

28722 - Procedures and Organisation

Syllabus Information

Academic Year: 2019/20

Subject: 28722 - Procedures and Organisation

Faculty / School: 175 -

Degree: 423 - Bachelor's Degree in Civil Engineering

ECTS: 6.0

Year: 3

Semester: First semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

The subject "Procedures and organization" will approach the student to the knowledge of the most common construction processes in civil works and the machinery used in them. The procedures for earthmoving, those for the use of concrete and those for bituminous mixtures are identified and studied in the subject. It also defines the use of machinery and auxiliary means common to many engineering processes such as formwork, shoring, shoring, cranes, compressors and various tools.

All these theoretical knowledge are applied in a practical way by solving problems related to performance calculations, work cycles and costs.

1.2.Context and importance of this course in the degree

The subject "Procedures and organization" aims to be a starting point that introduces the student to the way in which the most common engineering works are built, providing the necessary technical base to learn the methods used and the machinery necessary for this.

In addition to this basic knowledge of knowing "how" and "with what" it is important that the student learn the aspects related to the duration, limitations, selection criteria, phases, prices and in general of all the particularities necessary for a correct "execution of work".

The specific objectives of the subject are to know:

1. the general physical aspects of earthmoving procedures
2. the operating characteristics of earthmoving machinery
3. modes of employment and work cycles of earthmoving machinery
4. the procedures for dismantling by blasting
5. the aggregate manufacturing process
6. the process of manufacturing and placing the concrete
7. the process of manufacturing and putting bitumen mixtures into operation
8. the execution form of shoring, formwork, rebar, formwork and shoring
9. the use of load lifting elements
10. the use of auxiliary machinery of common use in the execution of works

1.3.Recommendations to take this course

The study of the procedures of movement of lands leaves from the knowledge that the student has had to acquire on the stony materials in the subject of "Geotécnia" (28718) of 2º course.

The study of the constructive procedures of putting concrete into concrete and executing part of the knowledge that the student has had to acquire on cements, aggregates, steels, bitumen and manufacture of bituminous mixtures in the subject of "Science and Technology of materials" (28712) of 2nd year.

For all the above it is highly recommended to have passed both subjects.

2.Learning goals

2.1.Competences

G01. Ability for organization and planning.

G02. Ability to solve problems.

G03. Ability to make decisions.

G04. Aptitude for oral and written communication in their mother tongue.

G05. Ability for analysis and synthesis.

G06. Ability to manage information.

G07. Ability for teamwork.

G08. Ability for critical thinking.

G09. Ability to work in an interdisciplinary team.

G10. Ability to work in an international context.

G11. Ability to improvise and adapt themselves to face new situations.

G12. Leadership ability.

G13. Positive social attitude towards social and technological innovations.

G14. Reasoning ability, discussion and presentation of ideas.

G15. Communication skills through word and image.

G16. Ability to Search, analyze and select information.

G17. Ability for independent learning.

G23. Learn and understand the respect to fundamental rights, equal opportunities between men and women, universal accessibility for people with disabilities, and respect for the values of the culture of peace and democratic values.

G24. Foster entrepreneurship.

G25. Knowledge on information and communication technology. Context and meaning of the subject in the degree

CB1 - Students must have shown knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the forefront of their field of study

CB2 - Students must know how to apply their knowledge to their work or vocation from a professional approach and possess the skills that are usually verified through the elaboration and defense of arguments and problem solving within their area of study

CB3 - Students must have the ability to gather and interpret relevant data (usually within their area of study) to convey views that include a reflection on relevant issues of a social, scientific or ethical nature

CB4 - Students must be able to convey information, ideas, issues and solutions to a specialized and non-specialized audience

C09 - Ability to analyze the problems concerning health and safety in construction sites

C12 - Knowledge of construction procedures, construction machinery and techniques for organizing, measuring and evaluating works.

