

د انجنيري پوهنځی/ پوهنځي انجنيري/ Engineering Faculty



## پيام مقام وزارت تحصيلات عالى

نیروی بشری آموزش دیده و متخصص یکی از عناصر اصلی توسعه سیاسی، اجتماعی و اقتصادی کشورها شمرده می شود. بدون تردید انکشاف همه جانبه افغانستان عزیز بدون حضور منابع بشری متخصص و متعهد امکان پذیر نخواهد بود. وزارت تحصیلات عالی افغانستان و نهاد های مربوط آن مسئولیت آموزش و تربیه متخصصین را در رشته ها و عرصه های مختلف با فراهم آوری امکانات مساعد و مناسب تحصیلات عالی عهده دار می باشد. تحصیلات عالی ستندرد و معیاری وابسته است به نصاب تحصیلی عالی، بروز و جامع که مبتنی بر نیازمندی محصلان درجامعه، منطقه و جهان و با معیار های قبول شده ملی و بین المللی تنظیم گردیده باشد. وزارت تحصیلات عالی افغانستان به منظور تحقق این امر مهم با وجود چالش های فراوان، گام های مؤثر و مفیدی را در جهت معیاری ساختن نظام تحصیلی کشور برداشته است. ما کاملاً باورمند هستیم که مردم افغانستان شایسته تحصیلات عالی با کیفیت اند که از اعتبار جهانی برخوردار بوده و پاسخگوی نیاز های اساسی بازار کار افغانستان باشد. برای نیل به این اهداف والا داشتن نصاب درسی هماهنگ با معیارهای جهانی، کار افغانستان شمول و کاربردی امر حتمی و الزامی است.

در پلان استراتژیک ملی وزارت تحصیلات عالی، تدوین نصاب تحصیلی معیاری برای تمام رشته های تحصیلی به عنوان یکی از اهداف اصلی مطمح نظر بوده و به همین جهت به کمیسیون ملی نصاب تحصیلی وظیفه سپرده شد تا در این مورد رهنمودی را تدوین نموده و در روشنائی آن روند انکشاف و بازنگری نصاب تمامی رشته های تحصیلی کشور راآغاز نماید.

خوشبختانه پروسه انکشاف و بازنگری نصاب های تحصیلی حدود دو سال قبل در تمام رشته ها از مرحله نیاز سنجی از سطح دیپارتمت ها، پوهنحی ها و پوهنتون ها، مستفیدان از نهاد های دولتی و خصوصی آغاز و همچنان مدل های متعددی سایر کشورها نیز مورد مطالعه و بررسی قرار گرفت و نصاب های یک تعداد رشته ها تکمیل و به منصه تطبیق قرار گرفت.

اینک مسرت داریم که در تداوم این پروسه، انکشاف و بازنگری نصاب های تحصیلی رشته های مختلف انجنیری پوهنتون های کشور؛ مبتنی بر رهنمود جدید، با همت و همکاری همه جانبه مسئولین و اعضای کادر علمی پوهنحی های انجنیری پوهنتون های دولتی و خصوصی کشور تحت نظر کمیسیون ملی نصاب تحصیلی تکمیل و آماده تطبیق گردیده است. ما شاهد تلاش های مستمر، صادقانه و تخصصی همکاران خویش در نهادهای تحصیلی کشور، در تمامی مراحل از جمله مستمر، صادقانه و تخصصی همکاران خویش در نهادهای تحصیلی کشور، در تمامی مراحل از جمله مستمر، صادقانه و تخصصی همکاران خویش در نهادهای تحصیلی کشور، در تمامی مراحل از جمله مستمر، صادقانه و تخصصی همکاران خویش در نهادهای تحصیلی کشور، در تمامی مراحل از جمله مرحله نیاز سنجی، بررسی های مسلکی کمیته های تخصصی و برگزاری کلستر های متعدد تدوین نصاب درسی، مرحله تدقیق و مرحله نهایی سازی در هر یک از رشته های فوق الذکر بودیم و اقدامات صورت گرفته را که با کیفیت و معیارهای عالی به انجام رسیده است، تحسین و تقدیر می کنیم.

اکنون با افتخار نصاب های بازنگری شده بیست رشته مختلف انجنیری نهایی شده در وزارت تحصیلات عالی افغانستان را جهت تطبیق در تمام پوهنتون ها و مؤسسات تحصیلات عالی دولتی و خصوصی که این رشته ها را دارند تقدیم جامعه علمی خویش می نماییم. امید داریم با تطبیق نصاب های جدید بسا از خلاها و کاستی های قبلی رفع گردیده، ارائه خدمات تحصیلات با کیفت بهتر و بازدهی مؤثر تر صورت گیرد. در پایان از تمامی تهیه کنندگان نصاب های تحصیلی رشته های انجنیری، به خصوص از همکاران گرامی در وزارت تحصیلات عالی، اعضای کمیسیون ملی نصاب، استادان پر تلاش شامل در این پروسه، رؤسای پوهنځی ها و آمرین دیپارتمنت های مربوطه، کمال قدردانی و سپاس گزاری را می نمایم و برای شان موفقیت های مزید در عرصه خدمت به جامعه اکادمیک کشور را تمنا دارم.

> پوهنمل دیپلوم انجنیر عبدالتواب بالاکرزی معین علمی و سرپرست وزارت تحصیلات عالی

# برنامه ملی بازنگری و انکشاف نصاب های تحصیلی

وزارت تحصیلات عالی بازنگری و معیاری سازی نصاب های تحصیلی را یکی از اولویت های کاری خویش دانسته و در راستای آن برنامه بازنگری و انکشاف نصاب های تحصیلی را طرح و تنظیم نمود است. بر اساس طرح فوق کمیسیون ملی نصاب تحصیلی؛ با در نظر داشت تعدد رشته ها، برنامه بازنگری را در مجموع **45** کلستر اصلی و **164** کلستر فرعی راه اندازی نمود. مبتنی بر پلان عملیاتی بازنگری نصاب هر رشته با حضور روسای فاکولته ها و اعضای کادر علمی همان رشته، ذینفع ها، متخصصین و مسئولین امور ذیربط صورت میگیرد. در همین راستا ما شاهد تدویر کلستر رشته های مختلف جهت بازنگری، انکشاف و بروز سازی نصاب تحصیلی کشور یکی بعد دیگری بحدید به اساس لایحه سیستم کریدت وزارت تحصیلات عالی تدوین گردد زیرا دراین سیستم، واحدهای درسی برای تکمیل هر یک از دورههای تحصیلی معین میباشد. مضامین به کتگوری های مدانگر حداق و حد ایز اواحد درسی در مطابقت به لایحهٔ سیستم کریدت، برای هر سستر مشخص شده است. برای تعیین و تسلسل مضامین در دورهٔ تحصیلی، بیش نیاز بودن یک مضمون برای مضمون دیگر مورد توجه قرار گرفته است. در کل وزارت تحصیلات عالی برنامه بازنگری و

- عیار سازی نصابهای تحصیلی در مطابقت با معیار های ملی و بین المللی
- به روز رسانی نصاب های تحصیلی با توجه به تحولات شگرف ساینس و تکنالوژی در مطابقت به نیاز بازار کار

در تمام کلستر های بازنگری و انکشاف نصاب های تحصیلی رشته های مختلف، تحقق اهداف ذیل مطمح نظر است:

- بازنگری مضامین به اساس تعداد کریدیت و محتوای مضمون؛
- نیاز سنجی جهت حذف و اضافه نمودن مضامین به اساس اولویت بندی نیاز های همان رشته؛
  - ارزیابی مضامین پیش نیاز (مضامین اساسی، حتمی-تخصصی و اختیاری)؛
- تطبیق اهداف آموزشی رشته با شیوه ها و مدل های جدید (OBE, SCL) آموزش مبتنی بر نتایج و شاگرد محوری؛
  - همسان سازی نام مضامین، تعداد کریدت ها و کود گذاری مضامین؛
  - مشخص نمودن نتایج متوقعه از کریکولم درسی و مطابقت آن با نتایج متوقعه رشته؛

- تغییرات، تعدیلات و تعویض نام مضامین به اساس پیشنهاد اعضای کلستر ها با استفاده از مآخذ معتبر کشور های منطقه و جهان؛
- ازدیاد، حذف و ادغام مضامین مطابق نیاز محصلان کشور، معیاری و همسان سازی کریکولم
   درسی با کشورهای منطقه و جهان و نیاز بازار کار

پو هنمل خواجه زبیر صدیقی رئیس انکشاف برنامه های علمی

### Preface

Due to years of war and conflict in Afghanistan, as any other sector of the country, energy sector was also demolished and could not provide satisfactory services. This was in case that the country had a lot of resources that could be used for generating electricity, biogas and etc. based on these problems and opportunities, the Engineering Faculty of Kandahar University conducted an academic need assessment for establishing bachelor of energy engineering program in 2010. As a result, it was determined that there is lack of enough knowledge in this field. For eliminating this problem, the Energy Engineering Department was officially established in the framework of Engineering Faculty in 2013. In the framework of an active partnership supported by USWDP/USAID, Kandahar University (KDRU) and Texas A&M University (TAMU) have prepared a market oriented curriculum which contains 52 (147 credits) courses. The courses and number of credits have been decided upon the requirement recognized by Ministry of Higher Education, Afghanistan and Accreditation Board for Engineering and Technology (ABET).

In 2015, Texas A&M University undertook the project funded by University Support and Work Force Development Program (USWDP)/United States Agency for International Development (USAID) to strengthen the capacity of Energy Engineering Department in developing a market oriented curriculum, identifying effective teaching methods, procuring curriculum related lab equipment, resources center and related books. The curriculum was reevaluated in the energy engineering clusters held two times by the Directorate of Academic Programs Development (DAPD) in the Ministry of Higher Education (MoHE) in the end of 2019. After some changes, it was approved by all members of the energy engineering cluster.

Energy Engineering Department gratefully acknowledge USWDP/USAID for providing the financial support for this vital project. We are thankful from the steering committee members of this program at Kandahar University and the technical advisors of Texas A&M University for their hard work and valuable efforts. We would also like to extend appreciation to the Directorate of Academic Programs Development (DAPD) of the Ministry of Higher Education (MoHE) for giving us chance to reevaluate the curriculum and finalize it.

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	Li. Engl 0102 English I (English for Academic Purposes)	
	Li.Engl 0202 English II (Critical Thinking and Writing)	
	Li. Engl 0302 English III (English Communication Skills in Engineering)	
	En. Hist 0105 History of Algnanistan	
	Sh. Isi 0101 Theology I: Islanic Outlook (IO)	
	Sh. Isi 0201 Theology III: Filmosophy of Wolship (r W)	
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46	2 Basic Courses {56credits (38%)}	
	En Ene 0104 Calculus I (Differential & Integral Calculus)	61
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## 1. Introduction to Kandahar University

Kandahar University was established in 1990 with the faculties of Agriculture, Medicine, Engineering, Education, Sharia, Economics, Journalism and Public relations, Law and Political Science, Public Administration and Policy, Languages and Literature, Computer Science and Stomatology, being established one after another.

The university has been engaged in training and graduating young generation in different study fields such as medical science, engineering, agriculture, education, Islamic studies, and journalism despite the harsh and challenging security, political and economic conditions of the country.

Kandahar University is the central university in southwestern zone of the country functioning as the main unit for observing all governmental and private higher education institutions in the region. Kandahar University has established its first filial institute of higher education in Helmand in 2006, second in Urozgan in 2012 and third in Zabul province in 2017.

In 2004, Kandahar University lacked specific buildings and establishments for teaching, administrative and hostel and with the governor's office support the university had to use different governmental buildings of Kandahar as teaching classes. The university was shifted to the current campus, which is located in northern part (9th district) of Kandahar city in 2004. The university currently holds possession of a total 350 hectares land that includes Agricultural Farm, Medical Faculty Campus and Aino Mina Campus.

Kandahar University has Agricultural Research Farm, Teaching Hospital, Central Laboratory, Library, Meteorological Center, Career Center, Information Technology Center, Media Center, Peace and Anti-Violation Center (Pacha Khan Research Center), India – Afghan Foundation Academic Research Center and English Learning and Computer Learning Center of (ELCLC) its own Pacha Khan Academic and Research Center, which was established in 2008, is the one and only unique center in all over the country that functions in working for peace and against violation.

Moreover, the Career Center was established for the first time in all over the country in 2011 with the innovation of Kandahar University and financial support of USA. This unique center helps graduated and non-graduated students of university in finding job opportunities and in improving work capacity and professional skills. This center has many achievements regarding their work scope in a short period.

Kandahar University is one of the national universities of Afghanistan that has around 10,000 students from 34 provinces, and lecturers, administrative staff and service workers from 20 provinces.

Kandahar University is one of the largest universities of the country that has academic and technical relations with well-known universities of the world. These universities include Asian Institute of Technology, Mahidol University – Thailand, Malaya University — Malaysia, Purdue University, Ball State University, Texas University, John Hopkins University — USA, Handong University—South Korea, Bochum University, Berlin University — Germany, Jawaharlal Nehru University — India, Sistan and Baluchistan University, Zabul University — Iran. Kandahar University is the first university to have the membership of Global Water Partnership.

Kandahar University has 12 faculties. The Education Faculty, Agriculture Faculty, Economics Faculty and Faculty of Sharia (Theology) are the faculties that also provide night shift services to the students. The Education Faculty also gives teaching services to (inservice) students. Besides, in the faculty of medicine we have master degree program in public health that was established in 2016. The university has a total of 43 graduating departments and 8 supporting (non-graduating) departments.

### 1.2.Vision

Kandahar University aspires to be a leading university in standard teaching, reliable researches, and fulfilling services in various academic fields of study throughout the country and will be regionally well- acknowledged.

### 1.3.Mission

Kandahar University educates the young generation by providing them with teaching, research, and high standard services at the utmost national levels of excellence.

### 2. Introduction to Engineering Faculty

Kandahar Engineering Faculty (KDREF) was established in September, 2000. It is the third faculty of Kandahar University in terms of establishment after agriculture and medicine faculties in 1990 and 1994 respectively. Currently it has four departments Civil Engineering, Water and Environmental Engineering, Energy Engineering and Architectural and Town Planning Departments. In addition to these, it is planned to establish Mechanical Department until 2021. All departments have market oriented and updated curriculums developed in the framework of partnerships with the world well-known universities. For the best curriculum delivery, all classes are equipped with standard academic requirements. To be updated from the world development, English is used medium of instruction in the faculty. About 85% of text books, lectures, exams and assignments are in English. By the financial supports of USWDP/USAID and HEDP, all departments have established standard laboratories and resources centers for the practical works and practices of students. After successful completion of the four year program, the graduates receive the B.Eng. degree. Since its establishment, KDREF has graduated 899 Engineers to Afghan society and currently has 931 students in four departments. It has 32 fulltime faculty members from which, 28 have completed their M. Eng. degrees with different specializations and 4 of them are preparing for getting master degree.

## 2.1.Vision

Kandahar Engineering Faculty strives to become a leading engineering institution in the country and well known at the regional level.

### 2.2.Mission

Kandahar Engineering Faculty strives to have such educational environment to acquire, share and use knowledge in various fields of engineering to contribute to the quality of life in Afghan society through innovation and generating research opportunities and engineering services.

### 2.3.Objectives

- Graduating engineers with high level of commitments to the country with respect to national and international legal frameworks, culture and Islamic values.
- Graduating engineers that have the necessary knowledge and skills for assessment and recognizing alternatives in designing of projects related to socio-economical, environmental and public safety.
- Graduating engineers having necessary verbal and written communication skills for success in their professions or entering graduate studies.
- Graduating engineers functioning effectively on teams with high level of ethical and professional standards.
- Graduating engineers with leadership skills and to be able to challenge the problems and difficulties.
- Conducting high quality researches nationally and internationally in field of engineering.
- Contributing to the overall development of the country.
- Acting as a consultant in the national and international level.

### 3. Introduction to Energy Engineering Department

Energy Engineering Department was established in 2013 in the framework of Engineering Faculty of Kandahar University. The establishment of this department was based on the problems and opportunities associated with field of energy in the country. The department follows a market oriented curriculum which was developed in the framework of an active partnership with the Texas A&M University of USA. Texas A&M University supported Energy Engineering Department in developing curriculum, preparing teaching materials and upgrading the faculties and lab technicians.

During the partnership with Texas A&M university of USA, a curriculum oriented laboratory, library and resources center were planned for the department. These facilities were procured by USWDP/USAID in 2018.

For the betterment of this four year degree program, four classrooms, one resources center, laboratory and one office were renewed and equipped in the building of engineering faculty by the financial support of USWDP/USAID.

Currently, Energy Engineering Department has six faculty members; four of them have obtained their master degree in energy engineering from the very well-known university, Asian Institute of Technology (AIT), and two faculties are currently preparing for getting master degree. The department graduated its first batch students in June, 2018.

Based on the demand, the faculties of Energy Engineering Department provide advisory and research services to the government and private sectors of the country. These services help to improve the educational and experience level of the faculties and the students.

### 3.1. Vision

Energy engineering department struggles to train skilled professionals in the field of energy and providing academic research services to the society.

## 3.2. Mission

To approach the vision of energy engineering department new technologies and effective academic, educational and research methods are worked out.

## 3.3. Objectives

- Offering skilled engineers to the society equipped with Islamic and national values in the field of energy.
- Searching solutions to energy related difficulties of the society through conducting researches and offering services.
- Investigating best utilization of the available national energy resources for economic development of the country.
- Improving renewable energy for mitigating greenhouse gases emissions from the earth to the atmosphere.

## 3.4. Values

- Respect of Islamic sanctities and Afghan values.
- Islamic and human moral and improving morality of patriotism.
- Establishing accepted national and international quality.
- Transparency and prevention of corruption.

## 4. Energy Engineering Curriculum

The bachelor of engineering program in energy engineering was designed to graduate engineers with the ability to identify and address energy related problems, identify appropriate solutions, design and implement energy projects, create and revise energy policies and provide guidance in promoting energy efficiency in different sectors.

### **4.1.Educational Need Assessment**

Due to years of war and conflict in Afghanistan, the energy sector of the country was unable to provide adequate services for the current energy requirements of the country. This was in case that the country had a lot of resources that could be used for generating electricity. In such a situation, the Engineering Faculty of Kandahar University met different involved stakeholders and individuals from the market and conducted a need assessment for establishing a bachelor of energy engineering program in the framework of engineering faculty in 2010. As a result, the problems and opportunities associated with the field of energy in the country was analyzed and it was determined that there is lack of enough knowledge in this field. For overcoming this problem, the Energy Engineering Department was officially established in the framework of Engineering Faculty in 2013.

#### **4.2.**Outcomes of Educational Need Assessment

After conducting the educational need assessment, it was observed that skilled engineers are required to eliminate the current shortage and inadequate use of energy by using national renewable and nonrenewable resources and modern techniques. To graduate engineers with the required knowledge and skills, the curriculum was created by considering the following major energy related areas:

- i. Renewable energy sources and technologies (solar thermal, solar photovoltaic, biomass, wind and hydropower).
- ii. Nonrenewable energy sources and technologies (coal, gas, fossil fuel thermal power plants).
- iii. Energy efficiency (efficient design and audit of energy systems in buildings and energy audit of industries and transport).
- iv. Energy policies, economics and politics (creating energy policies, evaluation of energy projects and understanding energy politics).

### 4.3. Program Educational Outcomes

By the successful completion of 4 years bachelor of energy engineering, the students will be able to

- i. Apply mathematics, science and engineering
- ii. Design/conduct experiments/analyze data
- iii. Use modern tools and techniques
- iv. Critical thinking and apply knowledge concurrence with other disciplines
- v. Understand professional and ethical responsibility
- vi. Communicate effectively

vii. Ability to function in a group and in multi-disciplinary team

### **4.4.**Curriculum Development

By considering the program educational outcomes, a market oriented curriculum was created in the framework of an active partnership with the Texas A&M University of USA. The curriculum of energy engineering consists of 52 (147 credits) courses in which 18 credits (12%) are collegiate, 54 credits (37%) are basics and 75 credits (51%) are professional including a final research/project.

This curriculum was prepared with due consideration to the criteria for engineering program recognized by Ministry of Higher Education, Afghanistan and the following bachelor of engineering curriculum definition and program educational outcomes set by ABET (Accreditation Board for Engineering and Technology) (<u>http://www.abet.org/wp-content/uploads/2018/02/E001-18-19-EAC-Criteria-11-29-17.pdf</u>) which states the following: **"Curriculum**: the curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:

- a) One year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.
- b) One and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.
- c) A general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.

