the photosynthetic rate.

References

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2. and Salinity Resistance in Crop Plants. Oxford and IBH.
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9. Mukherjee S & Ghosh AK. 1996. Plant Physiology. Tata McGraw Hill.
10. Narwal SS, Politycka B & Goswami CL. 2007. Plant Physiology:Research Methods. Scientific Publishers.

AGR 812 : CURRENT TRENDS IN AGRONOMY (3+0)

Objective

- To acquaint the students about recent advances in Agrl. production.

Theory

Unit–I

Agro-physiological basis of variation in yield, recent advances in soilplant- water relationship.

Unit–II

Globalization of agriculture and WTO, precision agriculture, contract farming, organic farming, marketing and export potential of organic products, certification, labeling and accreditation procedures.

Unit–III

Crop residue management in multiple cropping systems; latest developments in plant management, weed management, cropping systems, grassland management, agro-forestry, allelopathy.

Unit–IV

GIS, GPS and remote sensing for crop management, global warming, GM crops, seed production technology; seed certification, seed multiplication, hybrid seed production etc.

Unit–V

Concepts of system agriculture; holistic approach of farming systems, dryland farming, sustainable agriculture and research methodology in Agronomy.

Theory Lecture Schedule

1. Physiological factors limiting crop yields
2. Microclimate and crop production
3. Potential yield – actual yield – reducing the gap between potential yield and actual yield
4. Growth analysis – tools, crop production in different eco-system
5. Recent advances in soil, water &plant relationship
6. Conventions adopted in soil and plant water relationship
7. Active and passive absorption – soil plant atmosphere continuum
8. Water resources in India and Tamilnadu
9. Water resources present status and future needs
10. Water and its role in plants
11. Globalization in agriculture
12. Impact of WTO in Agriculture sector
13. Crop modelling, information techniques and WTO issues in agriculture
14. Precision Agriculture – concept, approach and relevance to Indian agriculture
15. Precision agriculture and cropping system
16. Soil and land information for precision agriculture
17. Organic farming – definition, concepts, prospects, opportunities
18. Current status of organic farming in India and Tamilnadu
19. Marketing and export potential of organic product
20. Certification standards, procedure and regularity mechanism

21. Organic certification – standards and agencies – marketing and export avenues
22. Organic product – labeling and accreditation
23. Crop residues in crop association
24. Farm wastes utilization in agriculture- Organic manures and their dynamics
25. Midsemester examination
26. Crop residue management – its importance in soil and crop productivity
27. Organic manures in relation to soil fertility
28. Latest development in plant management
29. New developments in weed management
30. Latest developments in Cropping system
31. Latest development in grassland management and agro forestry
32. Allelopathy and interaction among crop communities
33. GIS, GPS – Introduction – History – basic concept
34. Techniques, procedure and terminology of geography information systems
35. Application of GPS in Agrl. and natural resource management
36. Scope of remote sensing in agriculture – sensors and platforms, data availability for Agrl. remote sensing
37. Differentiation and identification of soils and soil resource mapping and remote sensing
38. Crop mapping – vegetation dynamics, crop stress evaluation and differentiation
39. Environmental pollution – global warming and impact of pollution and vegetation
40. Definition and concept of climatic change, climatic variability, green house effect – cause of climatic change with emphasis to agriculture
41. Genetic engineering and crop improvement – steps and techniques involved and application
42. GM crops and traits – prospects of transgenic crops
43. Principles and practices of seed production in field crops
44. Seed certification – basic principles
45. Seed multiplication – new techniques and methods, hybrid seed production in field crops
46. Concept of system agriculture
47. Holistic approaches of farming system
48. Dry farming – dry land research – past and present scenario
49. Dry climates – dry farming regions in India and Tamilnadu
50. Research prioritization and selection of research problem, designing research programme for field experimentation
51. Preparation of research project, evaluation of research articles – national and International

References

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2. Dahiya BS & Rai KN. 1997. *Seed Technology*. Kalyani.
3. Dushyent Gehlot, 2009 *Organic Farming*. Agrobios India, Jodhpur.

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9. *Practice*. Scientific Publ.
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12. Tarafdar JC, Tripathi KP & Mahesh Kumar 2007. *Organic Agriculture*. Scientific Publ.

AGR 813 : WEED MANAGEMENT (2+0)

Objective

- To teach about the changing weed flora, new herbicides, their resistance, toxicity, antidotes and residue management under different cropping systems.

Theory

Unit–I

Crop-weed competition in different cropping situations; changes in weed flora, various causes and affects.

Unit–II

Physiological and biological aspects of herbicides, their absorption, translocation, metabolism and mode of action; selectivity of herbicides and factors affecting them.

Unit–III

Climatic factors and phytotoxicity of herbicides; fate of herbicides in soil and factors affecting them, residue management of herbicides, adjuvants.

Unit–IV

Advances in herbicide application techniques; herbicide resistance; antidotes and crop protection compatibility of herbicides of different groups; compatibility of herbicides with other pesticides.

Unit–V

Development of transgenic herbicide resistant crops; herbicide development, registration procedures. Relationship of herbicides with tillage, fertilizer and irrigation; bioherbicides, allelochemical herbicide bioassays.

Theory Lecture schedule

1. Definition – Characters of weed – Survival mechanism of weeds – Economic uses of weeds
2. Crop weed competition - Allelopathy
3. Impact of weeds on different crops
4. Behavior of weeds in different agro-eco system
5. Ecological role of weeds in agro-ecosystems of crop manipulations.
6. Weed migration – Dormancy and Germination
7. Herbicides – definition – classification and it's characteristics
8. Inorganic herbicides - un classified groups -descriptions
9. Absorption, translocation of herbicides - Mode of action of herbicides
10. Selectivity of herbicides in plants
11. Factors influencing the selectivity of herbicides

12. uptake and translocation of foliage & soil applied herbicides
13. Persistence of herbicides as influenced by climatic factors
14. Degradation of herbicides as influenced by climatic factors
15. Herbicide toxicity to crop & weeds – symptoms
16. Degradation mechanism of herbicides in plant
17. Fate of herbicides in soil – volatilization & leaching
18. Midsemester examination
19. Chemical decomposition – adsorption, photo decomposition & plant uptake
20. Herbicide persistence & residue & residue management
21. Advance techniques in herbicide application & equipments
22. Principles of herbicide resistance
23. Nature and characteristics of herbicide resistance in crops & associated weeds
24. Reasons for development of herbicide resistance & its significance
25. New herbicides – herbicide protectants & antidotes
26. Crop protection compability of herbicides of different groups
27. Compability of herbicides
28. Bio-technological approaches – Development of herbicide resistance in crops
29. Development of herbicide resistance in crops – Genetic & other methods
30. Herbicide development
31. Herbicide relationship with – Tillage, fertilizers and irrigation
32. Herbicide registration & regulation – Decision support system
33. Bio-herbicides – development- Natural products & bio-technology in weed management
34. Bio-Assays of herbicides residue

References

1. Aldrich RJ & Kramer R.J. 1997. *Principles in Weed Management*. Panama Publ.
2. Ashton FM & Crafts AS. 1981. *Mode of Action of Herbicides*. 2nd Ed. Wiley-Inter Science.
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8. Tomlin, C.D.S. 2006. *The Pesticide Manual*. 14th Edition, BCPC Publications, Hampshire, UK.

AGR 814 : SOIL CONSERVATION AND WATERSHED (2+1)

Objective

- To teach about different soil moisture conservation technologies for enhancing the Agrl. productivity through holistic approach watershed management.

Theory

Unit–I

Soil erosion: definition, nature and extent of erosion; types of erosion, factors affecting erosion.

Unit–II

Soil conservation: definition, methods of soil conservation; agronomic measures - contour cultivation, strip cropping, cover crops; vegetative barriers; improved dry farming practices; mechanical measures - bunding, gully control, bench terracing; role of grasses and pastures in soil conservation; wind breaks and shelter belts.

Unit–III

Watershed management: definition, objectives, concepts, approach, components, steps in implementation of watershed; development of cropping systems for watershed areas.

Unit–IV

Land use capability classification, alternate land use systems; agro-forestry; ley farming; *jhum* management - basic concepts, socio-ethnic aspects, its layout.

Unit–V

Drainage considerations and agronomic management; rehabilitation of abandoned *jhum* lands and measures to prevent soil erosion.