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The subject 'Construction equipment and methods' is organized into five main groups of activities: two of them done by the teacher (lectures and problems), another one carried out by the students and teacher (problems), a fourth one consisting of self-study and finally the assessment written test:

- Lectures: In which the teacher will explain the theoretical concepts of the subject topics.
- Practical sessions: The teacher will explain the practical application on the concepts developed at the lectures, solving practical problems. This session will take place at the classroom or at the computer laboratory.
- Tutorials: in which the students will solve, individually or in groups of two, the practical applications of concepts detailed above. Depending on the duration of these practices they might be started at class time and finished by the student later.
- Assessment written tests: Students will demonstrate the knowledge acquired in two different assessment methods. One by continuous assessment throughout the course or, if these tasks are not successfully completed, global written tests in two calls.
- Personal study: Non-class activities in which students have to study the topics explained in lectures.

Besides these activities there will be individual tutorials based on personalized attention from the teacher in order to help and solve doubts and questions about the specific areas in which students have found more difficulties.

4.2.Learning tasks

To achieve the learning goals of the course, 60 ECTS credits and the following teaching load hours have been assigned (150 hours):

- Lectures 25 hours
- Practical lessons 12 hours
- Tutorials 14 hours
- Assessment 9 hours
- Personal study 90 hours

This teaching load of 150 hours is distributed in 15 teaching weeks.

4.3.Syllabus

To achieve the learning goals of the course, the students must cover 18 topics grouped into 3 teaching units. The detailed content of these topics is as follows:

TEACHING UNIT I: EARTH MOVING METHODS

TOPIC 1. EARTH MOVING MACHINERY

- 1.1. Earth moving
- 1.2. Earth moving basic operations and machinery
- 1.3. Land classification based on their hardness
- 1.4. Advantages and limitations of the earth moving machines
- 1.5. Machinery choice
- 1.6. Mechanization of works

TOPIC 2. EARTH VOLUMES

- 2.1. Earth volume changes
- 2.2. Swelling and swelling factor
- 2.3. Consolidation and compaction
- 2.4. Swelling values
- 2.5. Practical considerations in soil layer extension
- 2.6. Land clearing and land filling.
- 2.7. Land movement cuttings and landfills
- 2.8. Cross section areas
- 2.9. Determining the mass to be moved between two profiles
- 2.10. Mass diagram
- 2.11. Soil compensation

TOPIC 3. MACHINE TRACTION REQUIREMENTS

- 3.1. Required traction
- 3.2. Balance between available and usable tractions
- 3.3. Resistance to traction
- 3.4. Speed calculation. Motion Equation.
- 3.5. Practical exercises

TOPIC 4. PRODUCTION AND COST OF THE MACHINERY

- 4.1. Cost Calculation of the work unit
- 4.2. Definition of production
- 4.3. Cost of using machinery

TOPIC 5. EXCAVATION AND PUSHING: DOZER

- 5.1. Models and scope
- 5.2. Mechanical properties
- 5.3. Working equipment
- 5.4. Production cycle
- 5.5. Working capabilities
- 5.6. Excavation and pushing distances
- 5.7. Calculating dozer production
- 5.8. Excavation and pushing techniques
- 5.9. Ripping techniques
- 5.10. Practical exercises

TOPIC 6. EXCAVATION AND LOADING: FRONT LOADER

- 6.1. Definition, types and applications
- 6.2. Front loader elements and working equipment
- 6.3. Characteristic parameters
- 6.4. Working cycle
- 6.5. Buckets
- 6.6. Calculating front loader production
- 6.7. Match factor
- 6.8. Practical exercises

TOPIC 7. LOADING AND HAULING: SCRAPERS

- 7.1. Scraper functions
- 7.2. Scraper types and fields of application
- 7.3. Scraper elements and working equipment
- 7.4. Production cycle
- 7.5. Excavation methods
- 7.6. Different ways of working
- 7.7. Working tips
- 7.8. Calculating scraper production
- 7.9. Match factor
- 7.10. Practical exercises