**Student Outcomes**: the program must have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

- a) an ability to apply knowledge of mathematics, science, and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) an ability to function on multidisciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice."

In this curriculum, the course structure has been divided into three groups:

i. <u>Collegiate courses {18 credits (12%)}:</u>

The collegiate courses includes theology, English and history

- ii. <u>Basic courses {56 credits (38%)}:</u> The basic courses include the following: science, mathematics and other important courses related to their study.
- iii. <u>Professional courses including a final research/project {73 credits (50%)}:</u>

Professional courses includes all those courses which emphasize on the major fields of energy engineering. Students have to conduct a final year research in these courses.

**Code Number of the Course:** In this curriculum each course has a code number, such as En.Ene 0205, in which the first letters represent the faculty, the second letters represents the department, the first numbers represent semester and the last two numbers represent the number of course in that semester. For example, En.Ene 0205 is the 5th course in the 2nd semester of engineering faculty (En), energy engineering department (Ene).

**Credit Hour:** one credit hour is equivalent to one hour of lecture per week or two hours of lab per week or three hours of field work per weak in 16 continuous weeks.

	( Semester - 1) (First year / First Semester)									
			•	Cl	asse	s	Z	<b>.</b> .	Pr	I
No	Subjects	Codes	Subject Sategory	Theory	Practice	Total	umber of Credits	In charge Department and Faculty	requisite ubjects	
1	Theology I	Sh. Isi 0101	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	English I	Li. Engl 0102	Collegiate	3		3	3	English, Faculty of Literature	None	
3	History of Afghanistan	En. Hist 0103	Collegiate	1		1	1	History, Faculty of Education	None	
4	Calculus I	En. Ene 0104	Basics	4		4	4	Energy Engineering, Faculty of Engineering	None	
5	Engineering Physics I	En. Ene 0105	Basics	3	2	5	4	Energy Engineering, Faculty of Engineering	None	
6	Introduction to Engineering & Computer	En. Ene 0106	Basics	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
7	Drawing I	En. Ene 0107	Basics	1	4	5	3	Energy Engineering, Faculty of Engineering	None	
	Т	otal		15	8	23	19			

# 4.5.Semester-wise Curriculum Structure

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	5	3.40%
2	Professional	0	0.00%
3	Basics	14	9.52%
4	Optional	0	0.00%
	Total	19	12.93%

N 0	Optional/Basic/Professional Subjects	Codes	Credits
1			
2			
3			
	Signature		

	(Semester - 2) (First year / Second Semester)									
			0.50	C	lass	es	Z		Pr	R
No	Subjects	Codes	Subject Sategory	Theory	Total Practice Theory		umber of Credits	In charge Department and Faculty	erequisite Subjects	lemarks
1	Theology II	Sh. Isi 0201	Collegiat e	1		1	1	IS Department, Faculty of Sharia Law	None	
2	English II	Li.Engl 0202	Collegiat e	3		3	3	English, Faculty of Literature	English I	
3	Calculus II	En. Ene 0204	Basics	4		4	4	Energy Engineering, Faculty of Engineering	Calculus I	
4	Engineering Physics II	En.Ene 0205	Basics	3	2	5	4	Energy Engineering, Faculty of Engineering	Calculus I & Engineering Physics I	
5	Drawing II (CAD)	En.Ene 0207	Basics	2	2	4	3	Energy Engineering, Faculty of Engineering	Drawing I	
6	Engineering Chemistry I	Ed. Chem 0208	Basics	2	2	4	3	Chemistry, Faculty of Education	None	
	Т	otal		15	6	21	18			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	4	2.72%
2	Professional	0	0.00%
3	Basics	14	9.52%
4	Optional	0	0.00%
	Total	18	12.24%

N o	Optional/Basic/Professional Subjects	Codes	Credits
1			
2			
3			
	Signature		

	( Semester - 3) (Second year / First Semester)									
				(	Classe	s	Z		Pı	
No	Subjects	Codes	Subject Category	Theory	Practice	Total	lumber of Credits	In charge Department and Faculty	erequisite Subjects	Remarks
1	Theology III	Sh. Isi 0301	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	English III	Li. Engl 0302	Collegiate	3		3	3	English, Faculty of Literature	English II	
3	Calculus III	Ed. Ene 0304	Basics	4		4	4	Energy Engineering, Faculty of Engineering	Calculus II	
4	Engineering Physics III	En. Ene 0305	Basics	3	2	5	4	Energy Engineering, Faculty of Engineering	Engineering Physics I & Calculus I	
5	Thermodyna mics I	En. Ene 0309	Profession al	2	2	4	3	Energy Engineering, Faculty of Engineering	Engineering Physics II	
6	Engineering Mechanics I: Statics	En. Ce 0310	Basics	3		3	3	Civil Engineering, Faculty of Engineering	Engineering Physics I	
7	Surveying I	En. Ce 0311	Basics	2	2	4	3	Civil Engineering, Faculty of Engineering	None	
				18	6	24	21			

No	Subject Category	Credits	Percentag e due All Credits
1	Collegiate	4	2.72%
2	Professional	3	2.04%
3	Basics	14	9.52%
4	Optional	0	0.00%
	Total	21	14.29%

No	Optional/Basic/Profession al Subjects	Codes	Credits
1			
2			
3			
	Signature		

	(Semester - 4) (Second year / Second Semester)									
				(	Classes		Z		P	
No	Subjects	Codes	Subject Category	Theory	Credits Total Practice Theory	lumber of Credits	In charge Department and Faculty	erequisite Subjects	Remarks	
1	Theology IV	Sh.Isi 0401	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	Calculus IV	En. Ene 0404	Basics	4		4	4	Energy Engineering, Faculty of Engineering	Calculus II	
3	Thermodyna mics II	En.Ene 0409	Profession al	2	2	4	3	Energy Engineering, Faculty of Engineering	Thermodynamics I	
4	Engineering Mechanics II: Dynamics	En. Ce 0412	Basics	3		3	3	Civil Engineering, Faculty of Engineering	Statics	
5	Engineering Circuit Analysis I	En.Ene 0413	Basics	2	2	4	3	Energy Engineering, Faculty of Engineering	Engineering Physics III	
6	Fluid Mechanics	En. Wee 0414	Profession al	2	2	4	3	Water & Environmen tal Engineering, Faculty of Engineering	None	
				14	6	20	17			

No	Subject Category	Credits	Percen tage due All Credits
1	Collegiate	1	0.68%
2	Professional	6	4.08%
3	Basics	10	6.80%
4	Optional	0	0.00%
	Total	17	11.56%

No	Optional/Basic/Professi onal Subjects	Codes	Credits
1			
2			
3			
	Signature		

	( Semester - 5) (Third year / First Semester)									
			•		Class	sses		Pr		
No	Subjects	Codes	Subject Category	Theory	Practice	Total	lumber of Credits	In charge Department and Faculty	·erequisite Subjects	Remarks
1	Theology V	Sh. Isi 0501	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	Energy Conversion I	En. Ene 0515	Profession al	2	2	4	3	Energy Engineering, Faculty of Engineering	Engineerin g Circuit Analysis I	
3	Combustion Technology & Materials	En. Ene 0516	Profession al	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
4	Heat Transfer	En. Ene 0517	Profession al	3	2	5	4	Energy Engineering, Faculty of Engineering	Thermod ynamics I	
5	Power Systems I	En. Ene 0518	Profession al	2	2	4	3	Energy Engineering, Faculty of Engineering	ing Circuit Analysis	
6	Engineering Economics	En. Ene 0519	Basic	3		3	3	Energy Engineering, Faculty of Engineering	None	
				13	8	21	17			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.68%
2	Professional	13	8.84%
3	Basics	3	2.04%
4	Optional	0	0.00%
	Total	17	11.56%

No	Optional/Basic/Profession al Subjects	Codes	Credits
1			
2			
3			
	Signature		

		( 8	Semester - 6) (	Thir	d year	·/Se	cond Se	emester)		
					Classe	S	7		Рі	
No	Subjects	Codes	Subject Category	Theory	Practice	Total	lumber of Credits	In charge Department and Faculty	erequisite Subjects	Remarks
1	Theology VI	Sh. Isi 0601	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	Biomass Energy Engineerin g	En. Ene 0620	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
3	HVAC	En. Ene 0621	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
4	Solar Energy Engineerin g	En. Ene 0622	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
5	Hydropowe r Engineerin g	En. Ene 0623	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
6	Thermal Power Plant	En. Ene 0624	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	Thermo dynamic s I&II	
7	Seminar I (Research Methodolo gy)	En. Ene 0625	Basics	1		1	1	Energy Engineering, Faculty of Engineering	None	
8	Power System II	En. Ene 0626	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	Power System I	
				14	12	26	20			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.68%
2	Professiona 1	18	12.24%
3	Basics	1	0.68%
4	Optional	0	0.00%
	Total	20	13.61%

No	Optional/Basic/Professi onal Subjects	Codes	Credits
1			
2			
3			
	Signature		

			(Semester - 7	7) (Fo	ourth	year	· / Fir	rst Semester)		
			Su	(	Classe	s	Nu			
No	Subjects	Codes	bject Category	Theory	Practice	Total	mber of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
1	Theology VII	Sh.Isi 0701	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	Electrical Systems of Buildings	En. Ene 0727	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	Engineeri ng Circuit Analysis I	
3	Energy Efficiency	En. Ene 0728	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
4	Wind Energy Engineerin g	En. Ene 0729	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	None	
5	Solar Photovoltai c	En. Ene 0730	Professional	2	2	4	3	Energy Engineering, Faculty of Engineering	Engineeri ng Circuit Analysis I	
6	Seminar II	En. Ene 0731	Professional		4	4	2	Energy Engineering, Faculty of Engineering	Seminar I	
7	Professiona 1 Elective I	En. Ene 0732	Professional	3		3	3	Energy Engineering, Faculty of Engineering	None	
				12	12	24	18			

No	Subject Category	credits	Percentage due All Credits
1	Collegiate	1	0.68%
2	Professiona 1	17	11.56%
3	Basics	0	0.00%
4	Optional	0	0.00%
	Total	18	12.24%

No	Optional/Basic/Professi onal Subjects	Codes	Credits
1			
2			
3			
	Signature		

		( 5	Semester - 8) (l	Four	th ye	ear /	Secon	d Semester)		
			•	C	lass	es	z			
No	Subjects	Codes	Subject Category	Theory	Practice	Total	umber of Credits	In charge Department and Faculty	Prerequisit e Subjects	Remarks
1	Theology VIII	Sh. Isi 0801	Collegiate	1		1	1	IS Department, Faculty of Sharia Law	None	
2	Energy Policy & Politics	En. Ene 0833	Professional	3		3	3	Energy Engineering, Faculty of Engineering	None	
3	Research/P roject Design	En. Ene 0834	Professional		8	8	4	Energy Engineering, Faculty of Engineering	Seminar II	
4	Engineerin g Manageme nt	En. Ene 0835	Professional	3		3	3	Energy Engineering, Faculty of Engineering	None	
5	Energy and Environme nt	En. Ene 0836	Professional	3		3	3	Energy Engineering, Faculty of Engineering	Engineering Chemistry I	
6	Profession al Elective II	En. Ene 0837	Professional	3		3	3	Energy Engineering, Faculty of Engineering	None	
							17			

No	Subject Category	cre dits	Percentage due All Credits
1	Collegiate	1	0.68%
2	Profession al	16	10.88%
3	Basics	0	0.00%
4	Optional	0	0.00%
	Total	17	11.56%

No	Optional/Basic/Profession al Subjects	Codes	
1			
2			
3			
	Signature		

	Credits and Percentages of all Categories							
No.	Subject Category	Credits	Percentage due All Credits		No	Subjects	Credits	Percentage
1	Collegiate	18	12%		1	Subjects in all Semesters	114	77.70%
2	Professional	73	50%		2	Thesis	0	0.00%
3	Basics	56	38%		3	Practices	33	22.30%
4	Optional	0	0%		4	Total	147	100.00%
	Total	147	100%			Signature		

# 

# 4.6.Category-wise Course Syllabuses

# 4.6.1. Collegiate {18 credits (12%)}

# Li. Engl 0102 English I (English for Academic Purposes)

Item موضوع	Descripti	on	توضيحات			
Title عنوان یا مضمون	Li. En	gl 0102 English I (I	English for Academic Purposes)			
Credits and no.	تونيزه Total	نظري Theoretic	عملي Practical			
or nour د کرېدتونو او درسي ساعتونو شمير	3	3	0			
Offering year and semester د تدریس کال او سمستر	First year - First semester					
Aim موخي	The objective and cultural p in studying or	The objective of the course is to help students learn some of the linguistic and cultural practices – mainly institutional and disciplinary – involved in studying or working through the medium of English.				
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Understand the basic approach for learning the English language</li> <li>Able to understand phonetics and its application to the English language</li> <li>Develop vocabulary skills</li> <li>Able to understand common diction in the English language</li> <li>Understand common grammatical errors in English language</li> <li>Develop understanding of English literature</li> </ul>					
Academic Staff Responsible د تدریس مسئول استاد						
Syllabus مفردات	I. INTROI 1. Curr 2. Con II. PHONE 1. PhONE 1. Pho III. SYNTA 1. Voc 2. Dict 3. Sent 4. Gran IV. <u>READIN</u> 1. Rea 2. Rea 3. Gen 4. Rea 5. Con V. <u>WRITIN</u> 1. Prin	DUCTION rent Approaches to 1 nmunication Today <u>TICS</u> netics and Correct E <u>X</u> abulary tion and English Sentence Variety and Sentence Variety of Sentence Variety of Sentence Variety and Sentence Var	Learning English English Pronunciation Intence Tyle gh Purposive Reading Intes			

Pre-requisite	<ul> <li>3. Planning</li> <li>4. Organization and Development of Writing</li> <li>5. Composition</li> <li>6. Precis</li> <li>VI. <u>WRITTEN COMMUNICATION</u></li> <li>1. Business Communication</li> <li>2. Tenders and Quotations</li> <li>3. Journal Articles</li> <li>4. Report</li> <li>VII. <u>ORAL COMMUNICATION</u></li> <li>1. Dialogue</li> <li>2. Technical and Scientific Presentation</li> </ul>
مخکینی اړین مضامین	None
Related Courses اړونده مضامين	Critical Thinking and Writing, English Communication Skills in Engineering
Teaching and Learning methods د تدریس میتود	Lectures, tutorials and assignments
Computer Knowledge د کمپيوتر زده کړې ته اړتيا	Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint, and CAD.
Course Materials and References د مضمون درسي مواد او اخځليكونه	<ul> <li><u>Text Books</u>: <u>درسی کتاب</u></li> <li>Ingre, David (2007). Engineering Communication (1st Edition). Cengage Learning</li> <li><u>Reference</u>: <u>اخخلیکونه</u></li> <li>Alexander, O., Argent, S. &amp; Spencer, J. (2008), EAP essentials: A teacher's guide to principles and practice. Reading: Garnet</li> <li>Badger, R. &amp; White, G. (2000). A process genre approach to teaching writing. ELT Journal, 54, 153-160.</li> <li>Biber, D. (2006). University language: A corpus-based study of spoken and written registers. Amsterdam: John Benjamins.</li> <li>Sorenson, Webster's New World Student Writing Handbook, 4th Edition</li> <li>Nation, P. (2007). The four strands. Innovation in Language Learning and Teaching1, 2-13.</li> <li>Quality Assurance Agency for Higher Education (2002). Subject benchmark statements: Languages and related studies." Available from: http://www.qaa.ac.uk/</li> </ul>

	Evaluation activities and Grades									
	Activity فعالیت	روني فعاليتونه او نمري Scope هدف					Ma	urks نمر		
Atte co	ndance and class ntribution حاضري او پ درس کي برخ	Attending class, contributions to knowledge and relationships with the group.					5			
As	signments کورني دنده	Solving the ind from the proble submitting on t	Solving the indicated problems from the problem list and submitting on time.				:	5		
Lab field حي	oratory and trip reports د لابراتوار/ سا راپورونه	Weekly laborat that include abs method, result, implication.	cory/fiel stract, in conclu	ld trip r ntroduc sion and	eports tion, d		1	5		
) پ	Quizzes صنفي ارزونو	Quizzes include and assignment classes.	e teachi ts from	ng mat two pre	erials evious		:	5		
Mic A	lterm exam منځنۍ ازموين	The midterm excovered topics.	The midterm exam includes the covered topics.				2	0		
Fi پنہ	nal exam وروستی ازمو	The final exam topics after the	The final exam includes the covered topics after the midterm exam.				50			
		Total Course M	larks ں نمر ي	مجموعو	کورس	د	100			
Relationship of this Course to Program Learning Outcome										
1	د مصمون اړيکه د کانکې نه کنيدي ښوونيرو موجو سره Program Outcomes									
		<u>و</u> موجو سر <i>ہ</i>	، ښوونيز	، له کلی <i>د</i> و	د حانگې P	ممون اړيکه ا rogram O	utcomes			
		و موجو سره	ي ښوو بير 1	ي له کليدي 2	د حانگې P 3	rogram O	utcomes 5	6	7	
No.	Course	و موجو سر، Outcomes	Apply mathematics, science and engineering 1	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical <u>5</u> responsibility	Communicate effectively	Ability to function in a group and in multi-	
No.	Course Understand approach English lan	Outcomes	1     Apply mathematics, science and engineering     1	Design/conduct experiments/analyze data 2	P C C C C C C C C C C C C C	Critical thinking and apply knowledge 4 concurrence with other disciplines	C Understand professional and ethical 2 responsibility	1 Communicate effectively	L Ability to function in a group and in multi- disciplinary team	

	application to English							
	language							
	Develop the vocabulary				2			
3	skills	1	1	1	2	2	I	1
	Able to understand the							
4	common diction in	1	2	1	1	1	1	1
	English language							
	Understanding the							
5	common grammatical	2	1	1	1	1	1	1
	errors in English language							
	Develop the understanding	_				_		
6	of English literature	2	1	1	1	1	1	1
	Total	1.3	1.16	1	1.5	1.5	1	1
	Average				1.2			
	1= Some relation	2= Mo	derate	relatio	on 3=Exte	ensive rel	lation	

# Li.Engl 0202 English II (Critical Thinking and Writing)

Item		توضيحات	Description					
موضوع			-					
Title	Li Engl 020	2 English II (Critic	al Thinking and Writing)					
عنوان يا مضمون	LI.Lingi 0202	2 Eligiisii II (Critic	ar Thinking and Witting)					
Credits and no.	Total	Total						
of hour	ټوليزه		I factical					
د کرېدتونو او								
درسي ساعتونو	3	3	0					
شمیر								
Offering year								
and semester								
د تدريس کال او	First year - S	second semester						
سىمىتر								
Aim	Student wil	l learn to write	in a clear, concise style and to present					
	information	logically. Studen	t will also learn to design documents in					
موحي	and deliver of	oral presentations.	rity and efficiency including use of graphics					
	Key learning outcomes of this course follow:							
Key Learning	• Und	lerstand principles	and procedures of technical research and					
Outcomes	repo	ort writing						
کليدي ښوونيز	• Able	e to develop writin	$\alpha$ skills of a business letter					
نتايج	<ul> <li>Develop the basic idea of graphic aid</li> </ul>							

	• Understanding contemporary communication as an engineer
	• Develop practical writing skills by applying theoretical
	understanding
Academic Staff	
Responsible	
د تدريس مسئول	
استاد	
	I. OVERVIEW OF TECHNICAL RESEARCH AND REPORT
	<u>WRITING</u>
	<ol> <li>Definition and Nature of Technical Writing</li> <li>Properties of Technical Writing</li> </ol>
	3 Basic Principles of Technical Writing
	4. Styles in Technical Writing
	5. The Role of Technical Writing
	6. The Wholistic Guide of Technical Writing
	7. End-products of Technical Writing
	I INFORMATION STRUCTURE/TECHNIQUES IN TECHNICAL
	WRITING
	1. Distinction between Technical and Literary Writing
	2. Formal Definition
	3. Description Mechanism
	4. Process Description
	5. Classification
	6. Cause and Effect
	7. Comparison and Contrast
Syllabus	8. Analogy
مفردات	III. TYPES OF TECHNICAL REPORT
	1. Report Layout
	2. Formal Report Format
	3. Memorandum Report
	4. Letter Report
	5. Bulletins
	6. Abstract
	7. Proposal
	8. Research Report
	9. Feasibility Study
	IV. BUSINESS LETTER
	1. Definition and Purpose
	2. Elements and Characteristics
	3. Format and Styles
	4. Types of Business Letters
	5. Resume and Cover Letters
	V. PROCESS AND GUIDELINES IN TECHNICAL WRITING
	1. Writing Process: From Audience to Rough Draft

_	
	2. Audience Analysis
	5. Task Analysis 4. Dower Bowicion Techniques
	4. Fower-Revision Techniques
	5. Eloraries, Documentation, Cross-Referencing
	6. Basic Patterns And Elements of the Sentence
	7. Common Grammar, Usage, Punctuation Problems
	8. Common Spennig Problems
	VI. <u>OKAPHIC AIDS</u>
	1. Bar Chart
	2. Line Chart
	3. Tables
	4. Circle or Pie Chart
	5. Surface or Strata Chart
	6. Map Charts, Flow Charts, Flow Sheets, Diagrams
	7. Figures
	8. Photographs
	9. Drawings
	10. Important Points in Handling Graphics
	VII. <u>CONTEMPORARY COMMUNICATION</u>
	1. E-mail
	2. Internet
	3. Desktop Publishing
	4. Hypertext
	VIII. <u>LABORATORY SESSION</u>
	1. Technical Report Writing Based on the Real Case
	2. Writing of Business Letter Based on Different Case and
	Scenario of the Company
	3. Graphical Explanation of Different Charts, Figure and Facts of
	the Real Scenario
	4. Contemporary Communication Efficiency by Email, Internet,
	Desktop Publishing Etc.
Pre-requisite	English I (English for Academic Purposes)
مخكيني اړين مضامين	
Related	Critical Thinking and Writing, English Communication Skills in
Courses	Engineering
اړونده مضامين	
Teaching and	Lectures, tutorials and assignments
Learning	
methods	
د تدريس ميتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د کمپيوتر زده درې	
ته اړنيا	

Course Materials and References د مضمون درسي مواد او اخځليکونه	Text Books:         درسی کتاب         د Riordan, Daniel (2013). Technical Report Writing Today (10 <sup>th</sup> Edition). Cengage Learning         Reference:         Learning         Alred, Gerald J., Brusaw, Charles T., Oliu, Walter E. (2011).         Handbook of Technical Writing, [Hardcover] Tenth Edition. St.         Martin's Press         Vicente. et. Al. (2004), Technical Writing. Popular Bookstore,					
	Que	zon City, Philippines.				
		Evaluation activities and Grades				
Activi	tx	د ارزوني تعاييونه او تمري Scope	Marks			
فعاليت	à	هدف	نمرى			
Attendance and class contribution حاضري او په درس کي برخه اخستل		Attending class, contributions to knowledge and relationships with the group.	5			
Assignm تي دنده	ients کورن	Solving the indicated problems from the problem list and submitting on time.	5			
Laboratory and field trip reports د لابراتوار/ ساحي راپورونه		Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.	15			
Quizzes صنفي ارزوني		The quiz includes teaching materials and assignments from two previous classes.	5			
Midterm exam منځنۍ ازموينه		The midterm exam includes the covered topics.	20			
Final ex بی از موینه	am وروستہ	The final exam includes the covered topics after the midterm exam	50			
		Total Course Marks د کورس مجموعي نمري	100			

	Relationship of this Course to Program Learning Outcome								
	نيزو موخو سره ا	کليدي ښوو	څانګې له ا	ړيکه د	د مضمون ا				
		Program Outcomes							
		1	2	3	4	5	6	7	
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
	Understanding the principles								
1	and procedure of technical	1	1	1	1	1	1	1	
	research and report writing								
2	Able to develop the writing	1	1	2	1	2	1	1	
2	skills of business letter	1	1	Z	1	2	1	1	
2	Develop the basic idea of	1	1	1	1	1	1	1	
3	graphic Aid	1	1	1	1	1	1	1	
4	Understanding the Contemporary Communication as an Engineer	1	1	1	2	1	2	1	
	Develop the practical writing								
5	skills by applying the	1	1	1	1	1	1	1	
	theoretical understanding								
	Total	1	1	1.2	1.2	1.2	1.2	1	
	Average				1.11				
	1= Some relation 2=	= Modera	ate relat	ion 3	=Extensiv	e relatio	n		

## Li. Engl 0302 English III (English Communication Skills in Engineering)

Item موضوع	Description		توضيحات	
Title عنوان یا مضمون	Li. Engl 0302 English III (English Communication Skills in Engineering)			
Credits and no. of hour د کرېدتونو او درسي ساعتونو شمير	Total ټوليزه	نظري Theoretic	عملي Practical	
	3	3	0	
Offering year and semester د تدریس کال او سمستر	Second year - First semester			
Aim موخي	This English communication skills course covers introductions to communication models and analysis; the characteristics of engineering communication and ethics. The course engages students in the writing process and techniques for searching for information, team/group work, peer assessment, and making oral presentations.			
Key Learning Outcomes کلیدي ښوونیز نتايچ	<ul> <li>Key learning outcomes of this course follow:</li> <li>Develop communication models and ethics in professional life and communication</li> <li>Understand visual elements in oral and written communication with group work and collaborative writing</li> <li>Able to understand common documents in engineering communication including ethics in professional life and communication</li> <li>Able to understand and write the extended essay/research paper</li> <li>Seminar participation</li> <li>Understand the key elements of visual elements in oral and written communication; web content and multimedia presentations</li> <li>Group work and collaborative writing</li> </ul>			
Academic Staff Responsible د تدریس مسئول				

	I. II.	THE CHARACTERISTICS OF ENGINEERING COMMUNICATION1. Analysis of Communication Based on the CMAPP Model2. Introduction to the Writing Process3. Usage Focus on the Assessment of English UsageRESEARCH AND REFERENCE WORKS1. Working with Others2. Communication Skills3. Summarizing and Critique4. Style Guides, Field-Specific Discourse, and Literature5. Seminar Participation, Presentation6. Peer Reviewing and Group Dynamics7. Peer Assessment and Self-Assessment8. Ethical Behavior9. Results of Unethical Behavior
	III.	WORK GROUP TUTORIALS
	W	1. Oral Presentations WRITING PROCESS
Syllabus مفردات	1 V .	<ol> <li>Basics and Methods of Ideas Development</li> <li>Assessment of Writing</li> <li>Writing Tutorials</li> <li>Drafting and Revising</li> <li>The Extended Essay from Planning, Proposal and Drafting/Revising through Final Draft Proofreading.</li> <li>Writing Tutorials and Self-Editing</li> </ol>
	V.	<u>ORGANIZING</u>
		<ol> <li>Outlining.</li> <li>Writing Process</li> <li>Narrowing Topics</li> </ol>
	VI.	VISUAL ELEMENTS IN WRITTEN AND ORAL
	VII.	GROUP PROJECTS
		<ol> <li>Investigation of an Engineering Issue in Relation to Society</li> <li>Brainstorming and Topic Narrowing.</li> <li>Library/On-Line Research</li> </ol>
	VIII.	COMMUNICATION STRATEGIES
		<ol> <li>Mechanism and Process Description</li> <li>Classification and Definition</li> <li>Process Analysis</li> <li>Comparison and Causation</li> <li>Exemplification and Illustration</li> <li>Production of Short Essays and Extemporaneous Speeches on Relevant Topics</li> <li>Review of English Usage</li> <li>Parsuasion and Argument (Usa of Applogy)</li> </ol>

	<ul> <li>IX. <u>OVERVIEW OF CORRESPONDENCE, REPORTS, AND</u> <u>SUMMARIES FOR THE ENGINEERING WORKPLACE</u></li> <li>1. Forms of Address</li> <li>2. Titles and Heading</li> <li>3. Captions</li> <li>4. Salutations and Closings</li> <li>X. <u>GROUP PROJECTS</u></li> <li>1. Brainstorming, Project Planning; Proposal Writing (Collaborative/WIKI Writing)</li> <li>2. Elements of Web Pages and Web Content, Video Presentations, Animations, Scripting</li> <li>3. Progress Reports, Consultation with Experts.</li> <li>4. Tutorials</li> <li>XI PANEL DISCUSSION/SEMINAR</li> </ul>										
	<ol> <li>Evaluation and Assessment of Group Work</li> <li>Final Review</li> </ol>										
Pre-requisite											
مخكيني اړين مضامين	English I (English for Academic Purposes)										
Related	Critical Thinking and Writing English Communication Skills in										
Courses											
اړونده مضامين	Engineering										
Teaching and Learning methods د تدر بس میتود	Lectures, tutorials and assignments										
Computer	Moderate Computer Knowledge such as using MS Word MS Excel MS										
Knowledge	Participation of CAD										
د کمییوتر زده	PowerPoint and CAD.										
كړې ته اړتيا											
	Text Books:										
	درسی کتاب										
	• Ingre David (2007) Engineering Communication (1st Edition)										
	Conserve Learning										
	Cengage Learning										
Course											
Materials and											
References	<u>Reference</u> :										
د مصمون درسي	الخظيكونه										
لحوري <i>ا</i> ق اختليكه نه	• Cottrell, Stella. The Study Skills Handbook (3rd Edition). Palgrave										
J +'	Macmillan										
	• Mcmurrey & Buckley (2007). A Writer's Handbooks for Engineers										
	(1st Edition). Cengage Learning										
	<ul> <li>Sorenson, Sharon (2009). Webster's New World Student Writing Handbook (5th Edition). Webster's New World</li> </ul>										
Evaluation activities and Grades د ارزونی فعالیتونه او نمری											
--	---	--	---	--	---------------------------------	--	---	-------------------------	--	--	--
	Activity	Marks									
	فعاليت	مدف	6		نمر ی						
	endance and contribution حاضري او په درس کي برخ	contributions to lationships			5						
As	Assignments Solving the indicated problems from the problem list and submitting on time.						5				
Lab fielc <i>يي</i>	boratory and d trip reports d trip reports introduction, method, result, conclusion, and implication.					15					
Ļ	Quizzes صنفي ارزوني	eaching gnments ses.	from		5						
Mie A	dterm exam منځنی ازموین	The midterm exam includes the covered topics.				20					
Final exam وروستی ازموینه		The final exam includes the covered topics after the midterm exam.				50					
		Total Course Mar ورس مجموعي نمري	ks 100 د کو								
	R	elationship of this C رونیزو موخو سرہ	Course to مکلیدي ښو	Progra د څانګې له	m Le. یکه د	earning Out د مضمون اړ	come				
					Program Outcomes						
			1	2	3	4	5	6	7		
No.	No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team		

1	Develop the communication models and ethics in professional life and communication		2	2	3	2	2	3
2	2 Understanding the visual elements in oral and written communication with group work and collaborative writing		2	2	3	2	3	3
3	<b>3</b> Able to understand the common documents in engineering communication including the ethics in professional life and communication		2	2	3	3	2	2
4	4 Able to understand and write the extended essay/ research paper		1	2	2	2	3	2
5	5 Seminar participation		1	2	3	3	3	3
<ul> <li>6 Understand the key elements of visual elements in oral and written communication; web content and multimedia presentations</li> </ul>		1	2	2	3	3	2	3
7	Group work and collaborative writing	2	2	2	3	3	2	3
	Total	1.4	1.7	2	2.8	2.6	2.4	2.7
	Average 2.2							
1= Some relation 2= Moderate relation 3= Extensive relation								

# En. Hist 0103 History of Afghanistan

Item موضوع	Description	توضيحات					
Title عنوان یا مضمون	En. Hist 0103 History of Afghanistan						
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical				
د کرېدتونو او درسي ساعتونو شمير	1	1	0				
Offering year and semester د تدریس کال او سمستر	First year - Firs	st semester					

Aim موخي	<ul> <li>To provide understanding of the contemporary history of Afghanistan along last three centuries, that starts from Ahmad Shah BaBa Abdali till Karzai government.</li> <li>Key learning outcomes of this course follow:</li> <li>To understand the political road map of Afghanistan governments</li> </ul>
Key Learning Outcomes کليدي ښوونيز نتايچ	<ul> <li>To understand the patriotic generation of Afghanistan</li> <li>To acknowledge their sacrifices and services for the freedom</li> <li>To know the ascending peak of the country</li> <li>To know the involved personalities behind the events</li> </ul>
Academic Staff Responsible د تدریس مسئول استاد	
Syllabus مفردات	<ol> <li>AFGHANISTAN WITH RESPECT TO ITS GEOGRAPHY AT THE BEGINNING OF CONTEMPORARY STAGE         <ol> <li>The Founder of Afghan Imperial (Ahmad Shah Abdali).</li> <li>The Founder of Afghan Imperial (Ahmad Shah Abdali).</li> <li>The Founder of Afghan Imperial (Ahmad Shah Abdali).</li> <li>The Feudalism Government Exemplification</li></ol></li></ol>

	India
6	The (Alphensteen) Job to the Shah Shuja Government Hall and
0.	Deshawar Protocol
7	The Descenting of (Sedoozei Tribe) and Ascending of
7.	(Mohammad Zai Triba)
0	(Monaminad Zai 11106) The Downfoll of (Sodoroi Triba) and Desching to Dower of
0.	(Mehammed Zei Tribe)
0	(Mohammad Zai Tilde)
9.	Momineen)
10	Mollineen)
10.	Dost Monaminad Knan U-1 urned to Russian (1azar) for
11	Controlling Pesnawar The Deitich Freehennend Chele Check her Deut Mehennend Khennend
11.	The British Exchanged Shah Shuja by Dost Mohammad Khah and
10	by The Thangular Protocol; He Has Been Installed in Kabul
	The People Reaction (The First Argnan-British War)
V. <u>1H</u>	<u>2 2ND TURN OF DOST MOHAMMAD KHAN</u>
1.	The British Slaved Dost Mohammad Khan in (Kalkata, India) and
2	Sent Him Back to Kabul
۷.	The Last Round of Civil war Among the Payainda Monammad
2	Khan Sons
3.	The Herat Issue
4.	The (Jumrod) Two Protocols
5.	Passing Away of Dost Mohammad Khan and Starting Up New
VI. <u>RE</u>	FORMING AND AWAKENING OF THE NEW POLITICAL
<u>1</u>	INKING
1.	The Role of Sayid Jamal-U-Din in the Reforms of Shair Ali Khan
2.	Modernized Governmental System
3.	Modernized Publication and Awakening of the New Political
4	Ubservers
4.	(Emmoni) A stivition
D. VII TU	(Emirani) Activities
VII. <u>1П</u> 1	E CRISES AND MISS IN POLITICAL DALANCE
1.	The Capturning of (Knewa) by Russians and Brush Forward
2	Afghanistan is Not Beguired (Lord Loten)
2.	The Dechewar Negotiations (Savid Nor Mohammad Shah and Sir
5.	Valion Pala)
4	Sultan Abdul Hamid Invited Amir Shair Ali Khan to Britich
4.	Relationshin
5	Russian Delegation Trip to Kabul and Crises Peak
5. 6	Awful Letter (Between Amir Shair Ali Khan and Lord Leteen)
0. 7	British Decided War
י. עווי זיי	THE RESULT OF STUPID POLICY
1	The Differences of First and Second Afohan-British War
2	British Troops Entered Afghanistan
3	Amir Mohammad Yaqub Khan (Physiologically III Man)
4	Yaqub Khan Stressful Government and (Gandomac) Protocol
5	Protests in Kabul and (Kunaree) Killing
6.	Yagub Khan Surrendered Himself to British
0.	r aquo Khan Surrendered Hillisen to Bhush

IX. <u>THE DESPOTISM AND CONSPIRACY ERA</u>
1. Fearing Mail (Abdul Kannan Khail)
2. The Latter Detrycon Abdyl Dohmon Khon and Sir (Lable Honry)
5. The Letter Between Abdul Kalinali Kilali and Sil (Lable Holli'y Greefen)
A Intelligent Ditiless and Oninionated Leader Amir Abdul Rahman
4. Interrigent, Fritess and Opinionated Leader Anni Abdul Kannan Khan
5. The British and Russian Aggressive Diplomacy
6. The Abdul Rahman Khan External Strategy and the (Panjdeh)
Tragedy
7. Dewrand Line
8. The Last Result-Less Efforts of Abdul Rahman Khan
9. The Geographical Map of Afghanistan at the Time of Passing
Away of Abdul Rahman Khan
X. THE RIOTS AND CONSPIRACY HALL
1. Afghanistan at the Beginning of 20th Century
2. Amir Habibullah Khan
3. The Political Game Between Amir Habibullah Khan and
England
4. Amir Habibullah's Trip to India
5. The Russian-British Protocol (1907) and Afghanistan's
Consequence
6. The Modern Culture Propagation
7. The End of Democracy Beginners (Prison And Kill)
8. (Siraju-U-Alkhbar)
9. First World War and Afghanistan
10. First Indian Transitional Government in Kabul
11. Corruption (Degeneracy) and Conspiracy in The King's Hall
12. The King's Killing Tragedy
XI. INDEPENDENT AFGHANISTAN
1. Amanullah Khan is be the King
2. The Independency War and Announcement
3. The Peace Talk
4. Reforms
5. The Historical Trip of Amanullah Khan and Its Results
6. The Awakening of Asleep Ghosts
7. Lowering Conspiracies to Amanullah's Kingdom
8. Amanullah in History Court
XII. <u>THE SON OF (SAQAAW) AND THE TIME OF IDIOTISM</u>
1. Kabul Under the (Badawee) Culture Attack
2. Hadibulial Kalakani introduction 2. Excommunication of Amenullah Khan
J. The Reality of (Seconder) Government
4. The Reality of (Sayawee) Government 5. The Assassination of Well Known Dersonalities of the Erro
6 Do British Had Relations with (Sagawae) Government
7 Descending of (Sagwee) Government
8 Was (Sanawee) Government A Peasant Movement?
XIII. THE ACCOUNTABILITY TIME

1. Nader Shah's Government on Devastated Kabul
2. Nader Shah's Introduction and Background
3. Nader Shah's Government
4. Security Problems in Nader Shah's Government
5. Establishing the Foundation of A Legal Government
6. King's Relations to Religious Scholars
7. Trying to Solve Economic Problems
8. Administrative Formation
9. Cultural Activities
10. External Policies of the Government
11. Nader Shah's Sudden Assassination
XIV. ALMIGHTY GOD BELIEVER KING
1. Royal Family Accepted Mohammad Zahir Shah As King
2 Mohammad Zahir Shah's Introduction and Background
3 Mohammad Hashim Khan Cabinet Establishment by
Mohammad Zahir Shah Commandment
A New Establishment of Public Formation
<ol> <li>The Afghanistan Mambarshin in (Saad Abad) Protocol</li> </ol>
5. The Arghanistan Membership III (Sadu Abdu) Flotocol
6. Strengthening the Relations between Arghanistan and Germany
7. Argnanistan in the Time of Second World-war
8. Monammad Hashim Khan Resignation and the Start of (Sepan
Salar's) Government
9. The (Sepah Salar's) Cabinet
10. Democracy Exemplification
XV. <u>REPUBLIC GOVERNMENT</u>
1. The (Sirtaan 26th) Coup
2. How the Coup Got Over
3. Mohammad Zahir Shah's Resignation and Political Detainees'
Forgiveness
4. Giving Speech to Afghans
5. Maiwand Wal's Coup and Killing Issue
6. Republic Flag, Symbol and National Anthem
7. Renovation of Political Relations with Pakistan
8. Removal of (Purcham Group) in the Government and National
Revolution Movement
9. Assassinations and Target Killings
10. (Loyea Jerga), Fundamental Law and President Selection
11. Daud Khan's Last Trip to Moscow and Disagreement with
Brezhnev
12. Daud Khan Moved on A New and Unknown Rout
13. Khaibar Killing
14. (Khalq And Purcham) Groups Leaders Arresting and Republic
Government Collapsing
XVI. <u>COUP</u>
1. Coup and Its Reasons
2. Incident Start and End
3. Government Leadership
4. Eight Orders
5. Disunion in the Government and (Sabotaz)

