O‘ZBEKISTON RESPUBLIKASI
OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

SAMARQAND DAVLAT ARXITEKTURA – QURILISH UNIVERSITETI

“KELISHILGAN”
o‘quv ishlari bo‘yicha
prorektor _____
M.T.Shodmonqulov
Ro‘yxatga olindi: № 01/A
«29» avgust 2025 yil

“TASDIQLAYMAN”
Rektor _____
Ch.J. Turkyilmaz
«29» avgust 2025 yil

TERMODINAMIKA 1

FAN DASTURI

Bilim sohasi:	700000-	Muhandislik, ishlov berish va qurilish sohalari
Ta’lim sohasi:	700000-	Muhandislik ishi
Ta’lim yo‘nalishi:	60712300-	Mexanika muhandisligi

Samarqand – 2025

Kurs ma'lumotlari

Course Information Form

Modul kodi **Code** MAS2050	**O'quv yili** 2025-2026	**Semestr** 4	**ECTS – Kreditlar** 4-semestr -4			
Modul turi Tanlov	**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)	
Termodinamika 1		4-semestr -120	4-semestr -2			4-semestr -4

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	600712300-Mexanika 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	Mexanika muhandisligi Department of Mechanical engineering
Kursga ma'sul Cours Coordinator	Xalmanov Aktam
O'qituvchilar Instructor(s)	Xalmanov Aktam , Eshmatov Mansur, Omonqulov Orif
Yordamchilar Asistant(s)	Omonqulov Orifjon

Fanni o'qitishdan maqsad Course objectives	Termodinamika va issiqlik massa almashinuviga doir ma'lumot berish, muxandislik masalalarini echishda foydalaniladigan texnik termodinamikaning sof nazariy, issiqlik massa almashinuvining esa-xam nazariy va amaliy bilimlaridan amaliyotdagi muxandislik masalalarini echishda to'gri foydalanishga o'rganishdan iboratdir. Providing information on the two main branches of heat engineering, i.e., technical thermodynamics and heat mass transfer, and the correct use of pure theoretical technical thermodynamics used in solving engineering problems, as well as theoretical and practical knowledge of heat and mass transfer in solving practical engineering problems. consists of learning.
Fanning mazmuni Course content	" Termodinamika 1" faniga kirish. Texnik termodinamika. Texnik termodinamikaning qisqacha rivojlanish tarixi. Holat tenglamasi. Ideal gazlar holatining Klapeyron-Mendeleyev tenglamasi. Gazlarning issiklik

