

Academic Year/course: 2021/22

## 60565 - Water resources and hydraulic facilities

### Syllabus Information

**Academic Year:** 2021/22

**Subject:** 60565 - Water resources and hydraulic facilities

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 546 - Master in Agricultural Engineering

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject Type:** Compulsory

**Module:**

### 1. General information

### 2. Learning goals

### 3. Assessment (1st and 2nd call)

### 4. Methodology, learning tasks, syllabus and resources

#### 4.1. Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is focused on applied technology and it favors the acquisition of skills needed in professional practice.

The theoretical contents are taught with the support of ppt, animations, interactive examples, and encouraging the active participation of students and the incorporation of their own experience. Practical contents of the course consist on practical examples using computer tools provided in the course.

#### 4.2. Learning tasks

The course includes the following learning tasks:

- Lectures (30 hours).
- Exercises and case studies (20 hours).
- Computer laboratory practice sessions (10 hours).
- Optional homework projects: numerical integration of flow equations, sustainability of irrigation demands, proposed exercises (24 hours)
- Study (60 hours).
- Assessment (6 hours).

Regarding the Agenda 2030, in lectures, exercises, practical cases, and laboratory and computer activities, contents aligned with the SDG 6. Additionally, students will develop and be evaluated of skills associated with the goals 6.3 and 6.4 in voluntary work.

#### 4.3. Syllabus

The course will address the following topics:

##### **Theory**

- C1 Fundamentals of Hydrodynamic Transport
- C2 Free surface flows
- C3 Channel regulation
- C4. Free surface Irrigation
- C5 Transients in networks
- C6 Hydrological Cycle
- C7 Surface hydrology. Precipitation
- C8 Flood hydrographs
- C9 Underground hydrology. Wells characterization

#### Practice

- P1 Surface Flow steady
- P2 Surface Flow Transient I
- P3 Surface Flow Transient II
- P4 Surface irrigation
- P5 Water hammer

Theoretical classes consist of expository and demonstrative sessions of theoretical content and are supported by printed material that students will have in advance on which to make annotations and keep as technical documentation.

The practical classes of exercises are developed through examples of solving typical problems for each case, accessible with ordinary calculation tools.

The laboratory and computer sessions are based on the learning of professional tools for solving real cases. These practical sessions take place from the seventh week.

#### 4.4. Course planning and calendar

The following table shows the weekly organization proposed for this course, which is divided into topics (identified as contents C1, C2, ...). For each of them, it is specified the hours of theory, exercises, practice (all in sessions of 2h), assessment (6h), and homework hours for study and exercises.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
T1 Theory	C1	C1	C2	C2	C2	C3	C3	C4	C4	C5	C6	C7	C8	C9	C9
T2 Exercises	C1	C1	C2	C2	C2	C3						C7	C8	C9	C9
T3 Comp Lab							P1	P2	P3	P4	P5				
T6 Homework				2h	2h	2h	2h	2h	2h	2h	2h	2h	2h	2h	2h
T7 Study	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h	4h
T8 Assessment															

#### 4.5. Bibliography and recommended resources

- BB** Chow, Ven Te. Hidrología aplicada / Ven Te Chow, David R. Maidment, Larry W. Mays ; traducción Juan G. Saldarriaga ; revisión técnica Germán R. Santos G. . Santafé de Bogotá ; Madrid : McGraw-Hill, imp. 1999
- BB** French, Richard H.. Hidráulica de canales abiertos / Richard H. French ; traducción M.I. Ariel Fredman ; revisión técnica Jorge Esteban Athala Molano . México McGraw-Hill cop. 1988
- BB** Gurovich R., Luis A.. Riego superficial tecnificado / Luis A. Gurovich R. 2ª ed. México : Alfaomega, cop. 1999
- BB** Muñoz Carpena, Rafael. Hidrología agroforestal / Rafael Muñoz Carpena, Axel Ritter Rodríguez . Madrid : Mundi-Prensa ; Las Palmas de Gran Canaria : Gobierno de Canarias, Dirección General de Universidades e Investigación, 2005
- BB** Transitorios y oscilaciones en sistemas hidráulicos a presión / editores José M. Abreu, Rafael Guarga, Joaquín Izquierdo . Valencia : Universidad Politécnica, Unidad Docente Mecánica de Fluidos, D.L.1995
- BC** Abbott, Michael Barry. Computational hydraulics / Michael B. Abbott, Anthony W. Minns . [2nd ed.] Aldershot

: Ashgate, 1998

- BC** Discharge characteristics / edited by D.S. Miller . Rotterdam, [etc.] : A.A. Balkema, 1994
- BC** Energy dissipators / edited by D.L. Vischer and W.H. Hager . Rotterdam, [etc.] : A.A. Balkema, 1995
- BC** Fried, Erwin. Flow resistance : a design guide for engineers / Erwin Fried, I. E. Idelchik . New York [etc.] : Hemisphere Publishing Corporation, cop. 1989
- BC** Miller, D. S.. Internal flow systems / D.S.Miller . 2nd ed. Bedford, UK : BHR, 1996
- BC** Naudascher, Eduard. Hydrodynamic forces / Eduard Naudascher . Rotterdam, [etc.] : A.A. Balkema, 1991
- BC** Wylie, E. Benjamin. Fluid transients in systems / by E. Benjamin Wylie and Victor L. Streeter ; with Lisheng Suo . Englewood Cliffs, NJ : Prentice Hall, cop. 1993

The updated recommended bibliography can be consulted in:

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=60565>