		The Herat Protests	
		Internal Riots in the (Khalq) Group	
		Dolf Dobz, USA Ambassador Killing	n Kabul
		The Relations of Afghanistan and Paki	stan in the Era of Noor
		Mohammad (Taraake)	
		Noor Mohammad (Taraake) Assassina	tion Result
		Who Was Noor Mohammad (Taraake)	?
		Hafizullah Amin's Three Months Gov	ernment
		Hafizullah Amin's Introduction and Ba	ickground
		Legality and Justice	
		Amin, the Establisher of an Anarchisti	c Administration
		Agha Shahi Trip Canceling Riot to Ka	bul
		How Amin Was Killed?	
		Russian Military Attack on Afghanista	n
		National and International Reactions o	ver Russian Attack on
		Afghanistan	
		The (Jihaad) Announcement Against F	ussians
		(Jihadee) Groups and Donation Amou	nt
		(Babrak Karmal) Start Work at the Pea	k of Public Hate
		(Babrak Karmal) Introduction	k of f done flate
		Russian Plans and (Babrak Karmal)	
		The Start of Cultural Descending	
		Dr. Najibullah Government	
		Coup Against Naiih and Covernment	Collonging
		The (Ehedee) Crowne Covernment	Jonapsing
		The (Jinadee) Groups Government	
D ::/		The (Tandan) Wovement	
Pre-requisite	NT		
محكيني ارين	None		
مضامین			
Related Courses	None		
اړونده مضامين			
Teaching and L	earning		
methods		ectures, tutorials and assignments	
1 <b>5</b> 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	: .	C C	
دریس میتود			
~ ~			
Computer Know	wledge	Aoderate Computer Knowledge such as	, using MS Word
ر زده کړې ته اړتيا	د کمپيوت		
		ext Books:	
		177	
Course Materials and		درسني خناد	
		(Atayee), Mohammad Ibrahim (	2011). An Overview to
Reference	es	the contemporary history of Afg	hanistan. Maiwand
ون درسي مواد او	د مضمو	11:1:	
اخطيكونه	I	publishing society	
<b>•</b> *		leference:	
		اخخلبكو ن	

		American Encyclopedia Atayea, Mohammad Ibrahim, <i>Kheel aw weesh</i> Attaullah, Qazi, <i>Da Pashtoo Tarekh</i> Britanica Encyclopedia Dr. Bello, <i>Da Afghanistan Tokamona</i> Jamaluddin, Sayeed, <i>Tatamah-ul-bayan Fe Tareekh</i> <i>Afghan</i> Khatak, Khusal Khan, <i>Swat Namah</i> Nomyali, Mohammad Anwar, <i>Da Pahtoo da Tolaniz</i> <i>Mabadi</i>									
		Eva	luation	activiti	es and	Grades					
		I	و نمري	قاليتونه ا	رزوني ف	2					
Activity فعاليت				Scope هدف				M پ	arks نمر		
Attend co س کي	ance and class ntribution حاضري او په در، برخه اخستل	Attending class, contributions to knowledge and relationships with the group.					5				
As	signments کورني دنده	Solving the problem list	indicat t and su	ed prob bmittin	olems fr ig on tii	rom the ne.		5			
Labora tri حي	tory and field p reports د لابراتوار/ سا ر اپورونه	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.									
) پ	Quizzes صنفي ارزون	Quizzes inc assignment	zes include teaching materials and nments from two previous classes.						10		
Mic م	lterm exam منځنۍ ازموين	The midterm exam includes the covered topics.						20			
Fi ینه	nal exam وروستی ازمو	The final ex after the mi	kam inc dterm e	ludes th exam.	ne cove		60				
Total Cour يمو عي نمر ي			se Marks د کورس مج					00			
	Rela	tionship of th و موخو سرہ	nis Cour به ښوونيز	rse to P ے له کليدې	rogram ، د څانگو	Learning نیمون اړیکا	Outcon د مع	me			
<b>.</b>	<b>a a</b>				P	rogram (	Outcom	es			
No. Course O		utcomes	1	2	3	4	5	6	7		

		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understanding the contemporary history of Afghanistan	1	1	1	2	2	1	1
2	The extend and borders of Afghanistan through from 18 to 20 centuries	1	1	1	2	2	1	1
3	The first Afghan –Anglo War	1	1	1	2	2	1	1
Total		1	1	2	2	1	1	1
	Average	1.2						
	1= Some relation 2= Moderate relation 3=Extensive relation							

## Sh. Isi 0101 Theology I: Islamic Outlook (IO)

Item موضوع	توضيحات Description							
Title عنوان یا مضمون	Sh. Isi 0101 7	Sh. Isi 0101 Theology I: Islamic Outlook (IO)						
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical					
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	1	1	0					
Offering year and semester د تدریس کال او سمستر	First year - First semester							
Aim	The course is designed to introduce students on the subject of purpose of							
موخي	human existence in the universe.							

Key Learning	<ul><li>Key learning outcomes of this course should be as follows:</li><li>Importance of faith in human life</li></ul>
Outcomes	• Positive understanding of universe
	• Aim of creation
كليدي ببلوولير لكايج	• Human as a responsible part of universe
	• Purpose of life
Academic Staff	
Responsible	
د تدريس مسئول	
استاد	
	I. GENERAL INTRODUCTION
	1. Objectives
	2. Importance
	3. Resources
Syllabus	II. <u>ISLAMIC OUTLOOK</u>
مفردات	1. Properties of IO
	III. <u>MATTERS IN IO</u>
	1. Faith
	2. Islamic Anthropology
	3. Islam and Nature
	4. Allah, The Creator
Pre-requisite	None
مذكيني اړين	
مضامين	
Related Courses	PW, IMS, ISS, IPS, IES, QCT and IC.
ارونده مضامين	
Teaching and	Lectures, tutorials and assignments
Learning	
methods	
د تدریس میتود	
Computer	Moderate Computer Knowledge such as, using MS Word, MS Excel,
Knowledge	MS and PowerPoint.
د کمپيوتر زده کړې ته	
ارتيا	
Course Materials	Text Books:
	درسى كتاب
and References	• Dayee, Abdul Zahir, Translation by (Mahmood Marhoon) (1389
د مضمون درسي مواد	Hij-Sham ) Islamic outlook, Al-azhar publishing society
او احْطَلِيكُونَهُ	Reference:
1	

	<ul> <li>Jahed , Abdul Wahid (1391 Hij- Sham) Islamic worldview, Resalat publisher</li> <li>Lecture notes of Islamic studies instructors, Kabul university (1384)</li> </ul>									
	• Lecture notes of Islam Hij-Sham), Islamic w	<ul> <li>Lecture notes of Islamic studies instructors, Kabur university (1384</li> <li>Hii-Sham). Islamic worldview</li> </ul>								
	Evaluation activ	ities a	und Gr	ades						
	بتونه او نمري	ني فعاله	د ارزوا							
Activity	Scope		Mark	KS .						
فعاليت	هدف		نمري							
Attendance and class contributio حاضري او په درس کي برخه اخستل	n Attending class, contribution to knowledge and relations with the group.	ons hips	s ps 5							
Assignments کورن <i>ي</i> دنده	Solving the indicated problem from the problem list and submitting on time.	Solving the indicated problems from the problem list and submitting on time.				5				
Laboratory and field trip report: لابراتوار/ ساحي راپورونه	atory and Weekly laboratory/field trip rip reports reports that include abstract, introduction, method, result, راپورون									
Quizzes صنفي ارزوني	Quizzes include teaching materials and assignments from two previous classes.		10							
Midterm exam منځنی از موینه	The midterm exam include the covered topics.	S	20							
Final examThe final exam includes the covered topics after the وروستی ازموینهmidterm exam.				60						
	100									
	Relationship of this Course to مکلیدی ښوونیزو موخو سره	Progi بانگی ل	ram Le یکه د ڈ	earnin مون اړ	ig Outco د مضر	ome				
		-		Prog	gram O	outcome	s			
No.	. Course Outcomes		2	3	4	5	6	7		

		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi- disciplinary team
1	Importance of faith in human life	1	1	1	2	2	1	1
2	Positive understanding of universe	1	1	1	2	2	1	1
3	Aim of creation	1	1	1	2	2	1	1
4	Human as a responsible part of universe	1	1	1	2	2	1	1
5	Purpose of life	1	1	1	2	2	1	1
	Total	1	1	1	2	2	1	1
	Average				1.2			
	1= Some relation 2= Moderate relation 3= Extensive relation							

## Sh. Isi 0201 Theology II: Philosophy of Worship (PW)

Item موضوع	Description		توضيحات			
Title عنوان يا مضمون	Sh. Isi 0201 Theolog	y II: Philosophy of Worship (P	PW)			
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical			
د کرېدتونو او درسي ساعتونو شمير	1	1	0			
Offering year and						
semester	First year - Second se	emester				
د تدريس کال او سمستر						
Aim	This course aims to	provide information on criter	ria, importance, and			
موخي	benefits of worshipping Allah.					
Key Learning	Key learning outcome	es of this course follow:				
Outcomes	• Generality of Worship					

كليدي بنوونيز نتايج	Criteria for Worship	
	Objectives of Worship	
	Importance of Worship	
	Needs for Worship	
	Benefits of Worship	
Academic Staff		
Responsible		
د تدریس مسئول استاد		
	I. GENERAL INTRODUCTION	
	II. <u>WORSHIP IN ISLAM</u>	
	1. Criteria	
	2. Objectives	
0 11 1	3. Generality	
Syllabus	III. <u>BRANCHES IN ISLAM AND THEIR PHI</u>	LOSOPHY
مفردات	1. Faith (Shahadat)	
	2. Prayer (Salaat)	
	3. Fasting (Saum)	
	4. Islamic Tax (Zakaat)	
	5. Pilgrimage (Hajj)	
	IV. INVENTION IN WORSHIP (BEDA'AT)	
Pre-requisite	Islamic Outlook (IO)	
مخكيني اړين مضامين		
Related Courses	IMS, ISS, IPS, IES, QCT and IC.	
رونده مطامین Teaching and	Lectures tutorials and assignments	
Learning methods	Lectures, tutoriais, and assignments	
د تدریس میتود		
Computer	Moderate computer knowledge such as MS Word,	MS Excel, MS, and
Knowledge	PowerPoint	
د کمپيوتر زده کړې ته		
اړتيا		
	Text Books:	
	درسی کتاب	
Course Materials	• Azizi, Shere zad (1389 Hij-Sham), Worshipin	g jurisprudence
and References	(Feqha) in Islam	
د مضمون در سی مواد او		
• المعادي من	• Oarzawi, Yusuf, Translation by Saif-u-rah	man Habibi (2007)
الحصيحونة	Worship in Islam, New Kabul book store	
	• Rahim , Shah waliullah Ben Abdul	(1413 Hij-Qam),
	Hujjatullah-hel-baligha	
	Evaluation activities and Grades	
	د ارزوني فعاليتونه او نمري	
Activity	Scope	Marks

	فعاليت		هدف							
Atter دlass درس ستل	ndance and contribution حاضري او په ۱ کي برخه اخس	Attending cla relationships	Attending class, contributions to knowledge and relationships with the group.							
Ass	ignments	Solving the in	ndicated	em	5					
0	کورىي دىد	list and subm	utting on	time.						
Labo	bratory and	Weekly labor	ratory/fie	eld trip	reports	that includ	e			
neiu احی	د لابر اتو ار / س	abstract, intro	oduction	, metho	d, resul	lt, conclusio	on			
Ų	راپورونه	and implicati	on.							
Ç	Quizzes	Quizzes inclu	ide teach	ning ma	terials	and	Ĩ		10	
۔ سي	صنفي ارزون	assignments	from two	o previo	ous clas	ses.			10	
Midt بنه	term exam منځنۍ ازموي	The midterm	exam in	cludes	the cov	ered topics			20	
Fir	nal exam	The final exa	m incluc	les the	covered	l topics afte	er		60	
ينه	وروستي ازمو	the midterm	exam.						00	
		Total Course	Marks		100					
	Re	مجموعي نمري ationship of th	د کورس مجموعي نمري ionship of this Course to Program Learning Outcom							
	Ku	رو موخو سره	دي ښوونيز	کی له کلیا	که د څانځ	. مضمون اړيک	۵. ۱			
					Pro	ogram Out	come	s		
			1	2	3	4	5	5	6	7
No.	Course (	Dutcomes	pply mathematics, science and gineering ssign/conduct experiments/analyze ta se modern tools and techniques itical thinking and apply knowledge ncurrence with other disciplines ncurrence with other disciplines					responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Generality	erality of Worship 1 1 1 1							1	1
2	Criteria fo	or Worship	1	1	1	2	2	2	1	1
3	Objectives	of Worship	1	1	1	1	1	-	1	1
4	Importance	portance of Worship $1$ $1$ $1$ $1$ $2$ $2$							1	1

1= Some relation 2= Moderate relation 3=Extensive relation								
Average 1.1								
Total		1	1	1	1.33	1.33	1	1
6	Benefits of Worship	1	1	1	1	1	1	1
5	Needs for Worship	1	1	1	1	1	1	1

## Sh. Isi 0301 Theology III: Islamic Moral System (IMS)

Item موضوع	توضيحات Description								
Title عنوان یا مضمون	Sh. Isi 0301 Theology III: Islamic Moral System (IMS)								
Credits and no. of	عملي Theoretic نظري Practical توليزه Total								
د کرېدتونو او درسي	1 1 0								
ساعتونو شمير									
Offering year and semester د تدریس کال او سمستر	Second year - First semester								
Aim موخي	This course aims to provide information on moral values of Islam.								
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Importance of morality</li> <li>Relation between soul and body</li> <li>Close relation between faith and morality</li> <li>Importance of morality</li> <li>Resources of morality in Islam</li> <li>Islamic moral values</li> <li>Immoralities</li> <li>Reasons for immorality</li> </ul>								
Academic Staff Responsible د تدریس مسئول استاد									
Syllabus مفردات	I. GENERAL INTRODUCTION         II. RESOURCES OF IMS         III. OBJECTIVES OF IMS         IV. ISLAMIC MORAL VALUES								

	1. Integrity
	2. Prosperity
	3. Cooperation
	4. Dedication
	5. Modesty
	V. <u>SOCIAL MORAL VALUES</u>
	1. Justice
	2. Respect
	3. Positivism
	4. Cooperation
	5. Remission
	VI. INDIVIDUAL IMMORALITIES
	1. Arrogance
	2. Lying
	3 Dislovalty
	4 Stinginess
	5 Pessimism
	6 Fanatics
	7 Jealousy
	8 Fanaticism
	VII SOCIAL IMMORALITIES
	1 Mockery
	2. Abusing
	3 Injustice
	4 Backhiting
	5. Prodigality
	6 Hatred
	VIII REASONS FOR IMMORTALITY
	VIII. <u>REASONS FOR IMMORTALITT</u>
	$\begin{array}{c} \text{IA.}  \underline{\text{BAD OUTCOMES OF SOCIAL IMMORALITIES}} \\ \text{Y}  \text{TDEATMENT OF IMMORALITIES IN ISLAM} \end{array}$
Dro roquisito	A. <u>IREATMENT OF IMMORALITIES IN ISLAM</u>
Fie-lequisite	Islamic Outlook (IO)
محكيني اړين مضامين	
Related Courses	PW, ISS IPS, IES, QCT and IC.
ارونده مضامين	
Teaching and	Lectures, tutorials, and assignments
Learning methods	
د تدريس ميتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, and MS,
Knowledge	PowerPoint.
د کمپيوتر زده کړې ته	
اړتيا	
Course Materials	Text Books:
and References	درسی کتاب

مواد او م	د مضمون درسي . اخځليکونه	• Alghzalee , Mohammad Ben Mohammad, <i>Ehya-e-Ulomidden</i>								
		Reference:         اخطیکونه         • Fatimi , Said Ahmad, Ethical system in Islam         • Nadawi, Said suliman, Translated by Mowlana Aziz Rahman Saifee (1390 Hij-Sham), Nabawi Akhlaq								
		Evaluation	n acti	vities a	nd Gı	ades				
		نمري	ونه او	بني فعالية	د ارزو					
	Activity		Sc	cope				Ma	arks	
	فعاليت		L	هدف				ي	نمر	
Atte داass رس	endance and contribution حاضري او په در کی برخه اخست	Attending class, contributions to knowledge and relationship with the group.					ıd	5		
As	ssignments کورني دنده	Solving the indicat list and submitting	Solving the indicated problems from the problem list and submitting on time.					5		
Lab field حي	ooratory and l trip reports د لابراتوار/ ساد راپورونه	Weekly laboratory, abstract, introducti and implication.	/field on, m	trip rep ethod,	oorts t result	that includ	le on			
ų	Quizzes صنفي ارزوني	Quizzes include tea assignments from t	aching wo pi	g mater revious	ials a class	nd es.		]	10	
Mic A	dterm exam منځنۍ ازموين	The midterm exam	inclu	ides the	cove	ered topics		2	20	
Fi ينه	inal exam وروستی ازموی	The final exam includes the covered topics after the midterm exam.					er	60		
Total Course Marks 100 د کورس مجموعي نمري							00			
	Re	lationship of this Col ښوونيزو موخو سره	urse to کليدي	o Progr فانګې له	am L که د ک	earnin <del>g O</del> مضمون اړي	utcome د			
No	Course	Qutaomaa			I	Program (	Dutcom	es		
190.	Course Outcomes         1         2         3         4         5					5	6	7		

		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi- disciplinary team
1	Importance of morality	1	1	1	2	2	1	2
2	Relation between soul and body	1	1	1	2	2	1	2
3	Close relation between faith and morality	1	2	1	2	2	1	1
4	Importance of Morality	1	1	1	2	2	1	1
5	Resources of morality in Islam	1	1	1	2	2	1	1
6	Islamic moral values	1	1	1	2	2	2	2
7	Immoralities	1	1	1	2	2	3	3
8	Reasons for immorality Bad effects of immorality on society	1	1	1	1	2	2	2
	Total	1	1.12	1	1.87	2	1.5	1.75
	Average				2.0	)		
	<b>1</b> = Some relation <b>2</b> = Moderate relation <b>3</b> = Extensive relation							

## Sh.Isi 0401 Theology IV: Islamic Social System (ISS)

Item	Description	ته ضرحات
موضوع	Description	

Title عنوان یا مضمون	Sh.Isi 0401 Theology IV: Islamic Social System (ISS)								
Credits and no. of	ټوليزه Total	نظري Theoretic	عملي Practical						
hour									
د کرېدتونو او درسي	1	1 1 0							
ساعتونو شمير									
Offering year and									
semester	Second year - Secon	d semester							
د تدریس کال او سمستر									
Aim	This course provide	s insight on interrelation	between individual and						
موخي	society.								
	Key learning outcom	nes of this course follow:							
	• Interrelation	s between individual and	society						
Key Learning	Principles of	social life							
Outcomes	• Structure of	social life							
كليدي ښوونيز نتايج	• Structure of	• Structure of Islamic family							
	Rights and responsibilities of individual in society								
	Neighbor rights								
Academic Staff									
Responsible									
د تدریس مسئول استاد									
	I. <u>GENERAL IN</u>	TRODUCTION							
	II. <u>PRINCIPLES</u>	<u>OF ISS</u>							
	III. <u>PROPERTIES</u>	OF ISS							
	IV. <u>OBJECTIVES</u>	<u>OF ISS</u>							
Syllabus	V. <u>STRUCTURE</u>	<u>OF ISS</u>							
مفردات	1. Individual								
	2. Family								
	3. Society								
	VI. <u>SOCIAL REL</u>	ATIONS							
	VII. <u>SOCIAL RES</u>	PONSIBILITIES							
	VIII. <u>SOCIAL REF</u>	<u>ORM</u>							
Pre-requisite	Islamic Outlook (IO)	)							
مذكيني اړين مضامين									
Related Courses	PW, IMS, IPS, IES,	QCT and IC.							
ارونده مضامین									
Teaching and	Lectures, tutorials, and assignments								

Lear	ning methods							
ود	د تدریس میتو							
(	Computer	Moderate computer knowledge	such as MS Word, N	MS Excel, and MS				
K	Inowledge	PowerPoint.						
ې ته	د کمپیوتر زده کړ							
	اړتيا							
Text Books:         درسی کتاب         درسی کتاب         Course Materials         and References         افخلیکونه         د مضمون درسي مواد او         د مضمون درسي مواد او         د مضمون درسي مواد او								
	<ul> <li>Alkabisee, Dr. Ahmad (1428 Hij-Qam), Alahwa-lul-shkhseeya</li> <li>Zaidan, Abdul Karim, Translation by Abdul Hakim Amal (1407 Hij-Qam), Usoulloddawa</li> </ul>							
	Evaluation activities and Grades							
	د ارزوني فعاليتونه او نمري							
	Activity	Marks						
	فعاليت	هدف	نمري					
Atte class س	endance and s contribution حاضري او په در کي برخه اخستا	Attending class, contributions to relationships with the group.	o knowledge and	5				
As	ssignments کورني دنده	Solving the indicated problems list and submitting on time.	from the problem	5				
Lat field مي	ooratory and d trip reports د لابراتوار/ ساد راپورونه	Weekly laboratory/field trip rep abstract, introduction, method, r and implication.	orts that include result, conclusion					
	Quizzes صنفي ارزوني	Quizzes include teaching mater assignments from two previous	ials and classes.	10				
Mi	dterm exam منځنۍ ازموينا	The midterm exam includes the	covered topics.	20				
F	inal exam وروستی ازموین	The final exam includes the cov the midterm exam.	vered topics after	60				
		Total Course Marks د کورس مجموعي نمري		100				
	Rel	ationship of this Course to Progra	am Learning Outcom	e				
		څانګې له کليدي ښوونيزو موخو سره	د مضمون اړيکه د					
No.	(	Course Outcomes	Program (	Dutcomes				