Practical

- Study of different types of erosion
- Field studies of different soil conservation measures
- Run-off and soil loss measurements
- Laying out run-off plot and deciding treatments
- Identification of different grasses and trees for soil conservation

- Visit to a soil conservation research centre, demonstration and training centre

Theory Lecture Schedule

1. Soil erosion – Definition – Agents of erosion – Forms of erosion – soil and nutrient loss – land degradation.
2. Erosion – Extent of soil erosion – types – Geological – Accelerated erosion –
3. Water erosion – Process of water erosion – forms of water erosion – sheet erosion – rill erosion – Gully erosion – ravines – land slides – stream bank erosion.
4. Factors affecting water erosion – rainfall – soils – topography – soil surface cover – biotic interference.
5. Wind erosion – mechanism of wind erosion – saltation – suspension – surface crop.
6. Factors affecting wind erosion – soil cloudiness – surface crust – wind and soil moisture – vegetative cover – organic matter – Topography – soil.
7. Estimation of soil loss – losses due to water erosion – wind erosion – Erosion control factors – Agronomic measures forestry measures.
8. Soil conservation – Definition – soil conservation research in India – soil moisture constraints and their management.
9. Methods of soil and water conservation – Insitu conservation - Agronomic measures – contour cultivation - contour ploughing – summer ploughing - mulching – strip cropping – cover crops – Inter cropping.
10. Mechanical measures – Broad bed furrows – Dead furrow – contour bunding – compartmental bunding – Graded bunding –Terracing.
11. Biological measures – pastures – strip cropping with grasses – Ley farming – vegetative barriers.
12. Control of water losses – Evaporation control – shelter belts – wind breaks – Transpiration control – antitranspirants – Growth retardants – windbreaks – shelter belts.
13. Soil conservation programmes in rice valleys – national conservation strategy – Initiatives to control environmental pollution – new policy initiatives.
14. Degraded eco-system and conservation of biodiversity – India's efforts for biodiversity conservation – Insitu, Exsitu conservation – conventional methods of situ conservation by seeds.
15. Watershed management micro and macro watershed – definition – Principles of watershed management – need and advantages.
16. Concepts – Aim and approaches of watershed management – components of watershed management – water resource improvement – soil and moisture conservation in cultivated lands.
17. Components – soil water conservation and water harvesting – Hardware treatments – water ways – bunds - graded bunds – Terracing.
18. Mid semester examination
19. Medium Soft ware treatments – key line bunds – strip leveling – line buds - vegetative barriers – soft were treatments – contour farming – Tillage.
20. Water harvesting measures - minor irrigation tanks - Farm ponds – percolation tanks – stop dams.
21. Watershed development methods – crop management – selection of improved

varieties – contingency plan – Integrated farming system.

22. Alternate land use system – action plan for watershed development - socio economic problems – cost benefit analysis of watersheds.
23. Classification of land – land use Pattern before independance – land use pattern in India – types of land use – land use planning.
24. Steps in land use planning – change in land use pattern – optimal land use pattern – cropping pattern - Area under food grains and non food grains.
25. Alternate land use systems for marginal and degraded lands – pastures and grasslands lands – silvi culture – multipurpose tree species.
26. Agroforesty – Definition - Importance – components.
27. Agro forestry systems – based on structure, dominance of components, Temporal arrangement of components and allied components.
28. Agroforesty systems in India – Agri – silviculutre – silvi pastoral – Agri-horticulture – Agri – Silvi pastoral – Agri-horti – silvi culture.
29. Agroforesty Systems –Homestead agroforestry – ley farming – alley cropping – classification of alley cropping.
30. Jhum/shifting cultivation – Jhum cultivation in India – basic concepts.
31. Harmful effects – ecological problems due to Jhum cultivation - Jhum cultivation in modernday – lay out of Jhum cultivation.
32. Abolishing shiftting cultivation – role of government – drainage considerations and agronomic management.
33. Waste land development – management classification – cultivable and uncultivable wastelands- raverine land – coastal sandy areas.
34. High altitude and steep sloppy areas – salt affected soils. Salt affected soils of India – alkali soils – water logged and morshy lands – Gullied and Ravinous land – sand dune management – afforestation.

