**Course Specification**

**Description: Irrigation Science**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<tr>
<td>ENV</td>
<td>4106</td>
<td>14626</td>
<td>2, 2002</td>
<td>ONC</td>
<td>1.00</td>
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**Academic Group:** FOENS  
**Academic Org:** FOES03  
**HECS Band:** 2  
**ASCED Code:** 039999

**STAFFING**

Examiner: Rod Smith  
Moderator: Mark Porter

**PRE-REQUISITES**

Pre-requisite: AGR 3304

**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:

- explain the physical constraints on evaporation from crops and open water;
- apply concepts of fully forced convection to the atmospheric transport of water vapour and explain combination equation models;
- calculate potential evaporation from daily meteorological data and estimate actual crop evaporation;
- explain and make allowance for adventive and oasis effects;
• analyse and compare the available methods of evaporation measurement;
• estimate total crop consumptive use and teaching requirements, and prepare a workable irrigation schedule;
• determine the hydraulic conductivity of a saturated soil;
• apply Darcy's Law to a range of saturated and unsaturated flow problems;
• determine the infiltration behaviour of a soil under ponding and non ponding conditions and calculate limiting application rates;
• describe and compare the available irrigation methods;
• optimise the parameters in surface irrigation to achieve maximum efficiency and uniformity of applications;
• evaluate the efficiency and effectiveness of an irrigation;
• evaluate the uniformity of applications for surface, sprinkler and micro irrigation methods;
• be aware of the needs and distinguishing factors of amenity irrigation;
• calculate the drainage requirements of a crop and determine a suitable drain depth - spacing combination for effective sub surface drainage;
• determine the response of a water table to drainage;
• plan and design an on farm irrigation system.

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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<td>2. Soil plant atmosphere continuum</td>
<td>25.00</td>
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<td>3. Irrigation scheduling</td>
<td>10.00</td>
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<td>4. Irrigation application methods</td>
<td>30.00</td>
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<tr>
<td>5. Drainage</td>
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</tr>
<tr>
<td>6. On farm irrigation planning and design</td>
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TEXT and MATERIALS required to be PURCHASED or ACCESSED:
Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.

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,


**STUDENT WORKLOAD REQUIREMENTS**

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

<table>
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<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
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<th>Due Date</th>
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<tr>
<td>ASSIGNMENT 1</td>
<td>250.00</td>
<td>25.00</td>
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<td>ASSIGNMENT 2</td>
<td>150.00</td>
<td>15.00</td>
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<td>11 Oct 2002</td>
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<td>3 HOUR CLOSED EXAMINATION</td>
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<td>60.00</td>
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**NOTES:**

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

**OTHER REQUIREMENTS**

1. Students must achieve at least 45% of the maximum possible marks in each assessment, and at least 50% of total marks for all assessments in order to complete the course successfully.

2. A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.

3. The due date for an assignment is the date by which a student must submit the assignment to the USQ. The onus is on the student to provide proof of the submit date, if requested by the Examiner.
Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.

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.

If students submit assignments after the due date without prior approval then a penalty of up to 20% of the total marks for the assignment will apply for each working day late.

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.

The Faculty of Engineering and Surveying will NOT accept submission of hand written or typed assignments by facsimile, e-mail or computer diskette. Students in remote locations who do not have regular access to postal services may be given special consideration.

The final grades for students will be assigned on the basis of the aggregate of the marks obtained for each of the assessments in the course.

A closed examination is an examination where the candidates are allowed to bring only writing and drawing instruments into the examination.

The Faculty of Engineering and Surveying does not offer supplementary examinations.

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 the temporary grade: IM (Incomplete - Make up). An IM 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.

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; IDSM (Incomplete Deferred Examination and Make-up).