		1	2	3	4	5	6	7
		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Interrelations between individual and society	1	2	2	3	3	3	3
2	Principles of social life	1	1	2	3	2	3	3
3	Structure of social life	1	2	1	2	3	2	3
4	Structure of Islamic family	1	1	2	2	2	2	2
5	Rights and responsibilities of individual in society	1	2	2	3	3	3	3
6	Neighbor rights	1	2	2	2	2	3	3
Total		1	1.6	1. 8	2.5	2.5	2.6	2. 8
	Average				2.1			
	1= Some relation 2= Moderate relation	n	3= I	Exten	sive re	lation	L	

### Sh. Isi 0501 Theology V: Islamic Political System (IPS)

Item موضوع	توضيحات Description							
Title عنوان یا مضمون	Sh. Isi 0501 T	'heology V: Islamic P	Political System (IPS)					
Credits and no. of	توليزه Total	نظري Theoretic	عملي Practical					
hour د کرپدتونو او درسي ساعتونو شمير	1	1	0					
Offering year and semester د تدریس کال او سمستر	Third year - F	Third year - First semester						
Aim	This course j	This course provides insight on political system and its structure in						
موځي	Islam.	Islam.						
Key Learning Outcomes کلیدي ښوونیز نتایج Acadomic Stoff	<ul> <li>Key learning outcomes of this course follow:</li> <li>Nature of politics in Islam</li> <li>Relation between Islam and politics</li> <li>Sentence of Secularism</li> <li>Islamic government and its structure</li> <li>International relations of Islamic state</li> <li>Importance of peace in Islam</li> </ul>							
Academic Starr Responsible د تدریس مسئول استاد								
Syllabus مفردات	5.3         I. <u>GENERAL INTRODUCTION</u> II. <u>PRINCIPLES OF IPS</u> III. <u>PROPERTIES OF IPS</u> IV. <u>OBJECTIVES OF IPS</u> V. <u>ISLAM AND POLITICS</u> V. <u>ISLAM AND POLITICS</u> VI. <u>SECULARISM</u> VII. <u>GOVERNMENT IN IPS</u> VIII. <u>STRUCTURE OF ISLAMIC STATE</u> IX. <u>RESPONSIBILITIES OF ISLAMIC STATE</u> X. <u>GOVERNMENTAL RELATIONS</u> VI. <u>DEACE IN IPS</u>							
Pre-requisite مخکینی اړین مضامین	Islamic Outloo	ok (IO)						

Related Courses ار ونده مضامین	PW, IMS, ISS, IES, QCT and IC.	PW, IMS, ISS, IES, QCT and IC.					
Teaching and							
Learning methods	Lectures tutorials, and assignments	s					
د تدریس میتود		- -					
Computer							
Knowledge	Moderate computer knowledge suc	h as MS Word, MS Excel, and MS					
د کمپيوتر زده کړې ته	PowerPoint.						
اړتيا							
	<u>Text Books</u> : درسی کتا <u>ب</u> Daharani Mawlawi Sharif	(1200 III) Shaw) Jalawia political					
Course Materials	Kahmani, Mowlawi Sharif science	(1389 Hij-Sham), <i>Islamic political</i>					
and References	Reference:						
د مصمون درسي مواد	اخطيكونه						
او احطيحونه	• Qaiba Dainoree, Abu Mohammad Ben Muslim – Ebne- (1418						
	Hij-Qam), Al-Emamah- wal- seeyasah Zai Zahidi Ahmad (1383 Hij-Sham) Islamic political and						
	• Zai, Zaindi Aliniad (136 republic system	is mj-shain), islamic pontical and					
	Evaluation activities and Grades						
	زوني فعاليتونه او نمري	د ار					
Activity	Scope	Marks					
فعاليت	هدف	نمري					
Attendance and	Attending class contributions to						
class contribution	knowledge and relationships with	5					
حاضري او په درس	the group	5					
كي برخه اخستل	the group.						
Assignments	Solving the indicated problems						
که د ندر دنده	from the problem list and	5					
<u>مر</u> م	submitting on time.						
Laboratory and	Weekly laboratory/field trip						
field trip reports	reports that include abstract,						
د لابراتوار/ ساحي	introduction, method, result,						
راپورونه	conclusion and implication.						
	Quizzes include teaching	~					
منف ارزهند	materials and assignments from	10					
مسحي ارزومي	two previous classes.						
Midterm exam	The midterm exam includes the	20					

4	منځنۍ ازموينا	covered topics.							
		The final exam in	cludes th	e					
F	inal exam	covered topics aft	er the mi	dterm			60		
<u>م</u>	وروستئ أزمويد	exam.							
		Total Course Mar	·ks	100					
		رس مجموعي نمري	د کو				100		
	Relationship of this			Course to Program Learning Outcome					
		ونيزو موخو سره	ه کليدي ښو	د څانګې ل	اړيکه	د مضمون			
					Prog	ram Ou	tcomes		
			1	2	3	4	5	6	7
No.	o. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analvze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Nature of pol	itics in Islam	1	1	1	2	2	1	2
2	Relation betw	veen Islam and	1	1	1	2	2	1	2
	politics								
3	Sentence of S	lecularism	1	2	1	2	2	1	1
4	Islamic gover	mment and its	1	1	1	2	2	1	1
	structure								
5	International relations of		1	1	1	2	2	1	1
Islamic state									
6	Importance of	f peace in Islam	1	1	1	2	2	2	2
	Tot	al	1	1.16	1	2	2	1.16	1.5
	Aver	age				1.40			
	1= Some	relation 2= M	oderate	relation		3= Exter	nsive re	lation	

Item موضوع	توضيحات Description					
Title عنوان یا مضمون	Sh. Isi 0601 Theology	VI: Islamic Economic System	(IES)			
Credits and no. of	ټوليزه Total	نظري Theoretic	عملي Practical			
hour د کرېدتونو او درسي ساعتونو شمير	1 1		0			
Offering year and semester د تدریس کال او سمستر	Third year - Second semester					
Aim	This course aims to provide information on relation between Quran					
موخي	and contemporary tech	nnology.				
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Importance of economics in human life</li> <li>Nature of economics in Islam</li> <li>Revenue and expenditure in Islam</li> <li>Property and related issues in Islam</li> <li>Financial worship</li> </ul>					
Academic Staff Responsible د تدریس مسئول استاد						
Syllabus مفردات	I.       GENERAL INTRODUCTION         II.       PRINCIPLES OF IES         III.       PROPERTIES OF IES         IV.       IMPORTANCE OF IES         V.       RESOURCES OF IES         VI.       MAJOR PHILOSOPHIES IN ECONOMICS         VII.       PROPERTY IN IES					
Pre-requisite مخکینی اړین مضامین	Islamic Outlook (IO)					
Related Courses اړونده مضامين	PW, IMS, ISS, IPS, Q	CT and IC.				
Teaching and Learning methods د تدریس میتود	Lectures, tutorials, and assignments					

#### Sh. Isi 0601 Theology VI: Islamic Economic System (IES)

-										
Co	omputer									
Kn	nowledge	Moderate comp	uter kno	owledge	such a	s MS Word	l, MS Ex	ccel, a	nd N	MS
کړې ته	د کمپيوتر زده ا	PowerPoint.								
	اړتيا									
		Text Books:								
Cours	se Materials	<u>درسي کتاب</u>								
and l	References									
ې مواد او	د مضمون درسي	Reference:								
له ا	اخطيكون	اخطيكونه								
	Evaluation activities and Grades									
		ري	نه او نم	وني فعاليتو	د ارز					
A	Activity	Scope						Mar	ks	
	فعاليت		هدف						نە	
Atter	ndance and									
class of	contribution	Attending class,	Attending class, contributions to knowledge and relationships with the group					5		
-ر-س ستل	کی برخه اخس	relationships with the group.								
1										
Ass	Signments کورنی دنده	Solving the indicated problems from the problem list and submitting on time						5		
	••••		ng on t							
Labo	bratory and	Weekly laborate	ory/field	d trip rep	orts th	at include			/	
الداري الحي	د لابراتوار/ س	abstract, introdu	ction, 1	nethod, 1	esult,	conclusion				
	راپورونه	and implication.								
	Duizzes	Ouizzes include	teachi	ng materi	als and	đ		17	`	
ي	صنفي ارزون	assignments from	m two j	previous	classe	s.		П	,	
Mid	term exam									
به	منځنۍ ازموي	The midterm ex	am incl	ludes the	covere	ed topics.		20	)	
Eir	nalayam	The final arous	a alar da	a 41. a a a a			h .			
۲۱۱ ینه	وروستی ازمو	midterm exam.	Include	s the cov	ered to	opics after t	ne	60	)	
		Total Course M	arks دکەر					10	0	
	Rel	بن بينو عي - تري ationship of this (	Course	to Progra	m Lea	rning Outc	ome			
		ونيزو موخو سره	فليدي ښو	څانګې له ک	ړيکه د	د مضمون ا				
	0	0			Pro	gram Outc	omes			
INO.	Course	Outcomes	1	2	3	4	5	6		7

		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Importance of economics in human life	2	1	1	2	2	1	2	
2	Nature of economics in Islam	1	1	1	2	2	1	2	
3	Revenue and expenditure in Islam	2	1	1	2	2	1	1	
4	Property and related issues in Islam	1	1	1	1	2	1	1	
5	Financial worship	1	1	1	2	2	1	2	
Total			1	1	1.8	2	1	1.6	
	Average	1.4							
	1= Some relation 2= Moderate relation 3= Extensive relation								

# Sh.Isi 0701 Theology VII: Quran And Contemporary Technology (QCT)

Item موضوع	Description	توضيحات	
Title عنوان یا مضمون	Sh.Isi 0701 Theology (QCT)	VII: Quran And Contemporar	y Technology
Credits and no. of	ټوليزه Total	نظري Theoretic	عملي Practical
hour			
د کرېدتونو او درسي	1	1	0
ساعتونو شمير			
Offering year and			
semester	Fourth year - First sen	nester	
د تدریس کال او سمستر			
Aim	This course aims to pr	ovide information on relation	between Quran and
موخي	contemporary technol	ogy.	

Key Learning Outcomes کلیدي ښوونیز نتایج Academic Staff Responsible	Key learn • F • C • 7 • N • Posi	ning outcomes of this course follow: Relation between Quran and modern science Generality of Quranic teachings Fechnology as mean of spreading Islam Modern sciences prove Islam itive usage of technology	;		
د تدریس مسئول استاد					
Syllabus مفردات Pre-requisite مخکینی اړین مضامین	I. <u>(</u> II. <u>/</u> III. <u>(</u> IV. <u>(</u> VI. <u>(</u> VII. <u>(</u> VII. <u>1</u> Islamic (	GENERAL INTRODUCTION A GLANCE TO QURAN QURAN AND CONTEMPORARY SCIENT QURAN AND MEDICINE QURAN AND ENGINEERING QURAN AND ENGINEERING QURAN AND GEOGRAPHY QURAN AS BASE FOR CIVILIZATION SLAM AND UNPROVEN IDEAS	CES		
Related Courses	PW, IMS, ISS, IPS, IES and IC.				
Teaching and Learning methods د تدریس میتود	Lectures,	, tutorials, and assignments			
Computer Knowledge د کمپيوتر زده کړې ته اړتيا	Moderate PowerPo	e computer knowledge such as MS Word, I	MS Excel, and MS		
Course Materials and References د مضمون درسي مواد او	<u>Text Boc</u> درسی کتاب افکایکونه	o <u>ks</u> : Haroon Yahya, translation by Mohammad sl (1387 Hij-Sham), Da quran Eajaz <u>e</u> :	hafiq Haqpal		
احطيكونه	• (	Qatan, Khalil Al (1421 Hij-Qam), Fe Ulom- Sabir, Abdul Wasi (1390 Hij-Sham), Quran	El-quran and science		
	]	Evaluation activities and Grades			
		د ارزوني فعاليتونه او نمري			
Activity فعاليت		Scope هدف	Marks نمري		

At clas ں	tendance and ss contribution حاضري او په درس کې برخه اخستل	Attending or relationship	class, co ps with t	nd		5			
A	Assignments کورني دنده	Solving the list and sub	e indicate	ed proble on time.	ems fro	om the prob	lem		5
La fiel پ	boratory and ld trip reports د لابراتوار/ ساحہ راپورونه	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.							
	Quizzes صنفي ارزوني	Quizzes include teaching materials and assignments from two previous classes.							10
M	idterm exam منځنۍ ازموينه	The midter	The midterm exam includes the covered topics.					20	
]	Final exam وروستی ازموینا	The final e the midterr	The final exam includes the covered topics after the midterm exam.				60		
Total Course Marks د کورس مجموعي نمري Relationship of this Course to Program Learning Outcome د مضمون اړيکه د څانګې له کليدي ښوونيزو موخو سره									
		موخو سره	ښوونيزو	ې له کليدي	، د څانگې	مضمون اړيکا	د		
		موخو سره	، ښوونيزو 1	<sub>ب</sub> له کلیدي 2	۰ د څانگړ P۱ 3	مضمون اړيکا rogram Ou 4	د tcomes	6	7
No.	Course Ou	موخو سرہ tcomes	Apply mathematics, science and <b>1</b> engineering	Design/conduct المحالة محالة محالة محالة مح محالة محالة المحالة محالة محال	Use modern tools and techniques 3	Critical thinking and apply <b>A made C C C C C C C C C C</b>	Understand professional and <b>c</b> amont cethical responsibility	Communicate effectively 9	Ability to function in a group and <b>d</b> in multi-disciplinary team
No.	Course Ou Relation betwe	موخو سرہ tcomes	Apply mathematics, science and     1       engineering     1	له چېده اله اله اله اله اله اله اله اله اله ال	د کتر PT 3 1 1	Critical thinking and apply         Cobram On         Rhowledge concurrence with other         disciplines	tromessecondcerthical responsibility5	1     Communicate effectively	Ability to function in a group and <b>J</b> In multi-disciplinary team
No.	Course Ou Relation betwe and modern sci	موخو سرہ atcomes en Quran ence	Apply mathematics, science and     1       engineering     1	ر المحافظ المحا	Image: Provide modern tools and techniques       1	مجمون ارتک Critical thinking and apply A concurrence with other disciplines	tromes   sement     c   Understand professional and   c     c   ethical responsibility   c	1   Communicate effectively	Ability to function in a group and <b>1</b> in multi-disciplinary team
No.	Course Ou Relation betwe and modern sci Generality of Q teachings	موخو سرہ atcomes en Quran ience Quranic	Apply mathematics, science and       1       engineering       1	L     Design/conduct     Z       L     experiments/analyze data     T	د کتر المجان المحال المحال المحال المحال محال	مجمون ارتک Critical thinking and apply A Critical thinking a Cr	tromes 2 Comparison of the set o	I   Communicate effectively     1   1	Ability to function in a group and     L       1     in multi-disciplinary team
No.	Course Ou Relation betwe and modern sci Generality of Q teachings Technology as spreading Islam	موخو سرہ atcomes en Quran ience Quranic mean of	بنوونیزو       I       Apply mathematics, science and       I       engineering       1       1	د له کلیدي Conduct 1 1 1 1	د کتر Pl 3 1 1 1	مضمون اریک Critical thinking and apply Critical thinking and apply Cri	terms Tomes To	9     1     1     1	Ability to function in a group and     L       1     1       1     in multi-disciplinary team

	Islam							
5	Positive usage of technology	1	1	1	2	2	1	1
	Total	1	1	1	2	2	1	1
	Average	1.28						
	1= Some relation	= Some relation 2= Moderate relation 3= Extensive relation				1		

## Sh. Isi 0801 Theology VIII: Islamic Civilization (IC)

Item	Description		توضيحات		
موضوع					
Title	Sh. Isi 0801 Ti	heology VIII: Islamic (	Civilization (IC)		
عنوان يا مضمون					
Credits and no. of	توليزه Total	نظري Theoretic	عملي Practical		
hour					
د کرېدتونو او درسي	1	1	0		
ساعتونو شمير					
Offering year and					
semester	Fourth year - S	Second semester			
د تدریس کال او سمستر					
Aim	This course air	ns to provide informat	ion on local history of Islam.		
موخي					
Key Learning Outcomes کلیدي ښوونیز نتایج Academic Staff Responsible د تدریس مسئول استاد	Key learning c Import Islami Cohert Genera I. GENE	tance of understanding c civic history ence of Islam with new ality of Islamic civiliza	v area ntion		
Syllabus مفردات	I.       GENERAL INTRODUCTION         II.       ELEMENTS OF CIVILIZATION         III.       PROPERTIES OF IC         IV.       ROLE OF IC IN HUMAN DEVELOPMENT         V.       REASONS OF MUSLIMS BACKWARDNESS				
Pre-requisite	Islamic Outloc	ok (IO)			
مخكيني ارين مضامين					

Related Courses	PW, IMS, ISS, IPS, IES and QCT.				
ارونده مضامين					
Teaching and	Lectures, tutorials, and assignments				
Learning methods					
د تدریس میتود					
Computer	Moderate computer knowledge such	as MS Word, MS Excel, and MS			
Knowledge	PowerPoint				
د کمبیوت زده کرم، ته					
پيرو رو عري - ار تيا					
	Taxt Dooks:				
	<u>Text books</u> :				
Course Materials	Zahidi Ahmad zai, <i>Islamic ci</i>	ivilization			
and References	Reference:				
د مضمون در سې مو اد	الحظيكونه				
اه اختليكه نه	• Naizai, Dr. Mustafa (1391 H	Iij-Sham), The descending caused			
	of Islamic Ummah				
	• Shahood, Ali Ben Naif Al, Al hizarh at-ul- Islamiayiah Bain al				
	Esalat-ul- mazee Wa amaal H	Fel Mustaqbal			
	Evaluation activities and Gr	ades			
	د ارزوني فعاليتونه او نمري				
Activity	Scope	Marks			
فعاليت	هدف	نمري			
Attendance and					
class contribution	Attending class, contributions to				
حاضری او به درس	knowledge and relationships with	5			
کی بر خه اخستل	the group.				
	Solving the indicated problems				
Assignments	from the problem list and	5			
کورني دنده	submitting on time				
Laboratory and	Weekly laboratory/field trip reports				
field trip reports	that include abstract introduction				
	that include abstract, introduction,				
د لايرانواز / ساحي	method, result, conclusion and				
راپوروت	implication.				
Quizzes	Quizzes include teaching materials	10			
صنفي ارزوني	classes.	10			
Midterm exam	The midterm exam includes the	20			
منخنى ازموينه	covered topics.	20			

I A	Final exam وروستی ازموینه The final ex وروستی ازموینه exam.		xam includes the pics after the midterm				60			
Total Cour نمو عي نمري Palationship of			se Marks د کورس مج				100			
	Rel	this Course to Program Learning Outcome								
		موخو سرہ	ښوونيزو	، له کليدي	. څانگې	ضمون اړيکه د	د م			
		Program Outcomes								
			1	2	3	4	5	6	7	
No.	Course Ou	itcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Importance of understanding		1	1	1	2	2	1	1	
2	Islamic civic h	nistory	1	1	1	2	2	1	1	
3	Coherence of Islam with new area		1	1	1	2	2	1	1	
4	Generality of I	Islamic	1	1	1	2	2	1	1	
	civilization									
	Total		1	1	1	2	2	1	1	
Average		1.28								
	1= Some re	elation	2= Mod	erate re	lation	3= Ex	tensive	relatio	on	