Practical Schedule

1. Types of erosion and methods to prevent erosion
2. Insitu soil moisture conservation techniques
3. Mulching and its effects
4. Antitranspirants
5. Estimation of run off and soil loss
6. Laying out run-off plot and deciding treatments
7. Working out land use pattern in the world, India and Tamilnadu
8. Preparation and methodology for implementation of water shed projects
9. Preparation of model watershed programme
10. Identification of common tree species
11. Identification of common pasture grasses and legumes
12. Nursery techniques and planting methodology for tree crops.
13. Study of litter fall and biomass deposits
14. Assessment of economic uses of trees
15. Assessment of biomass production under watershed area
16. Visit to an Institute related to Agroforestry / dryland agriculture
17. Visit to watersheds of NWDPRA / CWDP – Input analysis

References

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2. Dhruvanarayana VV. 1993. Soil and Water Conservation Research in India. ICAR.
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8. Yellamanda Reddy T & Sankara Reddy GH. 1992. Principles of Agronomy.

SECOND SEMESTER

AGR 821 : FARMING SYSTEMS AND SUSTAINABLE AGRICULTURE (3+0)

Objective

- To apprise about different farming enterprises suitable for different agroclimatic conditions for sustainable agriculture and designing systems approach

Theory

Unit–I

Farming systems: definition and importance; classification of farming systems according to type of rotation, intensity of rotation, degree of commercialization, water supply, enterprises.

Unit–II

Concept of sustainability in farming systems; efficient farming systems; natural resources - identification and management.

Unit–III

Production potential of different components of farming systems; interaction and mechanism of different production factors; stability in different systems through research; eco- physiological approaches to intercropping.

Unit–IV

Systems classification; flow charts, modeling techniques and methods of integration - state, rates and driving variables, feedbacks and relational diagrams.

Unit–V

Crop modeling methods for crop-weather interaction, climate change and variability components.

Theory Lecture Schedule

1. Concept – Principles of Farming Systems Management
2. Goals of farming systems
3. Farming system definition and importance
4. Farming systems research and development priorities and methodological issues
5. Classifications and approaches to farming systems research
6. Scope and futurology of farming systems.
7. Low input concepts for farming systems
8. Inter related objectives and steps of farming systems research
9. Nutrient and water management in farming systems
10. Weed management in farming systems
11. Factors influencing the choice of component elements
12. Integrated farming systems prospects of constraints
13. Types and intensity of rotations in farming systems
14. On farm nutrient budgetting in farming system
15. Commercialization of value addition in farming systems
16. Enterprises involved in wetland farming systems
17. Enterprises involved in dryland farming systems
18. Enterprises involved in gardenland farming systems
19. Sustainability of farming system and development
20. Resource management through farming systems
21. Crop planning and alternate land use systems
22. Natural resource recycling through farming systems
23. FSR methodology and problem identification
24. Environment conservation and farming
25. Midsemester examination
26. Socio economic constraints for farming systems adoption
27. Component technologies of systems approach farming
28. Multidisciplinary approach and prospects in farming systems
29. Components identification and management in farming systems

30. Production potentiality of different components of farming systems
31. Organic recycling and integrated farming systems
32. Interaction and Allocation of farming components
33. Mechanism of different production factors in farming systems
34. Stability and complimentary benefits through farming systems research
35. Allelopathy and plant Interactions in cropping systems
36. Evaluation and socio economic constraints in cropping systems
37. Systems classifications and methodology for institutional research
38. Flow chart for methods in on farm trials
39. Flow chart for problem identification and development of a base
40. Analysis and hypothesis of various integration methods
41. Methodology of designing testing and improving in farming systems
42. Hierarchy and parameters quantifying the prototype evaluation
43. Modelling techniques in farming systems research
44. Driving variables, feed backs and relational modeling in farming systems
45. Tools to evaluate environmental impacts of farming systems
46. Predictions of crop production in relation to climate
47. Computerized farming system simulation model in land use optimization
48. Adaptation of different Agrl. systems to climate change.
49. Crop modelling a tool for Agrl. research
50. Variability and interaction involved in farming systems
51. Integrated approaches to climate crop modeling - Biotic interaction of farming components and crop modelling

References

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AGR 822 : IRRIGATION MANAGEMENT (2+1)

Objective

- To teach students about optimization of irrigation in different crops under variable agroclimatic conditions.