	sig‘imi. Entalpiya. Termodinamikaning birinchi qonuni. Termodinamikaning ikkinchi qonuni. Sovitish mashinalar sikllari. Karnoning teskari sikli. Sovitish koeffitsienti. Termodinamik jarayonlarning hahlili. Real gazlarning termodinamik jarayonlari. Ideal gazlar aralashmalari. Nam havo. To‘yingan va to‘yinmagan nam havo. Issiqlik almashish apparatlari. Issiqlik almashish apparatlarining tiplari. Introduction to "Thermodynamics 1". Technical thermodynamics. A brief history of the development of technical thermodynamics. Equation of state. Clapeyron-Mendeleev equation of state of ideal gases. The heat flow of gases. Enthalpy. The first law of thermodynamics. The second law of thermodynamics. Cycles of refrigeration machines. Reverse Carnot cycle. Cooling coefficient. Solution of thermodynamic processes. Thermodynamic processes of real gases. Mixtures of ideal gases. Humid air. Saturated and unsaturated moist air. Heat exchange devices. Types of heat exchangers.
Tavsiya qilingan yoki talab qilinadigan adabiyotlar ro’yxati Recommended Or Required Reading	**Asosiy adabiyotlar:** 1. Fundamentals of Engineering Thermodynamics, 9th Edition, by Michael J. Moran, Howard N. Shapiro, Daisie D. Buettner, Margaret B. Bailey (ISBN: 978-1-119-39138-8) 2. Energy, Entropy and Engines: An Introduction to Thermodynamics by Sanjeev Chandra, John Wiley and Sons, 2016 (PRINT ISBN 9781119013167; EBOOK ISBN 9781119013174) 3. FE Supplied Reference Handbook, NCEES (National Council of Examiners for Engineering and Surveying), 9.5 edition. (ISBN: 978-1-932613-67-4) 4. Xalmanov A.T. 2024 DARSLIK: O’rta maxsus professional ta’limning Issiqlik texnikasi (texnikaviy termodinamika va issiqlik almashish nazariyasi) - 60730400-Muhandislik kommunikatsiyalari qurilish va montaji (turlari bo'yicha) mutaxassisligining talabalari uchun mo’ljallangan darslik **Qo‘shimcha adabiyotlar.** 1. Bazarov I.P. Termodinamika: uchebnik / I.P. Bazarov.-Moskva: Oliy maktab ,2010.-384 s.-ISBN 978-5-8114-1003- 2. Belov, G.V. Termodinamika v 2 ch. Chastь 1: Uchebnik i praktikum dlya akademicheskogo bakalavriata / G.V. Belov.-Lyubertsы: Yurayt, 2016.-264 c. 3. Madaliev E.O‘. Issiqlik texnikasi. Oliy o‘quv yurtlari uchun darslik. “Farg‘ona” nashriyoti, 2001.-322 b. 4. Rashidov YU.K., Abutaliev E.B. Texnik termodinamika. Oliy o‘quv yurtlarining qurilish mutaxassisliklari uchun o‘quv qo‘llanma, TAKI, Toshkent, 2000.-100 b. 5. Rashidov YU.K., Abutaliev E.B. Issiqlik massa almashinuvi. Oliy o‘quv yurtlarining qurilish mutaxassisliklari uchun o‘quv qo‘llanma, TAQI, Toshkent, 2000.-96 b. 6. Kirillin, Vladimir Alekseyevich Texnicheskaya termodinamika: uchebnik dlya vuzov/V. A. Kirillin, V. V. Sichev, A. Ye. Sheyndlin.-5-ye izd., pererab. i dop.-Moskva: Izd. dom MEI, 2008.-495 s.: il
Tavsiya etilgan qo'shimcha dastur komponentlari Recommended Optional Program Components	Yo’q\ (bor bolsa yoziladi) None

Kursni o'rganish natijalari

Course learning outcomes

1	Ushbu kursni muvaffaqiyatli tamomlagan talabalar berilgan termodinamik holat parametrlarni muxandislik masalalarini echishda foydalanishni o'rganadilar; Students who have successfully completed this course will learn to use the parameters of the given thermodynamic state in solving engineering problems.
2	Ideal gazlar holatining Klapeyron-Mendeleyev tenglamasini muxandislik masalalarini echishda qo'llashni o'rganadilar. They learn to use Klapeyron-Mendeleev equation of state of ideal gases in solving engineering problems.
3	Termodinamikaning birinchi qonunini real hayotga qo'llashni tushuna oladilar. Being able to draw the graph of a function.
4	Termodinamikaning ikkinchi qonunini ichki yonuv dvigatelleriga qo'llashni o'rganadilar. They learn to apply the second law of thermodynamics to internal combustion engines.
5	Talabalar issiqlik almashish apparatlarining tiplari va ularda energiyaning bir turdan ikkinchi turga o'tishi hamda energiyaning saqlanish qonuniga amal qilishini nazariy jihatdan o'rganish qobiliyatiga ega bo'ladilar. Students will have the ability to theoretically study the types of heat exchangers and the transfer of energy from one type to another in them and the law of conservation of energy.