#### 4.6.2. Basic Courses {56credits (38%)}

#### Item توضيحات Description موضوع Title En. Ene 0104 Calculus I (Differential & Integral Calculus) عنوان يا مضمون Credits and no. of Total نظري Theoretic عملى Practical ټوليزه hour د کربدتونو او درسی 4 4 0 ساعتونو شمير Offering year and First year - First semester semester د تدریس کال او سمستر The objective of this course is to provide a firm foundation in the Aim concepts and techniques of the calculus, including standard functions, موخى limits, continuity, differentiation, integration, differential equations, Sequences and Series. Key learning outcomes of this course follow: Understanding the firm concepts of limits and functions Key Learning Able to understand the concepts of differentiation and • integration and its application Outcomes Develop the idea of different technique of integration كليدي بنوونيز نتايج Able to understand the firm concepts of differential equation, • parametric equation and polar coordinates, infinite sequences and series Academic Staff Responsible د تدریس مسئول استاد I. FUNCTIONS AND THEIR REPRESENTATIONS 1. Representation of functions 2. Essential functions 3. New functions from old functions 4. Exponential Functions **Syllabus** 5. Inverse functions and Logarithms مفردات II. LIMITS AND THEIR PROPERTIES 1. Limits of functions 2. Theorems on limits 3. Infinity 4. Special limits 5. Continuity, Right- and left-hand continuity, Continuity in

#### En. Ene 0104 Calculus I (Differential & Integral Calculus)

	an interval, Theorems on continuity, Piecewise continuity,
	Uniform continuity
III.	DIFFERENTIATION
	1. Interpretation of the Derivative
	2. Differentiation rules
	3. Derivatives of special Functions
	4. Hyperbolic Functions
	5. Higher order Derivatives
	6. Linear Approximations and Differentials
IV.	APPLICATIONS OF DIFFERENTIATION
	1. Maximum and Minimum Values
	2. Mean Value Theorem
	3. Indeterminate Forms and L'Hospital's Rule
	4. Curve Sketching
	5. Optimization Problems
	6. Ant derivatives
V.	INTEGRATION AND APPLICATIONS OF INTEGRATION
	1. Areas and Distances
	2. Definite Integral
	3. Fundamental Theorem of Calculus
	4. Indefinite Integrals and Net Change Theorem
	5. Connecting integral and differential calculus
	6. Areas between Curves, Volumes, Moment of Inertia
VI.	INTEGRATION TECHNIQUES
	1. Integration by Parts
	2. Trigonometric Integrals
	3. Trigonometric Substitution
	4. Integration of Rational Functions by Partial Fractions
	5. Strategy for Integration
	6. Approximate Integration
	7. Improper Integrals
VII.	DIFFERENTIAL EQUATIONS
	1. Modeling with Differential Equations
	2. Direction Fields and Euler's Method
	3. Separable Equations
	4. Exponential Growth and Decay
	5. The Logistic Equation
	6. Linear Equations
	7. Predator-Prey Systems
VIII.	PARAMETRIC EQUATION AND POLAR COORDINATES
	1. Curves Defined by Parametric Equations
	2. Calculus with Parametric Curves
	3. Polar Coordinates
	4. Areas and Lengths in Polar Coordinates

	5. Conic Sections, Conic Section	ns in Polar Coordinates				
	IX. INFINITE SEQUENCES AND S	ERIES				
	1. Sequences, Series, convergence or divergence					
	2. Alternating Series					
	3. Absolute Convergence and th	e Ratio and Root Tests				
	4. Power Series					
	5. Taylor and Maclaurin Series					
Dra requisita	6. Binomial Series					
Pre-requisite	None					
Polotod Courses	Multivariable Calculus for Engineers	Differential Equations Linear				
Kelaled Courses	Alashar Dashahilita & Statistica	Differential Equations, Linear				
اړونده مصامين	Algebra, Probability & Statistics					
Teaching and	Lectures, tutorials and assignments					
Learning methods						
د تدريس ميتود						
Computer	Moderate computer knowledge such a	as MS Word, MS Excel, MS				
Knowledge	PowerPoint, and CAD.					
د کمپيوتر زده کړې ته						
ارتيا						
	Text Books:					
	درسی کتاب					
	• Stewart James (2011) Calc	ulus (7 <sup>th</sup> Edition) Cengage				
Course Materials	Learning	and (7 Edition). Congage				
and References	Reference:					
د مضمون درسي مواد او	الخطيكونه					
اخطيكونه	• Larson Hostetler and Edwards	(2009) Calculus (9th				
	Edition). Cengage Learning	(2009). Calculus (9th				
	• Wrede, Robert C. and Murray S	spiegel. Schaum's Outline of				
	Advanced Calculus, Third Editi	ion (Schaum's Outline Series)				
	(3rd Edition). McGraw-Hill					
	Evaluation activities and Grade	S				
	د ارزوني فعاليتونه او نمري					
Activity	Scope	Marks				
فعاليت	هدف	نمري				
Attendance and	Attending place contributions to					
class contribution	Autending class, contributions to	_				
حاضری او یه درس	knowledge and relationships with the	5				
کی برخہ اخستل	group.					
	Solving the indicated problems from	~				
Assignments	the problem list and submitting on	5				

	کورني دنده	time.								
Lał	ooratory and	Weekly laboratory/field trip reports				rts				
field	d trip reports	that incl	that include abstract, introduction,					15		
ني	د لابراتوار/ ساد	method,	, result, o	conclusio	on and			15		
	راپورونه	tion.								
Quizzes صنفي ارزوني		The qui	z include	es teachi	ials	5				
		and assi	gnments	s from tw	ous					
		classes.								
Midterm exam		The mic	lterm ev	am inclu	ides the					
	منځنۍ ازموينه	covered	topics				20			
F	Sinal exam	The fina	al exam i	includes	the cove	red				
4	وروستۍ از موين	topics a	fter the 1	nidterm	exam.	Icu		50		
		Total C	ourse Ma	arks	••••••					
		عي نمري	س مجموع	د کو ر				100		
		~~ <del>_</del>	••••							
	Rela	ationship	of this C	ourse to	Program	n Learnin	g Outcom	e		
		۔ بخو سرہ	وونيزو مو	ه کليدي ښر	د څانګې ل	مون اړيکه	د مضر			
					Pro	gram Oi	utcomes			
						Si ann O	accomes			
			1	2	3	4	5	6	7	
			1	2	3	4	5	6	7	
			1 eou	2	3	4 4	5 pue	6	roup <b>L</b> team	
No.	Course Out	comes	1 science	2	3 p	l apply <b>b</b> and <b>b</b> apply <b>b apply apply <b>apply apply apply apply <b>apply apply apply apply <b>apply apply apply apply apply <b>apply apply apply apply <b>apply apply apply </b></b></b></b></b></b></b></b></b></b></b></b></b></b></b></b></b></b>	5	ively 9	n a group <b>L</b> nary team	
No.	Course Out	comes	tics, science	alyze data	3 Is and	g and apply <b>a</b> unrence with	s fessional and <b>2</b>	ffectively 9	on in a group <b>L</b> ciplinary team	
No.	Course Out	comes	lematics, science <b>1</b>	duct <b>c</b> s/analyze data	3 3	king and apply <b>4</b> concurrence with	lines <b>5</b> professional and <b>5</b> onsibility	ate effectively 9	Inction in a group	
No.	Course Out	comes	mathematics, science <b>1</b> gineering	/conduct <b>c</b> nents/analyze data	3 July and J	I thinking and apply <b>4</b> thinking and apply <b>4</b> thinking and apply <b>4</b> thinking the second se	isciplines tand professional and <b>5</b> responsibility	unicate effectively 9	to function in a group <b>4</b> multi-disciplinary team	
No.	Course Out	comes	pply mathematics, science <b>1</b> d engineering	sign/conduct <b>c</b> beriments/analyze data	e modern tools and £	itical thinking and apply <b>4</b> owledge concurrence with	ner disciplines iderstand professional and <b>5</b> iical responsibility	ommunicate effectively 9	vility to function in a group <b>4</b> d in multi-disciplinary team	
No.	Course Out	comes	Apply mathematics, science <b>1</b> and engineering	Design/conduct         c           experiments/analyze data         c	Use modern tools and techniques	Critical thinking and apply <b>4</b> knowledge concurrence with	other disciplines Understand professional and <b>4</b> ethical responsibility	Communicate effectively 9	Ability to function in a group <b>4</b> and in multi-disciplinary team	
No.	Course Out	comes	Apply mathematics, science <b>1</b> and engineering	Design/conduct         c           experiments/analyze data         c	Use modern tools and techniques	Critical thinking and apply <b>4</b> knowledge concurrence with	other disciplines     cticle       Understand professional and     cticle       ethical responsibility     cticle	Communicate effectively 9	Ability to function in a group <b>4</b> and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fun	comes g the pts of ctions	Apply mathematics, science     1       and engineering	1     Design/conduct     7       experiments/analyze data	Use modern tools and techniques	Critical thinking and apply <b>7</b> knowledge concurrence with	0     0     0       0     Understand professional and ethical responsibility     5	Communicate effectively     9	Ability to function in a groupL1and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fund	g the pts of ctions	Apply mathematics, science     1       and engineering	Design/conduct     7       r     experiments/analyze data	Use modern tools and techniques	Critical thinking and apply <b>7</b> knowledge concurrence with	other disciplines       0 </td <td><b>9</b> Communicate effectively</td> <td>Ability to function in a groupL1and in multi-disciplinary team</td>	<b>9</b> Communicate effectively	Ability to function in a groupL1and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fund Able to und	comes g the pts of ctions derstand	Apply mathematics, science     1       and engineering	Design/conduct     7       r     experiments/analyze data	Use modern tools and techniques	Critical thinking and apply <b>7</b> knowledge concurrence with	other disciplines       0 </td <td>Communicate effectively     1</td> <td>Ability to function in a groupL1and in multi-disciplinary team</td>	Communicate effectively     1	Ability to function in a groupL1and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fund Able to und the concep	g the pts of ctions derstand ots of	Apply mathematics, science     1       and engineering	Design/conduct     7       r     experiments/analyze data	Use modern tools and techniques	Critical thinking and apply <b>7</b> knowledge concurrence with	other disciplines       0 </td <td>Communicate effectively       1</td> <td>Ability to function in a group     L       1     and in multi-disciplinary team</td>	Communicate effectively       1	Ability to function in a group     L       1     and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fund Able to und the concep differentiation integration a	g the pts of ctions derstand ots of a and and its	I     Apply mathematics, science     I       and engineering	Design/conduct     Z       1     experiments/analyze data	3 Use modern tools and techniques 1	Critical thinking and apply     F     Critical thinking and apply     5     6     7 <td>other disciplines       other disciplines       Curderstand professional and chical responsibility</td> <td>Ommunicate effectively     1</td> <td>Ability to function in a group     L       1     and in multi-disciplinary team</td>	other disciplines       other disciplines       Curderstand professional and chical responsibility	Ommunicate effectively     1	Ability to function in a group     L       1     and in multi-disciplinary team	
No.	Course Out Understanding firm concep limits and fund Able to und the concep differentiation integration a application	g the pts of ctions derstand ots of a and and its	I     Apply mathematics, science     I       and engineering	L     Design/conduct     Z       1     experiments/analyze data     Z	3 1 1 1 1	Critical thinking and apply     7     6     7	other disciplines       other disciplines       Curderstand professional and chical responsibility	Ommunicate effectively     1	Ability to function in a group     L       1     and in multi-disciplinary team	
3	Develop the idea of different technique of integration	1	1	1	2	2	1	1		
--	---	-----	------	---	-----	-----	---	---		
4	Able to understand the firm concepts of differential equation, parametric equation and polar coordinates, Infinite Sequences and Series	1	2	1	1	1	1	1		
Total		1.3	1.16	1	1.5	1.5	1	1		
	Average	1.2								
1= Some relation 2= Moderate relation 3=Extensive relation										

# En. Ene 0204 Calculus II (Multivariable Calculus for Engineers)

Item موضوع	Description		توضيحات						
Title عنوان یا مضمون	En. Ene 0204 Calculus II (Multivariable Calculus for Engineers)								
Credits and no.	Total	نظري Theoretic	عملي Practical						
of hour	ټوليزه								
د کرېدتونو او									
درسي ساعتونو	4	4	0						
شمیر									
Offering year and semester د تدریس کال او سمستر	First year - Second semester								
Aim موخي	This course is designed to acquire an active knowledge and understanding of the main concepts and techniques of multivariable calculus including differential equations, sequences and series, vectors, partial differentiation, multiple integration and higher order differential equations.								
Key Learning Outcomes کليدي ښوونيز	<ul> <li>Key learning outcomes of this course should be as follows:</li> <li>Able to understand the firm concepts of differential equation, parametric equation and polar coordinates, Infinite Sequences and Series</li> </ul>								

1							
ىنايج	• Understanding the basic idea of the vectors and vector functions						
	• Develop the understanding of geometry of space						
	• Able to understand the basic and application of the functions						
	several variables, partial differentiation, multiple integration and						
	higher order differential equations						
Academic							
Staff							
Responsible							
د تدريس مسئول							
استاد							
	I. DIFFERENTIAL EQUATIONS						
	1. Modeling with Differential Equations						
	2. Direction Fields and Euler's Method						
	3. Separable Equations						
	4. Exponential Growth and Decay						
	5. The Logistic Equation						
	o. The Deplote Equation						
	II. PARAMETRIC EQUATION AND POLAR COORDINATES						
	1. Curves Defined by Parametric Equations						
	2. Calculus with Parametric Curves						
	3. Polar Coordinates						
	4. Areas and Lengths in Polar Coordinates						
	5. Conic Sections, Conic Sections in Polar Coordinates						
Syllabus	III. <u>INFINITE SEQUENCES AND SERIES</u>						
مفردات	1. Sequences, Series, convergence or divergence						
	2. Alternating Series						
	3. Absolute Convergence and the Ratio and Root Tests						
	4. Power Series						
	5. Taylor and Maclaurin Series						
	6. Binomial Series						
	IV VECTORS AND THE GEOMETRY OF SDACE						
	1. Three-Dimensional Coordinate Systems						
	2. Vectors						
	3. Vector products						
	4. Equations of Lines and Planes						
	5. Cylinders and Quadric Surfaces						
	6. Cylindrical and Spherical Coordinates						
	V. <u>VECTOR FUNCTIONS</u>						
	1. Vector Functions and Space Curves						

	2. Derivatives and Integrals of Vector Functions
	VI. PARTIAL DIFFERENTIATION
	1. Functions of Several Variables
	2. Limits and Continuity
	3. Partial Derivatives
	4. Tangent Planes
	5. Chain Rule
	6. Directional Derivatives and the Gradient Vector
	7. Maximum and Minimum Values
	8. Lagrange Multipliers
	9. Higher order partial derivatives
	VII. <u>MULTIPLE INTEGRALS</u>
	1. Double Integrals over Rectangles
	2. Iterated Integrals
	3. Double Integrals over General Regions
	4. Surface Area
	5. Triple Integrals
	6. Triple Integrals in Cylindrical and Spherical Coordinates
	7. Change of Variables in Multiple Integrals
	VIII. <u>VECTOR CALCULUS</u>
	1. Vector Fields
	2. Line Integrals
	3. The Fundamental Theorem for Line Integrals
	4. Green's Theorem
	5. Curl and Divergence
	6. Parametric Surfaces and Their Areas
	7. Surface Integrals
	8. Stokes' Theorem
	9. The Divergence Theorem
	IX. SECOND-ORDER DIFFERENTIAL EQUATIONS
	1. Second-Order Linear Equations
	2. Non homogeneous Linear Equations
	3. Applications of Second-Order Differential Equations
	4. Series Solutions
Pre-requisite	Calculus I (Differential & Integral Calculus)
مخكيني اړين	
مضامين	
Related	Differential & Integral Calculus, Differential Equations, Linear Algebra,
Courses	Probability & Statistics
ارونده مضامين	

