390306 - REC - Irrigation Technology

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering
Teaching unit: 745 - EAB - Department of Agri-Food Engineering and Biotechnology
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6  Teaching languages: Catalan

Degree competences to which the subject contributes

Specific:

General:
2. Ability to solve problems. LEVEL 3

Teaching methodology

The teaching methodology includes theory sessions with large group sessions and problem solving and presentation of two works with small groups. The lectures will be participatory lectures, and serve to introduce the learning objectives and present the concepts necessary to achieve them.

Problem solving sessions are compulsory and serve to maintain an active discussion with students (small group). They discuss problem solving that has made self-learning by the student from the teacher indications given in the lectures. The resolution of these issues will enable the teacher to see students making the applicability of the theoretical.

Each student must perform two jobs (one on drip irrigation and another on sprinkler) in groups of 2 or 3 people and present them to the teacher a written report and make an oral presentation to the other students. This activity will take place in small group practices 1, 2, 3, 8, 9 and 10. The student will be available on the digital campus Athena the statement of the problems (for problem solving sessions), a detailed script for the completion of the work, transparencies and lectures, also there is a bibliography on detailed reference books that can be found in the library.

Learning objectives of the subject

The monitoring of this course, students will be able to identify the main advantages of the different irrigation systems and establish criteria for choosing the most appropriate in each case. It will also recognize the materials used in each irrigation system installation and apply the criteria and procedures used for agronomic and hydraulic design.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>40h</th>
<th>26.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>20h</td>
<td>13.33%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</tbody>
</table>
# Introduction

**Description:**
- Geographical distribution of irrigation
- Agronomic aspects that will determine the design of the facilities
- Management and distribution of irrigation water: irrigation and well irrigation demand
- Criteria for choosing the most efficient irrigation system

**Related activities:**
- Activity 1: Theory classes
- Activity 2: Individual evaluation

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>15h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>6h</td>
</tr>
<tr>
<td>Self study</td>
<td>9h</td>
</tr>
</tbody>
</table>

# Localized Irrigation: Agronomic Design and Installation Components

**Description:**
- Design agronomic irrigation located:
  - Estimation of minimum needs water drip irrigation
  - Volume wet
  - Method Design agronomic
  - Distribution of issuers and irrigation laterals
  - Components of an installation of drip irrigation
    - Transmitters
    - Equipment filtering (decanters, hydrocyclones, sand filters, mesh filters and rings)
    - Equipment fertigation (fertilizing tank, venturi injector type dispensers electrical and hydraulic)
    - Automation: hydraulic valves, electrical and volumetric; Computer programmers and irrigation
  - Scheme of an installation of drip irrigation
    - Concept of unity and sub unit irrigation uniformity assessment

**Related activities:**
- Activity 1: Theory classes
- Activity 2: Individual evaluation
- Activity 3: Troubleshooting
- Activity 4: Work
- Activitat 4: Visita a instal·lacions
- Activitat 5: Treball

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>40h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes</td>
<td>12h</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>4h</td>
</tr>
<tr>
<td>Self study</td>
<td>24h</td>
</tr>
</tbody>
</table>
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## Drip irrigation: HYDRAULIC DESIGN

<table>
<thead>
<tr>
<th>Learning time: 30h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td>Self study: 18h</td>
</tr>
</tbody>
</table>

### Description:
- Coefficient of uniformity design
- Calculation of lateral irrigation
- Calculation of an irrigation subunit
- Calculation of primary and secondary pipes
- Design of pumping station

### Related activities:
- Activity 1: Theory classes
- Activity 2: Individual evaluation
- Activity 3: Troubleshooting
- Activity 4: Work

## Sprinkler irrigation: agronomic DESIGN AND INSTALLATION COMPONENTS

<table>
<thead>
<tr>
<th>Learning time: 31h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 9h</td>
</tr>
<tr>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td>Self study: 18h</td>
</tr>
</tbody>
</table>

### Description:
- Design agronomic
- Type of sprinklers
- Water Distribution: Evaluation of uniformity
- Stationary sprinkler systems
- Machines irrigation (sliders side cannons dragged by irrigation piping, pivots, rangers')
- Irrigation Sprinkler anti-frost

### Related activities:
- Activity 1: Theory classes
- Activity 2: Individual evaluation
- Activity 3: Troubleshooting
- Activity 4: Work
### Sprinkler: HYDRAULIC DESIGN

**Learning time:** 21h  
- **Theory classes:** 3h  
- **Laboratory classes:** 6h  
- **Self study:** 12h

**Description:**  
- Càlcul de la xarxa de canonades principals i del sistema d’impulsió  
- Losses in distribution pipes with linear flow  
- Criteria sprinkler uniformity  
- Calculation hydraulic lateral sprinkler  
- Calculation of the pipeline network and the main drive system

**Related activities:**  
- Activity 1: Theory classes  
- Activity 2: Individual evaluation  
- Activity 3: Troubleshooting  
- Activity 4: Work

### REG SURFACE

**Learning time:** 13h  
- **Theory classes:** 4h  
- **Self study:** 9h

**Description:**  
- Phases and time characteristic of surface irrigation  
- Foil infiltrated water uniformity distribution  
- Type of surface irrigation  
- Evaluation of uniformity and application efficiency  
- Design and management of irrigation units

**Related activities:**  
- Activity 1: Theory classes  
- Activity 2: Individual evaluation
## Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Hours</th>
<th>Details</th>
</tr>
</thead>
</table>
| (ENG) ACTIVITAT 1: CLASSES D'EXPLICACIÓ TEÒRICA | | 90h | Theory classes: 38h  
Self study: 52h |
| (ENG) ACTIVITAT 2: PROVA INDIVIDUAL D'AVALUACIÓ | | 2h | Theory classes: 2h |
| (ENG) ACTIVITAT 3: RESOLUCIÓ DE PROBLEMES | | 20h | Laboratory classes: 8h  
Self study: 12h |
| (ENG) ACTIVITAT 4: VISITA A INSTAL·LACIONS | | 38h | Laboratory classes: 12h  
Self study: 26h |

## Qualification system

The evaluation of the course will be based on the following partial evaluations:

N1: Evaluation Activity 2: written test which will take place at the end of the year and represent 55% of the evaluation. It will include all the content taught in lectures and practices.

N2: Evaluation Activity 3: problem solving sessions: represent 15% of the evaluation and will take into account attendance and teacher will correct that problem solved by the students. This evaluation will correspond with that of generic competition.

N3: Evaluation Activity 4: Work: represent 30% of the evaluation. Take into consideration the work presented, the defense work and student participation in the debate raised after each presentation.

Nfinal: \[ N = 0.55 \times N1 + 0.15 \times N2 + 0.30 \times N3 \]

## Regulations for carrying out activities

It had submitted all necessary documents related to the evaluation to pass the subject.
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Bibliography

Basic:


Complementary:


