

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

SAMARQAND DAVLAT ARHITEKTURA – QURILISH UNIVERSITETI

“KELISHILGAN”

o'quv ishlari bo'yicha  
prorektor

M.T.Shodmonqulov

Ro'yxatga olindi: № 340/a

«30» avgust 2024 yil



TERMODINAMIKA 1

FAN DASTURI

**Bilim sohasi:** 700000-Muhandislik, ishlov berish va qurilish sohalari

**Ta'lim sohasi:** 730000-Arxitektura va qurilish

**Ta'lim yo'nalishi:** 60112400-Professional ta'lim (Muhandislik kommunikatsiyalari)

**Kurs ma'lumotlari**  
Course Information Form

Modul kodi Code MAS 2050	O'quv yili 2024-2025	Semestr 4	ECTS – Kreditlar 4-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)	
Termodinamika 1	4-semestr -120	4-semestr -3			4-semestr -5

<b>Dastlabki shart</b> Prerequisite	<b>Yo'q</b> None
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<b>Semestr</b> Semestr	<b>Bahorgi</b> Spring
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<b>Kurs tili</b> Course language	<b>O'zbek, Rus</b> Uzbek, Russian
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<b>O'quv kursi</b> Level of Course	<b>Ikkinchi kurs</b> Second Cycle
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<b>Ta'lim yo'nalishlari</b> Course type	60713500-Mexanika muhandisligi
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<b>Kurs toifasi</b> Course Category	Majburiy Core Courses
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<b>Dars shakli</b> Mode of Delivery	An'anaviy (Yuzma – yuz muloqot) Face – to - face
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<b>Ma'sul kafedra</b> Owner academic unit	Mexanika muhandisligi Department of Mechanical engineering
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<b>Kursga ma'sul</b> Cours Coordinator	Xalmanov Aktam
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<b>O'qituvchilar</b> Instructor(s)	Xalmanov Aktam , Eshmatov Mansur, Omonqulov Orifjon
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<b>Yordamchilar</b> Asistant(s)	Omonqulov Orifjon
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<b>Fanni o'qitishdan maqsad</b> Course objectives	Issiqlik texnikasining ikki asosiy bo'limi, ya'ni texnik termodinamika va issiqlik massa almashinuviga doir ma'lumot berish, muhandislik masalalarini echishda foydalaniladigan texnik termodinamikaning sof nazariy, issiqlik massa almashinuvining esa - xam nazariy va amaliy bilimlaridan amaliyotdagi muhandislik masalalarini echishda to'g'ri foydalanishni 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
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	<p>foydalaniladigan texnik termodinamikaning sof nazariy, issiqlik massa almashinuvining esa - xam nazariy va amaliy bilimlaridan amaliyotdagi muhandislik masalalarini echishda to'g'ri foydalanishni o'rganishdan iboratdir.</p> <p>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.</p>
<p><b>Fanning mazmuni</b> Course content</p>	<p>“ Termodinamika 2” faniga kirish. Asosiy tushunchalar va ta'riflar. Issiqlik massa almashinuvini fanining qisqacha rivojlanish tarixi. Issiqlik massa almashinuvini fani va uning vazifalari. Qurilish sohasi uchun issiqlik massa almashinuvini fanining ahamiyati. Issiqlikni uzatish usullari. Issiqlik o'tkazuvchanlik. Issiqlik o'tkazuvchanlikning asosiy qonuni. Temperatura gradienti. Fure qonuni. Issiqlik o'tkazuvchanlik koeffitsienti. Statsionar rejimda issiqlik o'tkazuvchanlik. Bir jinsli yassi devor. Devorning issiqlik o'tkazuvchanligi. Devorning termik qarshiligi. Ko'p qatlamli devor. Konvektiv issiqlik almashinuvini (issiqlik berish). Konvektiv issiqlik almashinuvini asosiy qonuni. Issiqlik berish. Nyuton Rixman qonuni. Issiqlik berish koeffitsientini aniqlash uchun hisobiy bog'lanishlar. Issiqlik tashuvchisini majburiy xarakatidagi issiqlik berishi. Nurli issiqlik almashinuvini. YUtilish. Qaytarish va o'tkazish koeffitsientlari. Mutloq qora, oq, shaffof va kulrang jismlar. Issiqlik uzatish. Murakkab issiqlik almashish. Issiqlik almashish apparatlari.</p> <p>Introduction to "Thermodynamics 2". Basic concepts and definitions. A brief history of the development of the science of heat and mass transfer. The science of heat and mass transfer and its tasks. The importance of the science of heat and mass transfer for the construction industry. Methods of heat transfer. Thermal conductivity. The basic law of heat conduction. Temperature gradient. Fourier's law. Heat transfer coefficient. Thermal conductivity in stationary mode. Homogeneous flat wall. Thermal conductivity of the wall. Thermal resistance of the wall. A multi-layered wall. Convective heat exchange (heat transfer). The basic law of convective heat transfer. Give heat. Newton-Richmann's law. Mathematical connections for determining the heat transfer coefficient. Heat transfer in the forced motion of the heat carrier. Radiant heat exchange. Swallowing. Return and transfer coefficients. Absolute black, white, transparent and gray objects. Heat transfer. Complex heat exchange. Heat exchange devices.</p>
<p><b>Tavsiya qilingan yoki talab qilinadigan adabiyotlar ro'yxati</b> Recommended or Required Reading</p>	<p>1.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</p>

	<p>2.R.K. RAJPUT “ENGINEERING THERMODYNAMICS” For Engineering Students of All Indian Universitiyes and Competitive Examinations.</p> <p>3.Bazarov I.P. Termodinamika: uchebnik / I.P. Bazarov.- Moskva: Vysshaya shkola,2010.-384 s.-ISBN 978-5-8114-1003-1003-</p> <p>4.Belov, G.V. Termodinamika v 2 ch. Chastъ 1: Uchebnik i praktikum dlya akademicheskogo bakalavriata / G.V. Belov.- Lyubertsy: Yurayt, 2016.-264 c.</p> <p>5.Madaliev E.O'. Issiqlik texnikasi. Oliy o'quv yurtlari uchun darslik. "Farg'ona" nashriyoti, 2001.-322 b.</p> <p>6.Dulnev, G.N. Osnovy teorii teplomassoobmena [Tekst]/G.N. Dulnev, S.V. Tixonov.-SPb.: SPbGUITMO, 2010.</p> <p>7.Rashidov YU.K., Issiqlik texnikasi Oliy o'quv yurtlarining qurilish mutaxassisliklari uchun o'quv qo'llanma.- Toshkent,“Iqtisod-Moliya”.- 2019.- 184 b</p> <p>8.Rashidov YU.K., Abutaliev E.B. Texnik termodinamika. Oliy o'quv yurtlarining qurilish mutaxassisliklari uchun o'quv qo'llanma, TAKI, Toshkent, 2000.-100 b.</p> <p>9.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.</p> <p>10.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</p>
<p><b>Tavsiya etilgan qo'shimcha dastur komponentlari</b> Recommended Optional Program Components</p>	<p>Yo'q\ (bor bo'lsa yoziladi)</p> <p>None</p>

### Kursni o'rganish natijalari

#### Course learning outcomes

1	<p>Ushbu kursni muvaffaqiyatli tamomlagan talabalar berilgan issiqlik uzatish usullari va qonuniyatlari muxandislik masalalarini echishda foydalanishni o'rganadilar; Students who have successfully completed this course will learn to use the given methods and laws of heat transfer in solving engineering problems;</p>
2	<p>Issiqlik o'tkazuvchanlikning asosiy qonuni; Fure konuni va issiqlik o'tkazuvchanlik koeffitsienti muxandislik masalalarini echishda qo'llashni o'rganadilar. The basic law of heat conduction; Fourier's law and the coefficient of heat transfer will be studied in solving engineering problems.</p>
3	<p>Konvektiv issiqlik almashinuvining asosiy qonuni muhandislik masalalarini echishda qo'llashni tushuna oladilar. They can understand the basic law of convective heat exchange and its application in solving engineering problems.</p>
4	<p>Bir jinsli yassi devor, devorning issiklik o'tkazuvchanligi, devorning termik qarshiligi va ko'p qatlamli devor kabi tushunchalarga ega bo'lish va bu tushunchalarni muhandislik masalarini echishda qo'llashni o'rganadilar. They learn to understand the concepts of a homogeneous flat wall, thermal conductivity of a wall, thermal resistance of a wall, and a multi-layered wall and apply these concepts to solving engineering problems.</p>
5	<p>Talabalar murakkab issiqlik uzatishni va issiqlik almashish apparatlarining tiplari va ularda energiyaning bir turdan ikkinchi turga o'tishi hamda energiyaning saqlanish qonuniga amal</p>

qilishini nazariy jihatdan o'rganish qobiliyatiga ega bo'ladilar.  
Students will have the ability to theoretically study complex heat transfer and the types of heat exchange apparatuses 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.	Asosiy tushunchalar va ta'riflar. Issiqlik massa almashinuvi fanining qisqacha rivojlanish tarixi. Issiqlik massa almashinuvi fani va uning vazifalari.	1,2,3,4-darslik (I bob)
2.	Issiqlikni uzatish usullari. Qurilish sohasi uchun issiqlik massa almashinuvi fanining axamiyati.	1,2,3,4-darslik (I bob)
3.	Issiqlik o'tkazuvchanlik. Issiqlik o'tkazuvchanlikning asosiy qonuni.	1,2,3,4-darslik (I bob)
4.	Issiqlik o'tkazuvchanlik. Issiqlik o'tkazuvchanlik koeffitsienti. Fure qonuni.	1,2,3,4-darslik (I bob)
5.	Stasionar rejimda issiqlik o'tkazuvchanlik Bir jinsli yassi devor.	1,2,3,4-darslik (II bob)
6.	Ko'p qatlamli devor. Kontaktli termik qarshilik.	1,2,3,4-darslik (II bob)
7.	Konvektiv issiqlik almashinuvi (issiqlik berish). Konvektiv issiqlik almashinuvining asosiy qonuni.	1,2,3,4-darslik (II bob)
8.	Oraliq nazorat Tabiiy va majburiy konveksiya. Issiqlik berish koeffitsienti.	1,2,3,4-darslik
9.	Moddaning agregat holati. Moddaning agregat holatini o'zgarishida issiqlik berish	1,2,3,4-darslik (I bob)
10.	Nurli issiqlik almashinishi. Jarayon izohi va asosiy ta'riflari. YUtilish. Qaytarish va o'tkazish koeffitsientlari.	2,3,4,5-darslik (I bob)
11.	Nurli issiqlik almashinishi. Nurlanish oqimining spektral zichligi. Vin qonuni. Stefan - Bolsman qonuni.	2,3,5,6-darslik (II bob)
12.	Yutuvchi va tarqatuvchi muxitda nurlanish energiyasining olib o'tilishi. Buger qonuni.	2,4,5,6-darslik (II bob)
13.	Moddalarning yorug'lik nuri bilan o'zaro ta'sirlashishi.	2,3,5,6-darslik (II bob)
14.	Issiqlik uzatish. Murakkab issiqlik almashish.	2,3,5,6-darslik (II bob)
15.	Issiqlik almashish apparatlari. Issiqlik almashish apparatlari tipi va klassifikatsiyasi.	2,3,5,6-darslik (II bob)

**Baholash jarayoni**  
Evaluation System

Mashg'ulot turi Activities	Soni Number	Baholash Percentage of Grade
Darsga qatnashish Attendance / participation	15	20
Laboratoriya ishi		

Laboratory		
<b>Amaliy ish (qo'shimcha vazifa)</b> Application		
<b>Kurs ishi</b> Field work		
<b>Maxsus kurs amalyoti (ish joyida)</b> Special course internship (work placement)		
<b>Testlar</b> Quizzes / studio critics		
<b>Uyga vazifani baholash</b> Homework assignments		
<b>Ijodiy ish (taqdimot)</b> Presentations / jury		
<b>Loyiha ishi</b> Project		
<b>Seminar</b> Seminar / workshop		
<b>Oraliq nazorat</b> Mid -Terms	2	30
<b>Yakuniy nazorat</b> Final	1	50
<b>O'zlashtirish ko'rsatgichi</b> Percentage of in – term studies		50
<b>Yakuniy imtihon bahosi</b> Percentage of final examination		50
<b>Jami</b> Total		100

<b>ECTS taqsimoti</b> ECTS workload table			
<b>Topshiriqlar</b> Activities	<b>Soni</b> Number	<b>Davomiyligi (soat)</b> Duration (hour)	<b>Umumiy yuklama</b> Total workload
<b>Mashg'ulot soati</b> Course hours	15	2	30
<b>Laboratoriya ishi</b> Laboratory			
<b>Amaliy ish (qo'shimcha vazifa)</b> application			
<b>Kurs ishi</b> Field work			
<b>Mustaqil ta'lim</b> Study hours out of class	1	60	30
<b>Maxsus kurs amalyoti (ish joyida)</b> Special course internship (work placement)			
<b>Uyga vazifani baholash</b> Homework assignments			
<b>Testlar / Viktorina</b> Quizzes / studio critics			
<b>Loyiha ishi</b> Project			
<b>Ijodiy ish (taqdimot)</b>			

Presentations / seminar			
<b>Oraliq nazorat</b> Mid – terms (Examination +Examination prep. Duration)	2	10	20
<b>Yakuniy nazorat (nazorat va nazoratga tayyorlanish soati)</b> Final (examination +examination prep. Duration)	1	10	10
<b>Jami yuklama</b> Total workload			90
<b>Jami yuklama / 30 (soat)</b> Total workload / 30(h)			90/3=3
<b>Kredit</b> ECTS credit			3

<b>Qo'shimcha eslatmalar</b> Extra Notes	Yo'q\ (bor bo'lsa yoziladi) None
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Fan dasturi Mirozo Ulug'bek nomidagi Samarqand davlat Arxitektura-qurilish universiteti kengashning 2024 yil 30 -avgustdagi 1-sonli bayonnomasi bilan ma'qullangan.

Kafedra mudiri:

Z.X.Fayziyev

Tuzuvchilar:

A.T.Xalmanov

O.X Omonqulov