Theory

Unit–I

Water resources of India, irrigation projects; irrigation needs, atmospheric, soil, agronomic, plant and water factors affecting irrigation need; water deficits and crop growth.

Unit–II

Soil-plant-water relationships, transpiration and evapotranspiration, significance of transpiration, energy utilization in transpiration, physiological processes and crop productivity. Infiltration; water movement under saturated and unsaturated conditions; management practices for improving water use efficiency of crops.

Unit–III

Application of irrigation water, conveyance and distribution system, irrigation efficiency; agronomic considerations in the design and operation of irrigation projects; characteristics of irrigation and farming systems affecting irrigation management.

Unit–IV

Strategies of using limited water supply; factors affecting ET, control of ET by mulching and use of anti-transpirants; fertilizer use in relation to irrigation; optimizing the use of given irrigation supplies.

Unit–V

Land suitability for irrigation, land irrigability classification; integrated water management in command areas, institution of water management in commands, farmer's participation in command areas; irrigation legislation.

Practical

- Determination of water infiltration characteristics and water holding capacity of soil profiles
- Moisture extraction pattern of crops
- Consumptive use, water requirement of a given cropping pattern for optimum/variable productivity
- Crop planning at the farm and project level
- Agronomic evaluation of irrigation projects, case studies

Theory Lecture Schedule

1. Water resources of India, Tamilnadu present status and future recodes
2. Irrigation projects if India – Tamilnadu
3. Irrigation needs – Soil plant and meteorological factors determining irrigation need
4. Water deficits and crop growth
5. Water and its role in plants – Soil – water – plant relationship
6. Soil water constants

7. Water movement under – Saturated and unsaturated condition
8. Availability of water and absorption by roots.
9. Transpiration and evaportranspiration
10. Defination – Significance of transpiration
11. Evatranspiration and consumptive use
12. Physiological process of transpiration and crop productivity
13. Infiltration – Factors affecting infiltration rate – Measurement of infiltration rate.
14. Irrigation efficiency – Management practices for improving water use efficiency of crops.
15. Soil moisture conservation practices for improving water use efficiency of crops.
16. Surface water distribution system.
17. Underground pipeline irrigation.
18. Mid semester examination
19. Recent methods of distribution system, irrigation system.
20. Agronomic considerations in the design.
21. Agronomic considerations in the designs and operation of irrigation projects.
22. Irrigation management for different agro ecosystem
23. Characteristics of irrigation and farming systems affecting irrigation management.
24. Water requirement of crops.
25. Strategies of using unlimited water supply.
26. Crop plant adoption to moisture stress / excess and crop growth.
27. Factors affecting Evapotranspiration.
28. Control of ET by mulching and antitranspirants
29. Fertilizer use in relation to irrigation – fertigation.
30. Optimizing the use of water / Effective utilizing of irrigation
31. Land suitability for irrigation land irritability classification
32. Integrated water management is command areas
33. Institutions of water management in commands
34. Farmers participation in command area
35. Irrigation legislation

Practical Schedule

1. Estimation of soil moisture contents by different methods
2. Determination of soil moisture constants
3. Measurement of evapotranspiration
4. Computation of water requirement of crops using modified pennan formula
5. Measurement of water flow under saturated and unsaturated condition
6. Determination of infiltration rate and hydraulic conductivity
7. Designing and evaluation of modern methods of irrigation
8. Developing fertigation scheduling for various crops, chemigation under micro irrigation.
9. Working out irrigation efficiencies and crop water demand
10. Moisture extraction pattern of different crops

11. Crop planning at the farm and project level
12. Water requirement of a given cropping pattern/ variable productivity
13. Visit to canal and tank commands and identification and making intervention
14. Irrigation scheduling
15. Agronomic evaluation of irrigation projects
16. case studies
17. Measurement of irrigation water by various devices.

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AGR 823 : STRESS CROP PRODUCTION (2+1)

Objective

- To study various types of stresses in crop production and strategies to overcome them.

Theory

Unit–I

Stress and strain terminology; nature and stress injury and resistance; causes of stress.

