



**NATIONAL UNIVERSITY OF ENGINEERING**  
**COLLEGE OF CIVIL ENGINEERING**  
**CIVIL ENGINEERING PROGRAM**

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**TV761 – ROAD DESIGN**

**I. GENERAL INFORMATION**

<b>CODE</b>	: TV761 – Road Design
<b>SEMESTER</b>	: 7
<b>CREDITS</b>	: 04
<b>HOURS PER WEEK</b>	: 06 (Theory – Practices)
<b>PREREQUISITES</b>	: TV561 – Satellite Geodesics
<b>CONDITION</b>	: Mandatory

**II. COURSE DESCRIPTION**

The course prepares the student to have a logical and rational criterion to choose the most appropriate route by linking two villages through a road, designing the geometry of it, under the guidelines of current Peruvian regulations. Initially, general knowledge is provided about the history and current status of roads and vehicles. Then the students see aspects of the plan design, the longitudinal profile and the cross section. It is complemented by important generalities on sewer, signaling and Road Exchanges. An application software is used.

**III. COURSE OUTCOMES**

At the end of the course the student will:

- Propose alternative routes, for the link between two points, through a road.
- Design the road following current regulations for the geometric design of the road.
- Learn the use of more widespread software and application in the workplace.
- Express its design through the elaboration of plans, with the help of the software.
- Learn to work as a team and develop your ability to support your proposal.
- Develop self-learning skills, performing complementary readings.

**IV. LEARNING UNITS**

**1. HISTORY OF THE ROADS - GENERAL**

History of roads in Europe and America / News of transport in Peru / Overview of road markings / Works of art attached to the road.

**2. THE VEHICLE**

The vehicle: basic components and formulas / Standard of weights and measures of vehicles.

### 3. PLANT DESIGN

The art of the stroke of the gradient line / Trace of the preliminary road axis / Preliminary longitudinal profile of the raised axis / Decision matrix.

Speed / General Parameters of the Plan Design / Design of simple, compound, polycentric circular horizontal curves, Progress Calculation / Visibility Distances, Visibility / Pumping Bench, Cant, Transition Length of the cant, width / Design of horizontal curves with Spirals / Staking out: Circular Curves, Spiral Curves / Peralte Transition (critical points)

### 4. LONGITUDINAL PROFILE DESIGN

Subgrade design / Types of vertical curves / Calculation of the length of the vertical curve / Calculation of subgrade dimensions / Rest sections / Ascent lane.

### 5. DESIGN OF THE CROSS SECTION

Cross section design / Areas and volume of earth movement / Mass Diagram

### 6. PREPARATION OF DRAWINGS

Preparation of design sheets in plan, profile and cross section

### 7. EXHIBITION OF STAFF WORK

Reception and exhibition of works

### 8. DRAINAGE, ENVIRONMENTAL IMPACT, TUNNELS

General aspects of drainage, environmental impact and tunnels.

## V. LABORATORIES AND PRACTICAL EXPERIENCES

Throughout the semester, the geometric design of a road of approximately 1.5 km will be developed, with the help of the Civil3D software of Autodesk, which will culminate with a detailed report, reflected in the presentation of floor plans, profiles and sections.

## VI. METHODOLOGY

A basic culture of the history and evolution of roads and general characteristics in road design is initially provided, to provide a clearer idea of course expectations from the beginning. It also provides a basic knowledge of the components of the vehicle, reason why there is the "Road Design" course. The course also provides knowledge on the current regulations for road design. In the development of the course special emphasis is placed on the blueprint design. Both in theory and in practice, criteria are provided for adequate rational, economical and safe road design. In the computer lab, the Civil 3D of Autodesk, the software most used in the workplace, will be used for application work. This will be developed in a staggered manner in four presentations: TE1, TE2, TE3 and PRY1. They will form working groups of a maximum of 4 students.

## VII. EVALUATION FORMULA

The learning will be evaluated through the "G" system.

- Partial Exam (PE): Weight 1
- Final Exam (FE): Weight 1
- Average of Practices (P): Weight 1.

$$FA = \frac{PE + FE + P}{3}$$

$$P = \frac{TE1 + TE2 + TE3 + PRY1}{4}$$

## VIII. BIBLIOGRAPHY

- Ministry of Transportation and Communications (2010). Geometrical road design manual. Lima: Macro
- Cárdenas Grisales, James (2008). Geometric Track Design. Bogotá: ECOE Editions
- Chocontá Rojas, Pedro. (2014). Geometric track design. Bogotá: Colombian School of Engineering.