COURSE			LAND SURVEYING IV		
LECTURER			Asst. Prof. Nedim Tuno Ph.D.		
STUDY	**STATUS**	**SEMESTER**	**NUMBER OF LESSONS L+E**	**ECTS**	
B – G	Compulsory	4	3+4	8	

OBJECTIVES

- To provide a fundamental level of understanding of geodetic networks, with emphasis on the modern 1D precision survey networks.
- To develop student's ability to plan, supervise and carry out the fieldwork necessary to establish vertical survey networks, as well as the abilities to adjust and analyse these networks.

LEARNING OUTCOMES

- Explain the concepts of 1D survey networks.
- List and explain the procedures surveyors use to produce 1D positional data, including trigonometric heighting and differential leveling.
- Carry out measurement with precise and electronic theodolites, tachymeters and levels.
- Identify sources of error in measuring height differences.
- Perform practical 1D network designs and analysis.
- Perform 1D network least squares adjustments using appropriate software systems and manually.

COURSE CONTENT

- Vertical datum, height difference. Definition of trigonometric heighting. Trigonometric heighting - special rules of network design. Measurement of zenith angles. Calculating the elevation difference. Accuracy of trigonometric heights. Deflection of the vertical. Limitations of trigonometric heighting. Adjustment of elevation differences. Differential levelling as a method. Levelling as vertical geodetic network. Measuring the elevation differences. Levelling errors. Calculating the elevation differences. Estimation of the accuracy of measurements. Adjustment of elevation differences of levelling network. GPS basics.

RECOMMENDED LITERATURE

1. Mihailović, K. (1974): *Geodezija II*. Građevinska knjiga, Beograd.
2. Muminagić, A. (1987): *Viša geodezija II*. Naučna knjiga, Beograd.
3. Tuno, N., Kogoj, D. (2016): Primijenjena geodezija IV, unpublished manuscript. Građevinski fakultet, Univerzitet u Sarajevu, Sarajevo.
4. Tuno, N. (2015): Praktikum vježbi iz Primijenjene geodezije IV, unpublished manuscript. Građevinski fakultet, Univerzitet u Sarajevu, Sarajevo.

Examination:

The mid-term exam and the end-of-term exam (assesment based on a written tests related to solving practical issues) are organized during the semester. Each practical exam is scored out of a maximum of 25 score points. The pass mark for each practical exam is 55 % (13,75 points). The total score is computed as a sum of the scores from the mid-term exam and the end-of-term practical exam. In case the student gets less than 55% of the mid-term examination marks, he is considered failed, and has to set for re-examination at the end-of-term exam (an integrated written practical exam – maximum 50 score points). The pass mark for this integrated practical exam is 55 % (27,5 points). In case the student does not achieve the minimum requirements to pass the end-of-term exam or integrated practical exam, he is considered failed, and has to set for re-examination during the assigned examination period (June – July), under the same rules as in the previous cases. The students who do not achieve the required scores on this exam, can satisfy the assesment related to solving practical issues by passing the integrated written supplementary exam in September, with the score of 55% or higher.

Final written examinations related to theoretical issues are held during the assigned end-of-semester examination period (the regular examination terms and makeup examination terms in June and July). The practical exam must be passed before the theoretical exam, i.e. the students must earn a minimum of 27,5 points. Final theoretical exam is scored out of a maximum of 50 score points. The pass mark for this exam is 55 % (27,5 points). In case the student does not achieve the minimum requirements to pass the final exam in regular term, he is considered failed, and has to set for re-examination during the makeup examination term (second final exam). Students who do not achieve the required scores on this exam, can satisfy the assesment related to solving practical and theoretical issues by passing the integrated supplementary written exams in September, with the score of 55% or higher, under the same rules as in the previous cases.

Once the exams are passed, the total score is computed as a sum of scores from the practical exam and the theoretical exam and grade is formed in accordance to a scale prescribed by the Law on Higher Education.