Low temperature stress: freezing injury and resistance in plants, measurement of freezing tolerance, chilling injury and resistance in plants, practical ways to overcome the effect of low temperature tress through, soil and crop manipulations.

Unit–II

High temperature or heat stress: meaning of heat stress, heat injury and resistance in plants, practical ways to overcome the effect of heat stress through soil and crop manipulations.

Unit–III

Water deficit stress: meaning of plant water deficient stress and its effect on growth and development, water deficit injury and resistance, practical ways to overcome effect of water deficit stress through soil and crop, manipulations.

Unit–IV

Excess water or flooding stress: meaning of excess water stress, its kinds and effects on crop plants, excess water stress injury and resistance, practical ways to overcome excess water stress through soil and crop manipulations.

Unit–V

Salt stress: meaning of salt stress and its effect on crop growth, salt stress injury and resistance in plants, practical ways to overcome the effect of salt stress through soil and crop manipulations. Mechanical impedance of soil and its impact on plant growth; measures to overcome soil mechanical impedance. Environmental pollution: air, soil and water pollution, and their effect on crop growth and quality of produce; ways and means to prevent environmental pollution.

Practical

- Determination of electrical conductivity of plant cell sap
- Determination of osmotic potential and tissue water potential
- Measurement of transpiration rate
- Measurement of stomatal frequency
- Growing of plants in sand culture under salt stress for biochemical and physiological studies
- Studies on effect of osmotic and ionic stress on seed germination and seedling growth
- Measurement of low temperature injury under field conditions

Theory Lecture Schedule

1. Stress and strain terminology
2. Nature and stress injury in crop plants.
3. Soil salinity and sodicity as particular plant / Crop stress factors.
4. Different causes of stress.
5. High temperature stress – Definition - heat injury

6. Effect of heat – Temperature stress on photosynthetic apparatus.
7. Soil and crop manipulations to overcome the effect of heat stress.
8. Excess water stress through soil and crop manipulations.
9. Water stress – Definition – Plant water deficit stress.
10. Constraints by water stress on plant growth
11. Effect of water deficit stress on growth and development.
12. Nutrient uptake by plants under stress condition.
13. Plant response to water – Deficit condition.
14. Soil and crop manipulation to overcome the effect of water deficit stress.
15. Excess water to crop plant water stress.
16. Water stress and its kinds and effect on crop plants.
17. Mid-Semester examination
18. Excess water stress injury and resistance.
19. Soil and crop manipulation to overcome the effect of excess water stress.
20. Salt stress – Definition – Its effect on crop growth.
21. Plants in saline environments.
22. Salt stress injury and resistance in plants.
23. Crop response & management of salt affected soils.
24. Soil manipulation to overcome the effect of salt stress.
25. Crop manipulation to overcome the effect of salt stress.
26. Mechanisms involved in salt tolerance in plants.
27. Mechanical impedance of soil & its impacts on plant growth.
28. Measures to overcome soil mechanical impedance.
29. Definition – Pollution – air pollution effect on crop growth and quality of produce.
30. Soil pollution – Effect on crop growth and quality of produce.
31. Water pollution – Effect on crop growth and quality of produce.
32. Effect of atmospheric pollution with special reference to ozone on plants under normal & saline conditions.
33. Plant response to air pollution & heavy metal stress.
34. Photosynthetic response of crop to environmental changes.

Practical schedule

1. Determination of electrical conductivity of plant cell sap.
2. Determination of osmotic potential.
3. Determination of tissue water potential.
4. Measurement of transipiration rate.
5. Measurement of stomatal frequency.
6. Growing of plants in sand culture under salt stress for biochemical studies.
7. Growing of plants in sand culture under salt stress for physiological studies.
8. Studies on effect of osmotic stress on seed germination.
9. Students on ironic stress on seed germination.
10. Studies on effect of osmotic stress on seedling growth.
11. Students on effect of ironic stress on seedling growth.
12. Measurement of low temperature injury under field condition.
13. Measurement of high temperature under controlled condition.

14. Studies on Air, water and soil pollution.
15. Studies on effect of different types of pollution on crop growth and quality of produce.
16. Studies on the effect of excess water or flooding stress on crop growth and development.
17. Measures to prevent different environmental pollution.

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