TOPIC 8. EXCAVATION MACHINERY: EXCAVATORS

- 8.1. Definition, types and applications
- 8.2. Hydraulic excavators
- 8.3. Cable excavators
- 8.4. Practical exercises

TOPIC 9. HAULING: TRUCKS AND DUMPERS

- 9.1. Typology
- 9.2. Dump trucks
- 9.3. Dump semi-trailers
- 9.4. Dumpers
- 9.5. Off-road dumpers: rigid frame and articulated rear-dump trucks
- 9.6. Dump bodies
- 9.7. Hauling cycle and match factor
- 9.8. Calculating dumpers production
- 9.9. Practical exercises
- 9.10. Transport of heavy machinery

TOPIC 10. FINISHING EQUIPMENT: GRADERS

- 10.1. Definition and field of applications
- 10.2. Grader elements
- 10.3. Working equipment
- 10.4. Grader operations
- 10.5. Calculating grader production
- 10.6. Practical exercises

TOPIC 11. COMPACTION

- 11.1. Types of compacting equipment
- 11.2. Compacting diagram
- 11.3. Compacting methods
- 11.4. Factors affecting compactation
- 11.5. Compaction specifications and control
- 11.6. Compaction tests
- 11.7. Calculating compaction production
- 11.8. Compaction tips
- 11.9. Selecting a compactor
- 11.10. Practical exercises

TEACHING UNIT II: GENERAL CONSTRUCTIVE PROCEDURES

TOPIC 12. AUXILIARY EQUIPMENT

- 12.1. Electric generator
- 12.2. Air compressors and hammers
- 12.3. Equipment for pumping water
- 12.4. Gas cutting procedures
- 12.5. Welding procedures
- 12.6. Rock and soil drilling machinery

TOPIC 13. AGGREGATE PRODUCTION

- 13.1. General information:
- 13.2. Aggregate production machinery
- 13.3. Calculating aggregate production
- 13.4. Aggregates classification: Screeners
- 13.5. Aggregates washing
- 13.6. Feeders and belt conveyors
- 13.7. Surge piles
- 13.8. Facilities
- 13.9. Practical exercises

TOPIC 14. FLEXIBLE PAVEMENTS: MACHINERY AND EXECUTION

- 14.1. Soil stabilization
- 14.2. Bituminous coats: prime, tack and seal
- 14.3. Aggregate and bituminous coats
- 14.4. Bituminous concrete

TOPIC 15. CONCRETE: EQUIPMENT AND PLACING

- 15.1. Concrete mixers
- 15.2. Concrete plants
- 15.3. Execution: Concrete pumping

- 15.4. Execution: Consolidating and finishing
- 15.5. Execution: Concrete pavements
- 15.6. Execution: Shotcrete

TOPIC 16. TIMBERING, FORMWORK AND FALSEWORK

- 16.1. Timbering
- 16.2. Formwork
- 16.3. Concrete reinforcement
- 16.4. Falsework

TOPIC 17. CRANES AND LIFTING SYSTEMS

- 17.1. Introduction
- 17.2. Mayor crane types
- 17.3. Mobile cranes:
- 17.4. Tower cranes

TOPIC 18. PRACTICAL EXAMPLES OF CONSTRUCTION METHODS

4.4.Course planning and calendar

Week 1: TEACHING UNIT I.

Week 2 TEACHING UNIT I

Week 3: TEACHING UNIT I

Week 4: TEACHING UNIT I

Week 5: TEACHING UNIT I.

Week 6: TEACHING UNIT I.

Week 7: TEACHING UNIT I.

Week 8: TEACHING UNIT I.

Week 9: TEACHING UNIT I / ASSESSMENT

Week 10: TEACHING UNIT II.

Week 11: TEACHING UNIT II.

Week 12: TEACHING UNIT II.

Week 13: TEACHING UNIT II.

Week 14: TEACHING UNIT II.

Week 15:TEACHING UNIT II / ASSESSMENT

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28722&year=2019