Teaching and	Lectures, tutorials and assignments							
Learning								
methods								
د تدريس ميتود								
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS							
Knowledge	PowerPoint and CAD							
د کمپيوتر زده کړې								
ته ارتيا								
	Text Books:							
	درسی کتاب							
Course	• Stewart, James (2011). Cald	culus (7 <sup>th</sup> Edition). Cengage Learning.						
Materials and	Deference							
Waterials and	Kelerence:							
References								
د مضمون درسی	• Larson, Hostetler and Edwa	rds (2009). Calculus (9th Edition).						
مماد اه اخځار کونه	Cengage Learning							
مورد او الصيانون	• Wrede, Robert C. and Murr	ay Spiegel. Schaum's Outline of						
	Advanced Calculus, Third E	Edition (Schaum's Outline Series) (3rd						
	Edition). McGraw-Hill							
	Evaluation activities an	d Grades						
	د ارزوني فعاليتونه او نمري							
Activity	Scope	Marks						
فعاليت	هدف	نمر ی						
		~~~ 						
Attendance								
and class	Attending class, contribution to							
contribution	knowledge and relationship with	5						
حاصري او په	the group.							
درس کي برخه								
اخستل								
Assignments	Solving the indicated problems	_						
که ر نے دندہ	from the problem list and	5						
-ر-ي	submitting on time.							
Laboratory and	Weekly laboratory/field trip							
field trip	reports that include abstract							
reports	introduction method result	15						
د لابراتوار/	introduction, method, result,							
onclusion and implication. مناحى راپورونه								
0.1	Quizzes include teaching							
Quizzes	materials and assignments from	5						
صنفي ارزوني	two previous classes.							
Midterm exam	The midterm exam includes the	20						
منخنى ازموينه	covered topics.	20						
Final exam	The final exam includes the							
وروستى	covered topics after the midterm	50						
از موينه	exam							
, <u> </u>	Total Course Marks							
		100						
	ہ تورس مجموعی سری	1						

	Relationship of this Course to Program Learning Outcome							
	<u>و</u> موخو سره	ي ښوونيز	له کلیدې	، د څانگې	نمون اړيکه	د مط		
				Pr	ogram O	utcome	es	
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understanding the basic idea of the vectors and vector functions	1	1	1	1	1	1	1
2	Develop the understanding of geometry of space	1	1	1	2	2	1	1
3	Use the techniques, skills, and modern engineering tools necessary for engineering practice	1	1	1	1	1	1	1
4	Apply knowledge and skills to solve problems effectively and efficiently that contributes to the technical advancement of computer engineering.	1	1	1	2	2	1	1
	Total	1	1	1	1.5	1.5	1	1
	Average				1.14	1		
	1= Some relation 2= Moderate relation 3=Extensive relation							

Item موضوع	Description			توضيحات				
Title عنوان یا مضمون	Ed. Ene 0304 Calculus III (Differential Equations)							
Credits and no. of	توليزه Total	عملي Theoretic نظري Practical توليزه						
۲۰۵۵۲ د کرېدتونو او درسي ساعتونو شمير	4	4		0				
Offering year and semester د تدریس کال او سمستر	Second year - First semester							
Aim	This course	is designed to acc	quire advanced to	opics of particular				
موخي	importance in	engineering application	tions.					
Key Learning Outcomes کلیدي ښوونیز نتایج Academic Staff	<ul> <li>Key understanding of the Differential equations</li> <li>Key understanding of the partial Differential equations</li> <li>Able to understand the numerical method and its application</li> <li>Understanding the idea of special functions, fourier series and fourier integrals</li> <li>Develop the understanding of Laplace transformation</li> <li>Able to understand the complex analysis</li> <li>Develop the key of Matrix basic</li> </ul>							
Responsible								
د تدریس مسئول استاد								
Syllabus مفردات	I. <u>INTE</u> 1. Det 2. Init 3. Dif II. <u>FIRST</u> 1. Sol 2. Sep 3. Lin 4. Exa 5. Sol 6. A N III. <u>MODE</u> <u>EQUAT</u> 1. Lin 2. No 3. Mo	RODUCTION TO D         finitions and Terminial-Value Problems         ial-Value Problems         ferential Equations a         ORDER DIFFEREN         ution Curves Without         barable Variables         tear Equations         act Equations         utions by Substitution         Numerical Method         LING         WITH         FIONS         tear Models         nlinear Models         odeling with Systems	IFFERENTIAL Ed nology as Mathematical M <u>NTIAL EQUATIO</u> at a Solution ons FIRST-ORDER	QUATIONS Iodels <u>NS</u> DIFFERENTIAL				

#### Ed. Ene 0304 Calculus III (Differential Equations)

IV.	HIGHER-ORDER DIFFERENTIAL EQUATIONS
V.	<ol> <li>Preliminary Theory—Linear Equations</li> <li>Reduction of Order</li> <li>Homogeneous Linear Equations with Constant Coefficients</li> <li>Undetermined Coefficients—Superposition Approach</li> <li>Undetermined Coefficients—Annihilator Approach</li> <li>Variation of Parameters</li> <li>Cauchy-Euler Equation</li> <li>Solving Systems of Linear DEs by Elimination</li> <li>Nonlinear Differential Equations</li> <li>MODELING WITH HIGHER-ORDER DIFFERENTIAL</li> <li>EQUATIONS</li> </ol>
VI.	<ol> <li>10. Linear Models: Initial-Value Problems</li> <li>11. Linear Models: Boundary-Value Problems</li> <li>12. Nonlinear Models</li> <li>SERIES SOLUTIONS OF LINEAR EQUATIONS</li> </ol>
VII.	<ol> <li>Solutions About Ordinary Points</li> <li>Solutions About Singular Points</li> <li>Special Functions</li> <li>SYSTEMS OF LINEAR FIRST-ORDER DIFFERENTIAL</li> </ol>
	<ul> <li><u>EQUATIONS</u></li> <li>1. Preliminary Theory—Linear Systems</li> <li>2. Homogeneous Linear Systems</li> <li>3. Nonhomogeneous Linear Systems</li> <li>4. Matrix Exponential</li> </ul>
VIII. IX	<ul> <li><u>PARTIAL DIFFERENTIAL EQUATIONS</u></li> <li>1. Existence and uniqueness</li> <li>2. Euler-Tricomi equation</li> <li>3. Equations of first order</li> <li>NUMERICAL METHODS</li> </ul>
	<ol> <li>Direct and iterative methods,</li> <li>Discretization and numerical integration</li> <li>The generation and propagation of errors</li> <li>Interpolation, extrapolation, and regression</li> <li>Solving equations and systems of equations</li> </ol>
Х.	<u>SPECIAL FUNCTIONS</u> 1 Gamma Beta Bessel Legendre
XI.	<ul> <li>FOURIER SERIES AND FOURIER INTEGRALS</li> <li>Fourier Series</li> <li>Convergence of Fourier Series</li> <li>Generalizations: Fourier Cosine Series: Fourier Sine series</li> <li>Integration and Differentiation of Fourier series</li> <li>Fourier-Legendre Series</li> <li>Fourier-Bessel Series</li> <li>Equipartities</li> </ul>

	AII. LAPLACE I KANSFUKIIS
	1. Definition of the Laplace Transform
	2. Inverse Transforms and Transforms of Derivatives
	3. Operational Properties I
	4. Operational Properties II
	5. The Dirac Delta Function
	6. Systems of Linear Differential Equations
	7. Laplace transforms of some elementary functions
	8. Sufficient conditions for existence of Laplace transform
	9. Inverse Laplace transforms
	10. Laplace transforms of derivatives
	11. The unit step function
	12. Periodic function
	13. Some special theorems on Laplace transform
	14 Partial fraction
	15 Solutions of differential equations by Laplace
	transforms
	16 Evaluation of improper integrals
	XIII COMPLEX ANALYSIS
	1. Complex Functions
	2. Integration
	3. Cauchy's Theorem
	4. Taylor and Laurent Series
	XIV. <u>MATRICES</u>
	1. Definition, types and algebra of matrix
	2. Adjoint and inverse of a matrix
	3. Rank and elementary transformations of matrices
	4. Normal and canonical forms
	5. Solution of linear equations
	6. Quadratic forms
	7. Matrix polynomials
	8. Caley-hamilton theorem
	9. Eigenvalues and eigenvectors
Pre-requisite	Calculus I & II
مذكيني اړين مضامين	
Related Courses	Differential & Integral Calculus, Multivariable Calculus for Engineers,
ارونده مضامين	Linear Algebra, Probability & Statistics
Teaching and	Lectures, tutorials and assignments
Learning methods	
د تدريس ميتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD
د کمپيوتر زده کړې ته	
ارتيا	

	Text Books:						
	درسی کتاب						
	• Dennis G. Zill, Warren S.	Wright, Advanced Engineering					
	Mathematics, 5th Edition, 2014						
Course Materials Reference:							
and References	اخخليكونه						
د مضمون درسي مواد	• Dennis G. Zill, First Cour	se in Differntial Equations, 9th					
او اخځليکونه	Edition						
	Howard Anton, Chris Ror     Applications Version (11)	res, Elementary Linear Algebra					
	<ul> <li>Hildebrand. Advanced Ca</li> </ul>	lculus for Applications (2nd Edition)					
	• Wrede and Speigel. Schau	am's Outline of Advanced Calculus					
	(2nd Edition)	0.1					
	Evaluation activities and	Grades					
A otivity	روبي تعاليتونه او تمري	Montro					
Activity ("ull•i							
Attendance and		<b>مر</b> ي					
class contribution	Attending class, contributions to						
	knowledge and relationships	5					
کریں ،وپ پر ۲ رس کر بر خله اخستان	with the group.						
ـي برــــ ، ـــــر 	Solving the indicated problems						
Assignments	from the problem list and	5					
کورن <i>ي</i> دنده	submitting on time	5					
L aboratory and	Weekly laboratory/field trip						
field trip reports	reports that include abstract						
	introduction method result	15					
ي مير (يو (ر) معاصي د اده د ه نه	conclusion and implication						
	Ouizzos include teaching						
Quizzes	Quizzes include teaching	F					
صنفي ارزوني		3					
Midtama araa	The midtern even includes the						
	The midlerin exam includes the	20					
منحنئ ارموينه	The final even includes the						
Final exam	The final exam includes the	50					
وروستئ ازموينه	covered topics after the midterm	20					
	Tatal Course Meda						
	i otal Course Marks	100					
	د کورس مجموعي نمري						

	Relationship of this Course to Program Learning Outcome							
	موخو سره 	، ښوونيزو ، 	کې له کليدي	د ځان	د مضمون اړيکه	1		
		Program Outcomes						
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Key understanding of							
	the partial Differential	1	1	1	2	2	1	2
ļ	equations							
2	Able to understand the numerical method and its application	1	1	1	2	2	1	2
3	Understanding the idea of special functions, fourier series and fourier integrals	1	1	1	2	2	1	3
4	Develop the understanding of Laplace transformation	1	1	1	2	2	1	3
5	Able to understand the complex analysis	1	1	1	2	2	1	3
6	Develop the key of probability basic	1	1	1	2	2	2	2
	Total	1	1	1	2	2	1.16	2.5
	Average	1	<u> </u>	<u> </u>	1.52			
	1= Some relation	1 2= Mode	rate rela	tion	3= Exte	nsive re	lation	

#### En. Ene 0404 Calculus IV (Probability and Statistics)

Item موضوع	توضيحات Description				
Title عنوان یا مضمون	En. Ene 0404 Calcu	lus IV (Probability and Stati	stics)		
Credits and no. of	توليزه Total	نظري Theoretic	عملي Practical		

hour								
	4	1	0					
د درېدنونو او درسني	4	4	0					
ساعتونو شمير								
Offering year and semester د تدریس کال او سمستر	Second year - Secor	nd semester						
Aim موځي	The objective of thi and statistics neces decisions techniques	s is to introduce students to ssary to undertake basic 1 s in engineering.	o concepts of probability modeling and statistical					
Key Learning Outcomes کليدي ښوونيز نتايچ	<ul> <li>Key learning outcomes of this course should be as follows:</li> <li>Develop the key of probability basic</li> <li>Use the theory of probability to estimate the likelihood of both discrete and continuous random variables.</li> <li>Students will be able to calculate summary statistics for sample.</li> <li>Students will be able to calculate probability related parameters from raw data</li> </ul>							
Academic Staff								
Responsible								
د تدریس مسئول استاد								
Syllabus مفردات	I. PROBABILITY BASIC I         1. Experiments         2. Outcomes         3. Sample space         4. Sample point         5. Events         6. Set algebra         7. Probability & counting tools         II. PROBABILITY BASIC II         1. Independence of events         2. Conditional events         3. Bayes theorem         4. Calculating probability         III. INTRODUCTION OF STATISTICS         1. Frequency distribution         2. Mean median, mode and other measures of central tendency         3. Standard deviation and other measures of dispersion         4. Moments, skewness and kurtosis         IV. FUNCTIONS OF RANDOM VARIABLES         1. Distribution function technique         2. Transformation tachniques one variable coveral variables							

	V. <u>SAMPLING DISTRIBUTIONS</u>
	<ol> <li>The distribution of mean and variance</li> <li>The distribution of differences of means and variances</li> <li>The Chi-Square distribution</li> <li>The <i>t</i> distribution</li> <li>The <i>t</i> distribution</li> <li>The <i>F</i> distribution</li> <li>REGRESSION AND CORRELATION</li> <li>Linear regression</li> <li>The methods of least squares</li> <li>Normal regression analysis</li> <li>Normal correlation analysis</li> <li>Multiple linear regression (along with matrix notation)</li> <li>VI. <u>DISCRETE PROBABILITY DISTRIBUTIONS</u></li> </ol>
	<ol> <li>Uniform, bernoulli and binomial distribution</li> <li>Hypergeometric and geometric distribution</li> <li>Negative binomial and Poisson distribution</li> <li>VIII. <u>CONTINUOUS PROBABILITY DISTRIBUTIONS</u></li> </ol>
	<ol> <li>Uniform and exponential distribution</li> <li>Gamma and beta distributions</li> <li>Normal distribution</li> <li>IX. <u>APPLICATION OF STATISTICS</u></li> </ol>
	<ol> <li>Curve fitting by the method of least squares-fitting of straight lines</li> <li>Second degree parabolas and more general curves</li> <li>Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations</li> <li>INTRODUCTION TO MATLAB</li> </ol>
	<ol> <li>Variable, Scripts &amp; Operations</li> <li>Visualization &amp; Programming</li> <li>Solving equations &amp; Curve fitting</li> <li>Advanced Methods</li> <li>Symbolic, Simulink, File I/O, Building GUIs</li> </ol>
Pre-requisite	Calculus I (Differential & Integral Calculus)
مخکيني اړين مصامين Related Courses اړونده مضامين	Differential & Integral Calculus, Multivariable Calculus for Engineers, Differential Equations, Probability & Statistics
Teaching and Learning methods د تدریس میتود	Lectures, tutorials and assignments
Computer Knowledge د کمپيوتر زده کړې ته اړتيا	Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint, and CAD.

	Text Books:									
	 در سی کتاب									
	• Devore, JL (2008). Probability and Stat	istics for Engineering								
	and the Sciences (7 <sup>th</sup> Edition). Thomson	Brooks/Cole.								
	International Edition									
Course Materials	Reference:									
and References	اخذلیک									
د مضمون درسی مواد	Spiegel Schiller and Srinivasan Schaur	n's Outline of								
اه اختليكه نه	Probability and Statistics (4th Edition)									
	B S Grewel (2008) Higher Engineering Mathematics Khappa									
	Publishers Delhi	• B.S.Grewal (2008).Higher Engineering Mathematics, Khanna Publichers, Dalbi								
	• Stroock Daniel W (2000) Probability	Publishers, Denni.								
	View Cambridge University Press Rev	ised Edition ISBN-								
	10.0521663490									
Evaluation activities and Grades										
	د ارزونی فعالیتونه او نمری									
Activity	Scope Marks									
فعاليت	هدف	نمرى								
Attendance and										
class contribution	Attending class, contributions to knowledge									
حاضري او په درس	and relationships with the group.	5								
كي برخه اخستل										
Assignments	Solving the indicated problems from the									
کورني دنده	problem list and submitting on time.	5								
Laboratory and	Washly laboratory/field trip reports that									
field trip reports	include shateset introduction method result	15								
د لابراتوار/ ساحي	appropriate and implication	15								
راپورونه	conclusion and implication.									
Quizzes	Quizzes include teaching materials and	5								
صنفي ارزوني	assignments from two previous classes.	5								
Midterm evan	The midterm exam includes the covered									
منځني از موينه	topics.	20								
··ـــــــــــــــــــــــــــــــــــ										
Final exam	The final exam includes the covered topics	50								
وروستئ ازموينه	after the midterm exam.	20								
	Total Course Marks	100								
	100									

## Relationship of this Course to Program Learning Outcome د مضمون اړيکه د څانګې له کليدي ښوونيزو موخو سره

		Program Outcomes									
		1	2	3	4	5	6	7			
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team			
1	Develop the key of	3	2	3	3	2	2	3			
1	probability basic	5	2	5	5	2	2	5			
2	Use the theory of probability to estimate the likelihood of both discrete and continuous random variables.	3	1	3	3	2	2	3			
3	Students will be able to calculate summary statistics for sample	3	2	3	3	2	3	3			
<ul> <li>Students will be able to</li> <li>calculate probability related</li> <li>parameters from raw data</li> </ul>		3	1	3	3	3	3	3			
	Total	3	1.5	3	3	2.3	2.5	3			
	Average				2.6						
	1= Some relation 2= Mo	derate r	elation	3	8= Extensiv	e relati	on				

#### En. Ene 0105 Physics I (Mechanics)

Item موضوع	Description	توضيحات							
Title عنوان یا مضمون	En. Ene 0105 Physic	cs I (Mechanics)							
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical						
د کرېدتونو او درسي ساعتونو شمير	4	3	1						
Offering year and semester د تدریس کال او سمستر	First year - First sen	First year - First semester							
Aim موخي	This course is designed to provide a firm foundation in the concepts in mechanics, including measurements, basic statics, and dynamics.								
Key Learning Outcomes کليدي ښوونيز نتايچ	<ul> <li>Key learning outcomes of this course follow:</li> <li>The student will learn the basic of dimensions and measurements.</li> <li>The student will also get the basic knowledge of one- and two-dimensional kinematics.</li> <li>Concepts in dynamic mechanical systems displacement, velocity and acceleration, vectors will be also explored among the students.</li> <li>The student will also learn about the concept of force, Newton's laws on force system and its applications, center of gravity, static systems with distributed loads, angular motion, numerical molding in dynamics, kinetic and potential energy</li> <li>Develop an understanding of the application of the theoretical</li> </ul>								
Academic Staff Responsible د تدریس مسئول استاد	Knowledge with practical applications.								
Syllabus مفردات	I.       MEASUREMENTS         1.       Basic Dimensions         2.       Matter and Model Building         3.       Mass and Density         4.       Analysis of Dimensions and Units         5.       Measuring the Dimensions         II.       KINEMATICS (ONE DIMENSION)         1.       Displacement, Velocity, Acceleration         2.       Diagrams of Displacement, Velocity and Acceleration         3.       Freely Falling Objects         4.       Derivation of Kinematics Equation         III.       VECTORS         1.       Definition of Vectors         2.       Properties of Vectors         3.       Coordinate Systems								

L	IV. <u>KINEMATICS (TWO DIMENSIONS)</u>
	1. Displacement, Velocity, Acceleration
	2. Angular Motion
	3. Relative Velocity and Relative Acceleration
	V. BASIC LAWS OF MOTION
	1. The Concept of Force
	2. Newton's First Law
	3. Newton's Second Law, and Mass, Gravitational Force and
	Weight
	4. Newton's Third Law
	5. Applications of Laws of Motion
	VI. <u>STATICS</u>
	1. Center of Gravity of Objects
	2. Equilibrium of Systems
	3. Concept of Static Friction, and Static Analyses of Structural
	Systems
	4. Analysis of Links and Pulley Systems
l v	II CIRCULAR MOTION
	1 Uniform Circular Motion
	2 Non Uniform Circular Motion
	<ol> <li>Motion With to Pasistive Faces and Numerical Modeling in</li> </ol>
	5. Motion with to Resistive Paces, and Numerical Modering in Desticle Dynamics
N/I	
V	1 Definition of Engange
	<ol> <li>Definition of Energy</li> <li>Coloridation of Work with Constant and Varying Foreses</li> </ol>
	2. Calculation of work with Constant and Varying Forces
	3. work-Kinetic Energy Theorem
	4. Concept of Conservation of Energy
	5. Definition of Power, and Energy in Mechanical Systems
	IX. <u>POTENTIAL ENERGY</u>
	1. Definition of Potential Energy
	2. Conservative and Non Conservative Forces
	3. System Equilibrium and Energy Diagrams
	X. INTRODUCTION TO MOMENTUM AND COLLISION
	1. Linear Momentum
	2. Definition of Impulse, Collisions in one Dimension and
	Collision Based Motions in Practical Systems
	XI. <u>LABORATORY SESSIONS</u>
	1. Observation and Quantitative Measurements (Dimension
	Analysis, Unit Conversions)
	2. Verification of the Laws of Motion (Newton's Laws, Friction,
	Gravitational Force)
	3. Analysis and Measurement of Vectors
	4. Study of A Kinematics of A Particle Moving in Two
	Dimensions
Pre-requisite N	Jone
مخكيني اړين	
مضامین Dalata L Carr	Numies II (Electromescantism 9 Oction)
Related Courses P	nysics II (Electromagnetism & Optics)
ارونده مضامين	

Teaching and	Lectures, tutorials and assignments									
Learning										
methods										
د تدر بس میتود										
Computer	Moderate computer knowledge such as MS	Word, MS Excel, MS								
Knowledge	PowerPoint and CAD									
د کمیده تر زده	Tower ond, and erib.									
کر می تبه ار تبا										
_ۍ ې _ ۱ <u>ۍ -</u>	Text Books:									
	Raymond A Serway and John W Jewet	tt (2011) Physics for								
	<ul> <li>Kaymond, A. Serway and John W. Jewell</li> <li>Scientists and Engineers with Modern H</li> </ul>	w (2011). Thysics joi								
	Web Assign Homework and ePook LOE	Drinted Access Cand for								
G	Web Assign Homework and ebook LOE Printed Access Cara for Multi Term Math and Science) (8 <sup>th</sup> Edition). Congage Learning									