Haftalik mavzular va tegishli tayyorgarlik ishlari

Weekly Subjects and Related Preparation Studies

Hafta Week	**Mavzular** Themes	**Resurslar** Related preparation
1	Moddalarning suyuqlik/gaz fazasining holati va fizik tamoyillari. Van der Vaals tenglamasi. Bosim/hajm, harorat/hajm va bosim/harorat o'rtasidagi munosabat [f21_meng3401_alsmairat.pdf]	1,2-darslik (I bob)
2	Sof moddalarning termodinamik xossalari. Ish, issiqlik va energiya ta'riflari. Termodinamik sistema. Termodinamika asoslari. [f21_meng3401_alsmairat.pdf]	1,2-darslik (I bob)
3	Holat parametrlari.	1,2-darslik (I bob)
4	Termodinamikaviy jarayon	1,2-darslik (I bob)
5	Ideal gazning holat tenglamasi. Ideal gaz aralashmalari. Da'lton qonuni. Termodinamika 1-qonuni.	1,2-darslik (II bob)
6	Gazlar aralashmasi. 1 mol gaz uchun holat tenglamasi.	1,2-darslik (II bob)
7	Real gazning holat tenglamasi. Ideal gazning issiqlik sig'imi. [f21_meng3401_alsmairat.pdf]	1,2-darslik (II bob)
8	Issiqlik sig'imi. O'rtacha va haqiqiy issiqlik sig'imi. Massaviy, molyar va hajmiy issiqlik sig'imi. Issiqlik sig'imining jarayonga bog'liqligi.	1,2-darslik
9	Ichki energiya, issiqlik va bajarilgan ish. Gazning kengayishida bajarilgan ish.	2,3-darslik (I bob)
10	Termodinamika birinchi qonunining tenglamasi. Entalpiya. [f21_meng3401_alsmairat.pdf]	2,3-darslik (I bob)
11	Qaytar va qaytmas jarayonlar. Muvozanatli va muvozanatsiz jarayonlar.	2,3-darslik (II bob)
	Oraliq nazorat	
12	Siklning ta'rifi. Karno sikli. Karno teoremasi. Entropiya. Entropiya miqdorini aniqlash[f21_meng3401_alsmairat.pdf]	1,2,3-darslik (II bob)
13	Termodinamika ikkinchi qonunining talqini. [f21_meng3401_alsmairat.pdf]	2,3-darslik (II bob)
14	Termodinamika ikkinchi qonunining Klauzius, Kelvin va Plank ta'riflari. [f21_meng3401_alsmairat.pdf]	1,2,3-darslik (II bob)
15	Izoxorik jarayon. Izobarik jarayon. Izotermik jarayon. (Adiabatik jarayon, Politrop jarayon)	2-darslik (I bob)
16	Bug'fazasi aylanishi/Sovutgich va issiqlik nasos tizimlarida bo'gning aylanishi. Suv bug'ining asosiy parametrlari. Bug' hosil qilish issiqligi. [f21_meng3401_alsmairat.pdf]	1,2,3-darslik (I bob)
17	Nam to'yingan suv bug'ining asosiy parametrlari. O'ta qizigan bug'ning asosiy parametrlari.	2,3,4-darslik (II bob)
18	Suv bug'ining hs-diagrammasi. Suv bug'i holatining o'zgarishidagi asosiy termodinamik jarayonlar.	2,3,4-darslik (II bob)
19	Asosiy tushunchalar. Nam havoning zichligi, gaz doimiysi va entalpiyasi. Nam havoning hd-diagrammasi.	2,3,4-darslik (II bob)
20	Turbinalar va nasoslar/kompressorlar. Bir bosqichli kompressor. Kompressor yuritmasi uchun ishni aniqlash. Real kompressordagi siqish jarayonlari. Ko'p bosqichli compressor. [f21_meng3401_alsmairat.pdf]	1,2,5-darslik (I bob)

21	Turbinalar va nasoslar/kompressorlarning samaradorligi. Gaz turbinali qurilmalar. Issiqlik p=const da uzatiladigan GTQ. Issiqlik v=const da uzatiladigan GTQ. [f21_meng3401_alsmairat.pdf]	1,2, 5-darslik (I bob)
22	GTQ sikllarini taqqoslash. Gaz-turbinali qurilmaning F.I.K. ni oshirish yo'llari.	5-darslik (II bob)
23	Ichki yonuv dvigatellarining sikllari. Asosiy tushunchalar. Issiqlik jarayonlar davomida keltiriluvchi gaz turbina qurilmalari	5-darslik (II bob)
	Oraliq nazorat	

