

O'ZBEKISTON RESPUBLIKASI
OLIIY TA'LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

SAMARQAND DAVLAT ARHITEKTURA – QURILISH UNIVERSITETI

“KELISHILGAN”

O'quv ishlari bo'yicha prorektor
M.T. Shodmonqulov

Ro'yxatga olindi: № 92/a

«30» avgust 2024 yil



XATOLAR NAZARIYASI VA PARAMETRLARNI BAHOLASH

FAN DASTURI

- Bilim sohasi:** 700 000 – Muhandislik, ishlov berish va qurilish sohalari
- Ta'lim sohasi:** 720 000 – Ishlab chiqarish va ishlov berish sohalari
- Ta'lim yo'nalishi:** 60723300 – Geomatika muhandisligi

Samarqand – 2024

Kurs ma'lumotlari

Course Information Form

Modul kodi Code GEO2030	O'quv yili 2024-2025	Semestr 3	ECTS – Kreditlar 3-semestr /4		
Modul turi Majburiy	Ta'lim tili O'zbek/rus		Auditoriya soatlari		Mustaqil ta'lim (soat/hafta) Independent Education (hour/week)
Fan nomi Title	Jami yuklama	Ma'ruza (soat/hafta) Lecture (hour/week)	Amaliy (soat/hafta) Practical (hour/week)	Laboratoriya (soat/hafta) Laboratory (hour/week)	
Xatolar nazariyasi va parametrlarni baholash	3-semestr /120	3-semestr /3	-	-	3-semestr /5

Dastlabki shart Prerequisite	Yo'q None
--	---------------------

Semestr Semestr	Kuzgi Fall
---------------------------	----------------------

Kurs tili Course language	O'zbek, Rus Uzbek, Russian
O'quv kursi Level of Course	Ikkinchi kurs Second Cycle
Ta'lim yo'nalishlari Course type	60723300 – Geomatika muhandisligi
Kurs toifasi Course Category	Asosiy Core Courses
Dars shakli Mode of Delivery	An'anaviy (Yuzma – yuz muloqot) Face – to - face

Ma'sul kafedra Owner academic unit	Geomatika muhandisligi Geomatics Engineering
Kursga ma'sul Cours Coordinator	V.R.Niyazov
O'qituvchilar Instructor(s)	E.X.Isakov
Yordamchilar Asistant(s)	U.A.Berdikulov

Fanni o'qitishdan maqsad Course objectives	Geodezik o'lchashlar, o'lchash xatolari va ularning ehtimollar nazariyasi bilan aloqalari; kutish qiymati, dispersiya, kovariatsiya, korrelyatsiya, regressiya va normal taqsimot tushunchalari; geodezik o'lchash natijalaridan ehtimollar nazariyasi elementlari; matematik statistika elementlari; o'lchangan qiymatlar funksiyalari aniqligini baholash; o'lchashlar xatoliklari nazariyasining to'g'ri va teskari masalalarini yechish, teng aniqliqsiz o'lchashlar vazni; qo'sh o'lchashlari farqlari orqali aniqligini baholash; xatolarning tarqalishi qonunlari; miqdarlarning kerakli va ortiqcha o'lchamlari. bog'lanmaslik. masalaning matematik qo'yilishi va uning noaniqligi; eng kichik kvadratlar prinsipi va uni asoslash; eng kichik
--	---

