Description: Irrigation Science

Academic group: FOENS
Academic org: FOES03
Student contribution band: 2
ASCED code: 039999

STAFFING
Examiner: Rod Smith
Moderator: Steven Raine

REQUISITES
Pre-requisite: AGR3304

SYNOPSIS
The control of the application of water to land (irrigation) and the removal of surplus water from land (drainage) is critical to much of Australia's agriculture. This course will provide the skills necessary for the design and management of effective, efficient and sustainable on farm irrigation systems. Irrigation application methods (current and proposed) are studied with an emphasis on the evaluation and optimisation of performance. Efficient irrigation also requires an appreciation of the physical processes of the entry, storage and redistribution of water in soils; the uptake of water by plants (including limitations caused by soil salinization); evaporation of water directly into the atmosphere; and evaporation through plants as transpiration (evapotranspiration). The course will also show students that the long term viability of irrigation is dependent upon the provisions of adequate surface and subsurface drainage. Finally the course attempts to apply all of the above skills in the planning and design of whole farm irrigation systems.

OBJECTIVES
On completion of this course, students should be able to:
1. explain the physical constraints on evaporation from crops and open water;
2. apply concepts of fully forced convection to the atmospheric transport of water vapour and explain combination equation models;
3. calculate reference crop evaporation from daily meteorological data and estimate actual crop evaporation;
4. explain and make allowance for advective and oasis effects;
5. analyse and compare the available methods of evaporation measurement;
6. estimate total crop consumptive use and leaching requirements, and prepare a workable irrigation schedule;
7. determine the hydraulic conductivity of a saturated soil;
8. apply Darcy's Law to a range of saturated and unsaturated flow problems;
9. determine the infiltration behaviour of a soil under ponding and non ponding conditions and calculate limiting application rates;
10. describe and compare the available irrigation methods;
11. optimise the parameters in surface irrigation to achieve maximum efficiency and uniformity of applications;
12. evaluate the efficiency and effectiveness of an irrigation;
13. evaluate the uniformity of applications for surface, sprinkler and micro irrigation methods;
14. be aware of the needs and distinguishing factors of amenity irrigation;
15. calculate the drainage requirements of a crop and determine a suitable drain depth - spacing combination for effective sub surface drainage;
16. determine the response of a water table to drainage.

**TOPICS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Micrometeorology and the physics of evaporation</td>
<td>20.00</td>
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<tr>
<td>2. Soil plant atmosphere continuum</td>
<td>25.00</td>
</tr>
<tr>
<td>3. Irrigation scheduling</td>
<td>10.00</td>
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<tr>
<td>4. Irrigation application methods</td>
<td>25.00</td>
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<tr>
<td>5. Drainage</td>
<td>10.00</td>
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<td>6. Irrigation performance evaluation</td>
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</table>

**TEXT and MATERIALS required to be PURCHASED or ACCESSED:**

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at http://bookshop.usq.edu.au click 'Semester', then enter your 'Course Code' (no spaces).

*Env4106 Irrigation Science External Study Package, USQ Publication,*
REFERENCE MATERIALS:

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.


American Society of Agricultural Engineers Monograph 1980, *Design and Operation of Farm Irrigation Systems*,

Campbell, G. S. 1985, *Soil Physics with Basic*, *Developments in Soil Science 14*, Elsevier,

Doorenbos, J. & Kassam 1979, *Yield Response to Water*, FAO Irrigation and Drainage Paper No 33,


Oke, J. R. 1988, *Boundary Layer Climates*, 2nd edn, Methuen,


STUDENT WORKLOAD REQUIREMENTS:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
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<td>Examinations</td>
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<tr>
<td>Lectures</td>
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<td>Private Study</td>
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<td>Tutorial</td>
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ASSESSMENT DETAILS

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<th>Wtg(%)</th>
<th>Due date</th>
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<td>ASSIGNMENT</td>
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<td>25.00</td>
<td>17 Sep 2004</td>
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<tr>
<td>3 HOUR CLOSED EXAMINATION</td>
<td>750.00</td>
<td>75.00</td>
<td>END S2 (see note 1)</td>
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</table>

NOTES:

1. Student Administration will advise students of the dates of their examinations during the semester.

IMPORTANT ASSESSMENT INFORMATION

1 Attendance requirements:
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

2 Requirements for students to complete each assessment item satisfactorily:
To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assessment item.

3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 10% of the total marks available for the assignment will apply for each working day late.

4 Requirements for student to be awarded a passing grade in the course:
To be assured of receiving a passing grade a student must submit all of the summative assessment items and achieve at least 50% of the available weighted marks for those items.

5 Method used to combine assessment results to attain final grade:
The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.

6 Examination information:
In a Closed Examination, candidates are allowed to bring only writing and drawing instruments into the examination.

7 Examination period when Deferred/Supplementary examinations will be held:
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.

8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL http://www.usq.edu.au/corporateservices/calendar/part5.htm or in the current USQ Handbook.

ASSESSMENT NOTES

1 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.

2 Students must retain a copy of each item submitted for assessment. This must be despatched to USQ within 24 hours if required by the Examiner.

3 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.

4 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.
5 The Faculty will NOT accept submission of assignments by facsimile.
6 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.
7 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
8 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded one of the temporary grades: IM (Incomplete - Make up), IS (Incomplete - Supplementary Examination) or ISM (Incomplete - Supplementary Examination and Make up). A temporary grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.
9 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).