Baholash jarayoni
Evaluation System

Mashg'ulot turi Activities	**Soni** Number	**Baholash** Percentage of Grade
Darsga qatnashish Attendance / particition		
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 crtics		
Uyga vazifani baholash Homework assignments		
Ijodiy ish (taqdimot) Presentations / jury		
Loyiha ishi Project		
Seminar Seminar / workshop		
Oraliq nazorat Mid -Terms	2	60
Yakuniy nazorat Final	1	40
O'zlashtirish ko'rsatgichi Percentage of in – term studies		60
Yakuniy imtihon bahosi Percentage of final examination		40
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	22 1	2 1	45
Laboratoriya ishi Laboratory			
Amaliy ish (qo'shimcha vazifa) application			
Kurs ishi Field work			
Mustaqil ta'lim Study hours out of class	1	75	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)	2	10	20
Yakuniy nazorat (nazorat va nazoratga tayyorlanish soati) Final (examination +examination prep. Duration)	1	10	10
Jami yuklama Total workload			150
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

Oliy ta'lim, fan va innovatsiyalar vazirligi tomonidan 2025-yil uchun tasdiqlangan xalqaro e'tirof etilgan tashkilotlarning reytingida top 300 talikka kiruvchi University of Texas at Tyler (QS-68) ning "Thermodynamics" fan dasturi tahlil qilinib ushbu asosda fan dastur ishlab chiqildi. "Termodinamika 1" fanining dasturi tayyorlanib 10 ta mavzusi yangilandi.[Mechanical Engineering Syllabi]

Fan dasturi Mirozo Ulug'bek nomidagi Samarqand davlat Arxitektura-qurilish universiteti kengashning 2025 yil _____-avgustdagi ____-sonli bayonnomasi bilan ma'qullangan.

Kafedra mudiri: Z.X.Fayziyev

Tuzuvchilar: A.T.Xalmanov

O.X.Omonqulov

M.Ulug'bek nomidagi Samarqand davlat arxitektura-qurilish universiteti Mexanika muhandisligi kafedrasi "60712300 – Mexanika muhandisligi" ta'lim yo'nalishi uchun tayyorlangan "Termodinamika 1" fanining namunaviy fan dasturi uchun

T A Q R I Z

Ushbu fan dastur "60712300 – Mexanika muhandisligi" ta'lim yo'nalishi uchun "Termodinamika 1" fanidan zamonaviy talablar asosida yaratilgan va bu dastur mazmunan fanning tegishli bo'limlarini qamrab olgan, hamda davlat ta'lim standarti talablariga to'la mos keladi.

Fan dasturida fanni o'qitishning asosiy vazifalari, fanning mazmuni va uni o'qitish metodlari, texnologiyalari, o'qitish natijasida shakllanadigan umummadaniy va kasbiy kompetensiyalar qisqa va lo'nda bayon qilingan.

Bu fan dasturida talabalarni Termodinamika faning mazmuni, uning sohaga bo'lgan ehtiyoji uchun zarur bo'lgan asosiy ma'lumotlar keltirib o'tilgan.

Dasturda keltirilgan mavzular fanning mazmunini to'liq qamrab oladi va shu bilan birgalikda kredit tizimida o'qitilishiga moslashtirilgan. Nazariy mashg'ulotlar, amaliy mashg'ulotlar va mustaqil ta'lim uchun alohida mavzular keltirilgan bo'lib, bu talabalar bilimini yanada mustahkamlashga xizmat qiladi. Fanning mazmuni zamonaviy adabiyotlar(asosiy va qo'shimcha adabiyotlar) hamda internet saytlari ro'yxati ko'rsatib o'tilgan.

"60712300 – Mexanika muhandisligi" ta'lim yo'nalishlari uchun tuzilgan "Termodinamika 1" fanining namunaviy fan dasturi ta'lim dasturlariga qo'yilgan talablarga mos keladi va undan ta'lim jarayonida foydalanish mumkin.

Farg'ona politexnika instituti,
"Muxandislik kommunikatsiyalari qurilishi
va montaji" kafedrasi dotsenti, t.f.f.d. **J.T.Orzimatov**

FARG'ONA POLITEXNIKA INSTITUTI
imzosini
TASDIQLAYMAN
I XB BOSHLIG'I