	<p>kvadratlar usuli bo'yicha ko'p marta o'lchangan miqdorlarning ehtimoliy qiymati; tenglashtirishning parametric va korrelat usuli. Ikkita asosiy tenglashtirish usullarining mohiyati va ular orasida bog'liqlik.</p> <p>Geodetic measurements, measurement errors and their relationship with probability theory; concepts of expectation value, variance, covariance, correlation, regression and normal distribution; elements of probability theory from geodetic measurement results; elements of mathematical statistics; assessment of the accuracy of functions of measured values; solving the correct and inverse problems of the theory of measurement errors, the weighting of measurements without equal precision; assessment of accuracy through the differences of double measurements; error propagation laws; the required and excess sizes of quantities. do not connect. mathematical formulation of the problem and its ambiguity; principle of least squares and its justification; the probable value of quantities measured many times by the method of least squares; parametric and correlation method of equalization. The essence of the two main methods of equalization and the relationship between them.</p>
<p>Fanning mazmuni Course content</p>	<p>Ehtimollar nazariyasi.Hodisalar. Hodisaning nisbiy chastotasi va ehtimoli.Ehtimollarni ko'paytirish. Ehtimollar integrali.Tasodifiy miqdorlar. Tasodifiy miqdorlarning taqsimot qonunlari. Tasodiy miqdorning asosiy xossalari (taqsimot parametrelari). Tasodifiy miqdorlar uchun normal taqsimot qonuni. Normal taqsimotdan farqli bo'lgan bazi taqsimotlar haqida. Matematik kutishning taqribiy qiymatini baholash. Dispersiyani empirik qiymatini baholashifiy miqdorlar. Statistik munosabatlar tushunchasi. Korrelatsiya koeffitsiyenti. Korrelatsiya koeffitsiyentining xossalari. Regressiya tenglamasi. O'lchovlar haqida umumiy ma'lumot. O'lchash aniqligi mezonlari. Absolyut va nisbiy xatolar. O'rta kvadratik xatoning taqribiy qiymatining aniqligini baholash. Bir xil miqdorlarni o'lchashning matematik qayta ishlanishi. Sistematik xatolarning ta'sirini kamaytirish bo'yicha ba'zi tavsiyalar. Bitta miqdorni teng imkoniyatli o'lchashlardagi qayta ishlash tartibi. Vazn haqida umumiy tushuncha,vazn birligi xatosi. Funksiyalarning vaznlarini hisoblash. Vazn birligi xatosini hisoblash. Teng imkoniyatli bo'lmagan o'lchashlar qatorini tahlil qilish. Bitta kattalikni teng imkoniyatli bo'lmagan o'lchovlarini qayta ishlash tartibi. Ikkita teng imkoniyatli o'chashlarning farqiga ko'ra aniqlikni baholash.Aniqligi teng bo'lmagan o'lchovlar farqlari bo'yicha baholash. Miqdarlarning kerakli va ortiqcha o'lchamlari. Bog'lanmaslik. Masalaning matematik qo'yilishi va uning noaniqligi. Poligonometriya to'rini tenglashtirish va aniqligini baholash. Geodezik to'rlarni tenglashtirishda zamonaviy elektron hisoblash dasturlaridan foydalanish.</p> <p>Probability theory. Events. Relative frequency and probability of an event. Probability multiplication. Integral of probability. Random quantities. Laws of distribution of random quantities. Basic properties of random quantity (distribution parameters). Normal distribution law for random variables. About some distributions that differ from the normal distribution. Estimating the approximate value of mathematical expectation. Estimating the empirical value of the variance of quantitative quantities. The concept of statistical relationships. Correlation coefficient. Properties of the correlation coefficient. The regression equation. An overview of measurements. Measurement accuracy criteria. Absolute and relative errors. Estimate the accuracy of the approximate value of the root mean square error. Mathematical processing of the measurement of the same quantities. Some</p>

	<p>recommendations for reducing the impact of systematic errors. Procedure for processing a single quantity in equal-probability measurements. General concept of weight, weight unit error. Calculation of weights of functions. Calculation of weight unit error. Analyzing a series of unequal measurements. Procedure for processing unequal measurements of one quantity. Assessment of accuracy according to the difference of two equally likely extinctions. Assessment according to the differences of unequal measurements. Methods for solving function weights. Calculation of function weights by the method of parametric equalization. N Calculation of function weights by correlation equalization method. Leveling and accuracy assessment of the polygonal grid. Use of modern computer programs in leveling geodetic grids.</p>
<p>Tavsiya qilingan yoki talab qilinadigan adabiyotlar ro'yxati Recommended Or Required Reading</p>	<ol style="list-style-type: none"> 1. Isakov E.X. Geodezik o'lchash natijalarini matematik qayta ishlash. I-qism. Darslk. "TURON NASHR". Samarqand - 2022. ISBN: 978-9943-8731-8-6. 184 bet. 11.5 b.t 2. Математическая обработка геодезических измерений. 1-часть. "TURON NASHR". Samarqand 2022. ISBN: 978-9943-8732-3-0. 208 стр. (Grif raqami 106-469, 17.03.2022 y.). 3. Jo'rayev D.O. Geodezik o'lchashlarni matematik qayta ishlash nazariyasi. O'quv qo'llanma. 1-Qism. O'lchashlar xatoliklari nazariyasi. Toshkent, TAQI, 2000 y., 142 bet. 4. Jo'rayev D.O. Geodezik o'lchashlarni matematik qayta ishlash nazariyasi. O'quv qo'llanma. 2-Qism. Eng kichik kvadratlar usuli. Toshkent, TAQI, 2000 y., 110 bet. 5. Error theory. E Navarro, A Montagud, P Fernandez de Cordoba, JF Urchueguía.
<p>Tavsiya etilgan qo'shimcha dastur komponentlari Recommended Optional Program Components</p>	<ol style="list-style-type: none"> 1. Mirziyoev SH.M "Tanqidiy tahlil, qat'iy tartib- intizom va shaxsiy javobgarlik xar bir raxbar faoliyatining kundalik qoidasi bo'lishi kerak" T "O'zbekiston" 2017 y 1025 bet. 2. Mirziyoev SH.M "Qonun ustuvorligi va inson manfaatlarini ta'minlash- yurt taraqqiyoti va xal, Plane and geodetic survering ., CRC Press 2014 3.Design and analysis of experiments. A Dean and D Boss. Springer Design and analysis of experiments. DC Montgomery. Wiley and Sons 4. Statistical design and analysis of experiments.RL Mason, LM Gunst and JL Guess. Wiley and Sons 5. Golubev V.V. Teoriya matematicheskoy obrabotki geodezicheskix izmereniy. Kniga 1 Osnovy teorii oshibok. M., MIIGAIK, 2005, 70 s. 6. Azarov B.F, Karelina I. Resheniye zadach po teorii oshibok geodezicheskix izmereniy. Barnaul 2013 g/ 7. Kemnis Yu.V. Matematicheskaya obrabotka zavisimых rezultatov izmereniy. M.Nedra, 1970 y. 8.Isakov Erkin Xo'jayorovich, Berdiqulov Usmon, Hamdamova Dinara. Geodezik o'lchash natijalarini matematik hisoblash.2-qism. 2023. 9. Исаков Э.Х. Математическая обработка геодезических измерений. 2-часть. Учебник

Kursni o'rganish natijalari

Course learning outcomes

1	<p>Ehtimollar nazariyasining asosiy tushunchalari va ta'rifi; ehtimollikning normal taqsimot qonuni; basic concepts and definition of probability theory; the normal distribution law of probability;</p>
---	---

2	Tasodifiy, uzluksiz va deskret miqdorlar; geodezik o'lchashlar, o'lchash xatoliklari va klassifikatsiyasi; random, continuous and discrete quantities; geodetic measurements, measurement errors and classification;
3	Matematik statistikaning asosiy; teng aniqlikdagi va teng aniqlikka ega bo'lmagan o'lchashlarni matematik qayta ishlashni; the basics of mathematical statistics; mathematical processing of measurements with equal precision and unequal precision;
4	Bir nechta o'lchash miqdorlarini birgalikda tenglashtirish masalasining mohiyatini; normal taqsimot qonuniga bo'ysunadigan tasodifiy miqdorlarning xossalari; the essence of the issue of equating several measurement quantities together; properties of random quantities subject to the law of normal distribution;
5	Geodezik o'lchashlarni parametrik va korrelyatsion usulida tenglashtirishni bilishi va ulardan foydalana olishi; turli geodezik o'lchashlarni tenglashtirish usullarini tahlil qila bilish; to know and be able to use geodetic measurements in parametric and correlation methods; to be able to analyze the methods of equalization of different geodetic measurements;
6	Geodezik tarmoqlarning o'lchangan miqdorlarini tenglashtirishda EHMni qo'llay bilish ko'nikmalarga ega bo'lishi kerak. should have the skills to use EC in equalizing the measured quantities of geodetic networks

Haftalik mavzular va tegishli tayyorgarlik ishlari

Weekly Subjects and Related Preparation Studies

Hafta Week	Mavzular Themes	Resurslar Related preparation
1.	Fanning maqsadi va qisqacha mazmuni. O'lchov va xato tushunchalari, xato turlari	1, 2, 3, 5, 6, 7
2.	Aniqlik ko'rsatkichlari	1, 2, 3, 5, 6, 7
3.	Normal taqsimotdan farqli bo'lgan bazi taqsimotlar haqida. Matematik kutishning taqribiy qiymatini baholash.	1, 2, 3, 5, 6, 7
4.	Dispersiyani empirik qiymatini baholashifiy miqdorlar. Statistika munosabatlar tushunchasi.	1, 2, 3, 5, 6, 7
5.	Og'irlik va vazn koeffitsientini taqsimlash qoidalari	1, 2, 3, 5, 6, 7
6.	O'lchovlar haqida umumiy ma'lumot. O'lchash aniqligi mezonlari. Absolyut va nisbiy xatolar.	1, 2, 3, 5, 6, 7
7.	O'rta kvadratik xatoning taqribiy qiymatining aniqligini baholash.	1, 2, 3, 5, 6, 7
8.	Cheklangan o'lchov massivlari yordamida standart og'ishlarni hisoblash	1, 2, 3, 5, 6, 7
9.	Parametrlarni baholash usullari; bashorat qilishning asosiy tamoyillari va turlari	1, 2, 3, 5, 6, 7
10.	Parametrlarni baholash usullari; bashorat qilishning asosiy tamoyillari va turlari	1, 2, 3, 5, 6, 7
11.	Eng kichik kvadratlar prinsipi va uni asoslash. Eng kichik kvadratlar usuli bo'yicha ko'p marta o'lchangan miqdorlarning ehtimoliy qiymati.	4, 5, 6, 7(5, 8, 9-qo'shimcha)
12.	Oddiy tenglamalar va ularning yechimlari, noma'lumlarning og'irlik koeffitsientlari matritsasi va noma'lumlarni hisoblash.	4, 5, 6, 7(5, 8, 9-qo'shimcha)
13.	Noma'lum va muvozanatli o'lchovlarni hisoblash va yechimni nazorat qilish	4, 5, 6, 7(5, 8, 9-qo'shimcha)
14.	Matritsalar va taxminiy parametrlar va boshqa miqdorlarning standart og'ishlari	4, 5, 6, 7(5, 8, 9-qo'shimcha)
15.	Funksiya vaznlarini yechish usullari. Funksiya vaznlarini parametrik tenglashtirish usulida hisoblash. Funksiya vaznlarini korrelyatsion	4, 5, 6, 7(5, 8, 9-qo'shimcha)

tenglashtirish usulida hisoblash.		
Baholash jarayoni Evaluation System		
Mashg'ulot turi Activities	Soni Number	Baholash Percentage of Grade
Darsga qatnashish Attendance / participation		
Laboratoriya ishi Laboratory		
Amaliy ish (qo'shimcha vazifa) Application		
Kurs ishi Field work		
Maxsus kurs amalyoti (ish joyida) Special course internship (work placement)		
Testlar Quizzes / studio critics		
Uyga vazifani baholash Homework assignments		
Ijodiy ish (taqdimot) Presentations / jury		
Loyiha ishi Project		
Seminar Seminar / workshop		
Oraliq nazorat Mid -Terms	2	50
Yakuniy nazorat Final	1	50
O'zlashtirish ko'rsatgichi Percentage of in – term studies		50
Yakuniy imtihon bahosi Percentage of final examination		50
Jami Total		100

ECTS taqsimoti ECTS workload table			
Topshiriqlar Activities	Soni Number	Davomiyligi (soat) Duration (hour)	Umumiy yuklama Total workload
Mashg'ulot soati Course hours	15	3	45
Laboratoriya ishi Laboratory			
Amaliy ish (qo'shimcha vazifa) application			
Kurs ishi Field work			
Mustaqil ta'lim Study hours out of class	15	5	75
Maxsus kurs amalyoti (ish joyida)			

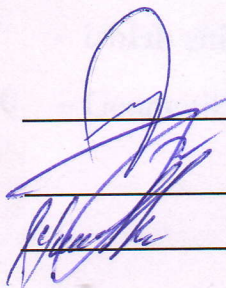
Special course internship (work placement)			
Uyga vazifani baholash Homework assignments			
Testlar / Viktorina Quizzes / studio critics			
Loyiha ishi Project			
Ijodiy ish (taqdimot) Presentations / seminar			
Oraliq nazorat Mid – terms (Examination +Examination prep. Duration)			
Yakuniy nazorat(nazorat va nazoratga tayyorlanish soati) Final (examination +examination prep. Duration)			
Jami yuklama Total workload			120
Jami yuklama / 30 (soat) Total workload / 30(h)			120/30=4
Kredit ECTS credit			4

Qo'shimcha eslatmalar Extra Notes	Yo'q\ (bor bolsa yoziladi) None
--------------------------------------	------------------------------------

Fan dasturi Mirzo Ulug'bek nomidagi Samarqand davlat arxitektura-qurilish universiteti kengashining 2024 yil ____-avgustdagi ____-sonli bayonnomasi bilan ma'qullangan.

Kafedra mudiri:

Tuzuvchilar:



V.R.Niyazov

E.X.Isakov

U.A. Berdikulov