Course Motorials and	Multi Term Main and Science) (8 Edition). Cengage Learning									
Naterials and										
References	• Cutnell John D and Kannah W Johnson	(2010) Develop (0th								
د مصمون درسي	Cuthen, John D. and Kennen W. Johnson     Edition). John Wiley, & Song	1 (2010). Fliysics (901								
اخځار کونه	Cinacci Develos C. (2010). Physics Pri	noinlog with Annlightions								
الحتيمونة	• Ginacoi, Douglas C. (2010). Physics Principles with Applications									
	(bth Edition). Addison-Wesley									
	• Halliday, Resnick & Walker (2010). Fun	damentals of Physics (9th								
	Edition). Wiley.									
	• Young and Freedman (2007). University	Physics (12th Edition),								
	Addison-Wesley Publishers									
	Evaluation activities and Grades									
	د ارزوني فعاليتونه او نمري									
Activity	Scope	Marks								
		ىمري								
Attendance and										
class										
contribution	Attending class, contributions to knowledge	5								
حاصري او په	and relationship with the group.									
درس کي برکه										
احسیل										
Assignments	Solving the indicated problems from the	5								
حورىي دىدە	problem list and submitting on time.									
Laboratory and	Weekly laboratory/field trip reports that include									
field trip reports	abstract, introduction, method, result,	15								
د لابرانوار / ساحي	conclusion, and implication.									
راپورونه										
Quizzes	Quizzes include teaching materials and	5								
صنفي ارزوني	assignments from two previous classes.									
Midterm exam	The midterm exam includes the covered topics.	20								
مىحىي ارمويىيە										
Final exam	The final exam includes the covered topics	50								
وروستي ازموينه	after the midterm exam.									
	Total Course Marks	100								
	د کورس مجموعي نمري									

Relationship of this Course to Program Learning Outcome د مضمون اړيکه د څانګی له کليدی ښوونيزو موخو سره								
			ې .	Pro	gram Out	comes		
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	The student will learn the basic of dimensions and measurements.	1	1	1	1	1	1	1
2	The student will also get the basic knowledge of one and two dimensional kinematics.	1	1	2	1	2	1	1
3	Concepts in dynamic mechanical systems displacement, velocity and acceleration, vectors will be also explored among the students.	1	1	1	1	1	1	1
4	The student will also learn about the concept of force, Newton's laws on force system and its applications, centre of gravity, static systems with distributed loads, angular motion, numerical molding in dynamics, kinetic and potential energy	1	2	1	2	1	2	1
5	Develop an understanding of the application of the theoretical knowledge with practice application.	1	1	2	1	1	1	1
		1	1.2	1.2	1.2	1.2	1	1
	Average				1.11			
	1= Some relation 2	2= Mode	rate rel	ation	3=Extensi	ive relati	on	

#### En.Ene 0205 Physics II (Oscillations and Lights)

Item موضوع	توضيحات Description							
Title عنوان یا مضمون	En.Ene 0205 I	Physics II (Oscillation	ns and Lights)					
Credits and no.	توليزه Total	عملي Practical نظري Theoretic توليزه						
د کرېدتونو او درسي ساعتونو شمير	4	3	1					
Offering year and semester د تدریس کال او سمستر	First year - Se	First year - Second semester						
Aim موخي	This course is electromagnet towards wirele	This course is designed to develop basic background understanding of electromagnetic, mechanic, and matter waves to provide basic path towards wireless and optical communications.						
Key Learning Outcomes کلیدي ښوونیز نتايچ	<ul> <li>Key learning of</li> <li>Understa</li> <li>Able to u their app</li> <li>Understa</li> <li>Develop knowledge</li> </ul>	<ul> <li>Key learning outcomes of this course follow:</li> <li>Understand the elements of heat, waves, thermodynamics</li> <li>Able to understand about optics, lenses, and optical instruments and their applications</li> <li>Understand firm concepts of modern physics</li> <li>Develop an understanding of the application of the theoretical knowledge with practical applications.</li> </ul>						
Academic Staff Responsible د تدریس مسئول استاد								
Syllabus مفردات	<ul> <li>I. <u>WAVES</u> <ol> <li>Wave Motion</li> <li>Sound Waves</li> <li>Superposition and Standing Waves</li> </ol> </li> <li>II. <u>THERMODYNAMICS</u> <ol> <li>Temperature</li> <li>The First Law of Thermodynamics</li> <li>The Kinetic Theory of Gases</li> <li>Heat Engines</li> <li>The Second Law of Thermodynamics</li> </ol> </li> <li>III. <u>THE ELECTROMAGNETIC SPECTRUM</u> <ol> <li>Radio Waves</li> <li>Microwaves</li> <li>IR Radiation</li> <li>UV, X-Rays, Gamma Rays</li> </ol> </li> <li>IV. <u>LIGHT AND OPTICS</u> <ol> <li>Focal Point</li> <li>Index of Refraction</li> </ol> </li> </ul>							

	5. Fiber Optics						
	6. Lensmaker's Equation						
	7. Refraction and Diffraction						
	8. Polarization						
	V. LENSES AND OPTICAL INSTRUMENTS						
	1. Cameras (F-Stop, Depth Of Field)						
	2. Telephoto Lens						
	3. Wide-Angle Lens						
	4. Nearsightedness, Farsightedness, Magnifying Glass						
	5. Astronomical (Refracting) Telescope, Reflecting Telescope,						
	Terrestrial Telescope						
	6. Microscopes, Resolution						
	7. X-Rays, CAT Scan						
	VI. MODERN PHYSICS						
	1. Introduction to Quantum Physics						
	2. Quantum Mechanics						
3. Atomic Physics							
	4. Molecules and Solids						
	VII. LABORATORY SESSIONS						
	1. Investigation of Phenomenon of Total Internal Reflection –						
	Demonstration on Optical Fibers						
	2. Lenses and Optical Instruments						
	3. Diffraction and Interference						
Pre-requisite	Physics I (Mechanics)						
مخكيني ارين							
مضامين							
Related Courses	Physics I (Mechanics). Engineering Chemistry						
ارونده مضامين							
Teaching and	Lectures, tutorials and assignments						
Learning							
methods							
د تدريس ميتود							
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS						
Knowledge	PowerPoint, and CAD,						
د کمپيوتر زده							
كرى ته ارتيا							
,	Text Books:						
	درسى كتاب						
	• Raymond, A. Serway and John W. Jewett (2011). Physics for						
Course	Scientists and Engineers with Modern, Hybrid (with Enhanced						
Materials and	Web Assign Homework and eBook LOE Printed Access Card for						
References	Multi Term Math and Science) (8 <sup>th</sup> Edition). Cengage Learning						
د مضمون درسی	Reference:						
مواد او	اخځليکونه						
اخطيكونه	• Cutnell, John D. and Kenneh W. Johnson (2010). Physics (9th						
	Edition). John Wiley & Sons.						
	• Griffiths, David J. (2012) Introduction to Electrodynamics (4th						
	Edition). Addison-Wesley						
	Edition). Addison-Wesley						

Evaluation activities and Grades د ارزونی فعالیتونه او نمری										
A	ctivity	Scope			N	Iarks				
	فعاليت	هدف			ي	ئمر				
Atten cont په	dance and class tribution حاضري او درس کې بر	Attending the c to knowledge a with the group.	lass, con nd relati	ntribution onships	n	5				
	اخستل									
Assi .ه	gnments کورني دند	Solving the indicated problems from the problem list and submitting on time.				5				
Labor field t	ratory and rip reports د لابراتوار	Weekly laboratory/field trip reports that include abstract, introduction, method, result,				15				
ونه	ساحي راپور	conclusion, and implication.								
Q بني	uizzes صنفي ارزو	Quizzes include teaching materials and assignments from two previous classes.				5				
Midte	erm exam	The midterm exam includes the				20				
ينه	منځنۍ ازمو	covered topics.				20				
Fin وينه	al exam وروستۍ ازم	The final exam includes the covered topics after the midterm			1	50				
		Total Course M	larks			100				
		س مجموعي نمري	د کور his Course to Program Learning Outcome							
		ه مو خو سر ه	nis Cour ورينو و نيز ر	se to Pro	ه د څانه	د مضمون اربکا	alcome			
				ې د ا	Pr	ogram Outo	comes			
			1	2	3	4	5	6	7	
No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team		
1	Understan of heat, w thermodyn	d the elements aves, namics	1	1	1	2	2	2	2	

1= Some relation 2= Moderate relation 3= Extensive relation								
	Average 1.92							
Total		1	1.5	1.5	2.5	2	2.5	2.5
4	<ul> <li>Develop an understanding of the application of the theoretical knowledge with practice application</li> </ul>		2	1	3	2	2	3
3	Understand the firm concepts of modern physics	1	1	2	3	2	3	3
2	Able to understand about optics, lenses and optical instruments and their applications	1	2	2	2	2	3	2

## En. Ene 0305 Physic-III (Electricity and Magnetism)

Item موضوع	توضيحات Description						
Title عنوان یا مضمون	En. Ene 0305 Physic-III (Electricity and Magnetism)						
Credits and	توليزه Total	عملي Theoretic نظري Theoretic توليزه					
د کرېدتونو او درسي ساعتونو شمير	د کربدتونو او د کربدتونو او 4 درسي ساعتونو او 4 درسي ساعتونو او شمير						
Offering year and semester د تدریس کال او سمستر	Second year - First semester						
Aim موخي	The objective understanding is designed to university phy electromagneti some laws of Nature and Instruments	The objectives of this course are to provide for students the basic understanding and knowledge of university physics principles. The course is designed to be taught during two successive academic semesters in university physics I and II. Physics volume two course will cover electromagnetism and optics. Electromagnetism covers electric charge, some laws of charge, electric system and magnetic. Optics introduces the Nature and Propagation of Light, Geometric Optics, and Optical Instruments					
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Understanding types of the concepts and methodologies for:</li> <li>Understanding the elements of electricity</li> <li>Understanding the firm concepts of magnetism</li> <li>Develop an understanding of the application of the theoretical knowledge with practice application</li> </ul>						

Aadamia	
Academic	
Starr	
Responsible	
د ندریس مستول	
(ستاد	
	I. <u>ELECTRIC CHARGE AND ELECTRIC FIELD</u>
	1. Electric Charge
	2. Conductors, Insulators, and Induced Charges
	3. Coulomb's Law
	4. Electric Field and Electric Forces
	5. Electric Field Calculations
	6. Electric Field Lines
	7. Electric Dipoles
	II. <u>GAUSS'S LAW</u>
	1. Charge and Electric Flux
	2. Calculating Electric Flux
	3. Gauss's Law
	4. Applications of Gauss's Law
	5. Charges on Conductors
	III. ELECTRIC POTENTIAL
	1. Electric Potential Energy
	2. Electric Potential
	3. Calculating Electric Potential
	4. Equipotential Surfaces
	5. Potential Gradient
	IV. CAPACITANCE AND DIELECTRICS
Syllabus	1. Capacitors and Capacitance
مفردات	2. Capacitors in Series and Parallel
	3. Energy Storage in Capacitors and Electric Field Energy
	4. Dielectrics
	5. Molecular Model of Induced Charge
	6 Gauss's Law in Dielectrics
	V DIRECT-CURRENT CIRCUITS
	1 Pagistors in Series and Parallel
	2 Kirchhoff's Bules
	2. Electrical Magguring Instruments
	4. B.C.Circuita
	4. R-C Clicuits
	5. Power Distribution Systems
	VI. <u>MAGNETIC FIELD AND MAGNETIC FORCES</u>
	1. Magnetism
	2. Magnetic Field
	3. Magnetic Field Lines and Magnetic Flux
	4. Motion of Charged Particles in a Magnetic Field
	5. Applications of Motion of Charged Particles
	6. Magnetic Force on a Current-Carrying Conductor
	VII. SOURCES OF MAGNETIC FIELD
	1. Magnetic Field of a Moving Charge
	2. Magnetic Field of a Current Element
	3. Magnetic Field of a Straight Current-Carrying Conductor

	4 Fores Detriver Devellel Conductors
	4. Force Between Parallel Conductors
	5. Ampere's Law
	6. Applications of Ampere's Law
	7. Magnetic Materials
	VIII. <u>ELECTROMAGNETIC INDUCTION</u>
	1. Induction Experiments
	2. Faraday's Law
	3. Lenz's Law
	4. Motional Electromotive Force
	5. Induced Electric Fields
	6. Eddy Currents
	7. Displacement Current
	IX INDUCTANCE
	1 Mutual Inductance
	2 Self-Inductance and Inductors
	2. Inductors and Magnetic Field Energy
	5. Inductors and Magnetic-Field Energy
	4. The R-L Circuit
	5. The L-C Circuit
	X. <u>GEOMETRIC OPTICS AND OPTICAL INSTRUMENTS</u>
	1. Reflection and Refraction at a Plane Surface
	2. Reflection at a Spherical Surface
	3. Thin Lenses
	4. Cameras
	5. The Eye
	6. The Magnifier
	7. Microscopes and Telescopes
Pre-requisite	Physics-I
مخكيني اړين	
مضامين	
Related	Physics-I. Electrical Circuit Analysis, Electrical Machines and Drives,
Courses	Power System-I&II and Electrical Control.
اړونده مضامين	
Teaching and	Lectures, tutorials, and assignments
Learning	
methods	
د تدریس میتود	
Computer	Basic computing skills using MS Word, Excel, CAD, and/or SolidWorks
Knowledge	with applications to electrical engineering computing
ک مرتبه ارتبا	
<u> </u>	Text Books:
	در سی کتاب
Course	• University physics (Voung and Freedman, 12 Edition 2010)
Course	- University physics (100ing and 11ccuman, 12 Edition 2010) Volume?
Protein and	
References	Keierence:
د مضمون درسي	احديدويه
مواد او	• Youog, Hugh D.Sears and Zemansky's university physics: with
اخخليكونه	modem physics12th ed. /Hugh D.
	• Youog, Roger A. Freedman; contributing author, A. Lewis Ford.I.
	Freedman, Roger A. ll. Sears, Francis Weston, 1898-1975.

	<ul> <li>University physics.III.</li> <li>Title. Iv. Title: University physics.2007 Copyright © 2008 Pearson</li> </ul>								
	Education, Evaluation activities and Grades								
		ري	ونه او نم	وني فعالية	د ارز				
A	Activity	Scope					М	arks	
	فعاليت	هدف					_ي	ئمر	
At a د coi	tendance nd class ntribution حاضري او پ درس کي برد اخستل	Attending the class, contribution to knowledge and relationships with the group.							
Ass	signments کورني دنده	Solving the indicated and submitting on tim	problen e.	ns from	the pr	oblem list		10	1
La and	boratory l field trip reports د لابراتوار/ ساحي راپورونه	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion, and 10 implication.					I		
(	Quizzes	Quizzes include teach	ing mat	erials a	nd ass	ignments		5	
ي ۱	صنفي ارزون مسمعاهنا	from two previous cla	sses.					U	
د ا	exam منځنۍ ازمویک	The midterm exam includes the covered topics. 20							
Fi	nal exam وروستی از موینه	The final exam includes the covered topics after the midterm exams.					50		
		Total Course Marks						100	)
		د کورس مجموعي نمري						100	,
		Relationship of this C	Course to	o Progra	$\lim_{x \to x} Le$	arning Out	come		
		ووليرو موجو مترا	حيدي بمر	کالانې له	Pro	و مصور ر	comes		
			1	2	3		5	6	7
			1	2	5	4	5	0	7
N O. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Understa	nding the elements	2	2	2	2	2	2	2
of electricity		_	_	-	-	-		-	

Average     2.1       1- Some relation     2- Moderate relation								
Total		2.8	2.8	2.2	2.2	1.6	1.4	1.8
5Able to distinguish all laws of AC and DC currents		3	3	2	2	1	1	2
4	Able to utilize field concepts in electricity	3	3	2	2	1	2	2
3	Develop an understanding of the application of the theoretical knowledge with practice application	3	3	2	3	2	1	2
2	Understanding the firm concepts of magnetism		3	3	2	2	1	1

### Ed. Chem 0208 Engineering Chemistry

Item موضوع	توضيحات Description					
Title عنوان یا مضمون	Ed. Chem 0208 Engineering Chemistry					
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical			
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	2	1			
Offering year and semester د تدریس کال او سمستر	First year - Second semester					
Aim موخی	The objective of this course is to develop fundamental knowledge of physical, inorganic, and organic chemistry pertinent to engineering.					
Key Learning Outcomes کليدي بنوونيز نتايج	<ul> <li>physical, inorganic, and organic chemistry pertinent to engineering.</li> <li>Key learning outcomes of this course follow: <ul> <li>Understanding the relationship between atomic/molecular structure and properties</li> <li>Able to understand the Lewis Structures for chemical species and determine ionic/covalent character of chemical bonds</li> <li>Develop the concepts of Valance-Bond Theory and Molecular Orbital Theory to predict electron arrangement and molecular shape</li> <li>Recognize, rationalize, and quantify acid/base behavior and also calculate and interpret solubility</li> <li>Understanding the development of theories resulting in Arrhenius temperature dependence of reaction rates</li> <li>Able to understand how energy is stored by molecules and analyze closed system and open systems, steady and unsteady</li> </ul> </li> </ul>					

	• Understand the basic ideas of electrochemistry, nuclear
	chemistry, and organic chemistry
	• Develop an understanding of the application of theoretical
	knowledge with practical applications through laboratory works
Academic Staff	
Responsible	
د تدریس مسئول استاد	
	I. INTRODUCTION AND REVIEW
	1. Units of Measure and Conversion
	2. Scientific Notation
	3. Significant Figures
	4. Stoichiometry Review
	II. THE PERIODIC TABLE AND ATOMIC STRUCTURE
	1. The Periodic Table of the Elements
	2. Atomic Models
	3. Excitation and Ionization Energies
	4. Ionization Energy
	5. Electron Affinity
	III. INTRODUCTION TO QUANTUM THEORY
	1. Bohr's Theory of the Hydrogen Atom
	2. Wave-Mechanical Description of Atoms
	3. Ouantum Numbers
	4. Atomic Orbitals
	5. Electron Configuration
	IV CHEMICAL BONDING
	1. Jonic Bond
Syllabus	2 The Nature of Covalence
مفردات	3 Electronegativity
	4 The Concept of Resonance
	5 Bond Enthalny
	6 Valence Bond Theory
	o. Valence Dona Theory
	V. <u>GAS</u>
	1. Pressure of a Gas
	2. The Gas Laws
	3. The Ideal Gas Equation
	4. Gas Stoichiometry
	5. Imperfect Gases
	VI. <u>CHEMICAL KINETICS</u>
	1. Rate of a Reaction
	2. Rate Law
	3. Temperature Dependence of Rate Constants
	4. Reaction Mechanism
	5. Catalysis
	VII. <u>CHEMICAL EQUILIBRIUM</u>
	1. The Concept of Equilibrium and the Equilibrium Constant
	2. The Relationship between Chemical Kinetics and Chemical

	Equilibrium
	3. Predicting the Direction of a Reaction
	4. Calculation of Equilibrium Concentration
	5. Factors Affecting Chemical Equilibrium
VIII.	ACIDS, BASES AND SALTS
	1. Lewis Concept Acids and Bases
	2. Bronsted-Lowry Concept of Acids and Bases
	3. Acid-Base Titration
	4. Acid-Bases Indicators
	5. Hydrolysis of Salts
	6. pH and Buffer Solutions
IX.	THERMOCHEMISTRY AND INTRODUCTION TO
	THERMODYNAMICS
	1. Nature and Types of Energy
	2. Energy Changes in Chemical Reactions
	3 Introduction to Thermodynamics
	4. Enthalpy of Chemical Reactions
	5 Calorimetry
	5. Cultimitery
X.	CHEMICAL THERMODYNAMICS
	1. Three Laws of Thermodynamics
	2. Spontaneous Process
	3 Entrony
	4 Gibbs Free Energy
	5. Thermodynamics in Living Systems
XI	
XI.	ELECTROCHEMISTRY
	1. Redox Reactions
	2. Conductivity
	3. Galvanic Cells
	4. Standard Reduction Potentials
	5. Thermodynamics of Redox Reactions
XII.	NUCLEAR CHEMISTRY
	1. Nature of Nuclear Reactions
	2. Natural Radioactivity
	3. Uses of Isotopes
	4. Effects of Radiation
	5. Application of Nuclear Energy
XIII	ORGANIC CHEMISTRY
74111.	1 Classes of Organic Compounds
	<ol> <li>Aliphatic Hydrocarbons</li> </ol>
	2. Aromatic Hydrocarbons
	A Chemistry of the Functional Groups
	T. Chemistry of the Functional Oroups
XIV.	LABORATORY SESSIONS
	1. Laboratory Information and Safety
	2. Periodic Relationships Among the Elements
	3. Paper Chromatography
	4. Acid-Base Titration and Volumetric Analysis

	5 Chamical Equilibrium Vincean Analys					
	5. Chemical Equilibrium – Vinegar Analys	S1S				
	<ul> <li>o. Gravimetric Analysis and Filtration Technique</li> <li>7 Separation</li> </ul>					
	7. Saponification					
Pre-requisite	None					
مخكيني اړين مضامين	None					
Related Courses						
ارونده مضامين	Physics-II and Biomass Energy					
Teaching and						
Learning methods	Lectures, tutorials and assignments					
د تدريس ميتود						
Computer						
Knowledge	Moderate computer knowledge such as MS Word,	MS Excel, MS				
د کمیده ت زده ک ی ته	PowerPoint, and CAD.					
<del>~</del> ~*'	Taxt Books:					
	<u>Text Dooks</u> .					
	$\frac{1}{2}$	MaCross II:11				
	• Chang, R. (2010). Chemistry (10 <sup></sup> Edition	I). McGraw-Hill				
Course Materials	Science.					
and References	<u>Reference</u> :					
د مضمون درسي مواد	الخطيكونه					
او اخطَّيكونه	• Brown, L. S. and Holmes, T. A. (2011). Chemistry for					
	Engineering Students (2nd Edition). Cengage Learning					
	• Yen, T. F. (2008). Chemistry for Engineer	rs. Imperial College				
	Press, London					
Evaluation activitie	es and Grades					
روني فعاليتونه او نمري	د ارز					
Activity	Scope	Marks				
فعاليت	 هدف	نمري				
Attendance and						
class contribution	Attending the class, contribution to the	_				
حاضري او به درس	knowledge and relationship with the group.	5				
کی بر خه اخستل						
Assignments	Solving the indicated problems from the					
کہ رنے دندہ	problem list and submitting on time	5				
L aboratory and						
field trip reports	Weekly laboratory/field trip reports that include					
	abstract, introduction, method, result,	15				
د ډېرانوار / مناهي	conclusion, and implication.					
	Onizza in sluda tao shina matariala and					
Quizzes	Quizzes include teaching materials and	5				
صلفي ارزوني	assignments from two previous classes.					
Midterm exam	The midterm exam includes the covered topics.	20				
منحني أزموينة						
Final exam	The final exam includes the covered topics after	50				
وروستي ازموينه	the midterm exam.					
	Total Course Marks	100				
	د کورس مجموعي نمري	100				

		Relationship of this Course to Program Learning Outcome						
د مضمون اړيکه د څانګې له کليدي ښوونيزو موخو سره								
			]	Prog	ram Out	comes	-	
		1	2	3	4	5	6	7
No.	Course Outcomes		Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understanding the relationship between atomic/molecular structure and properties	1	1	1	1	1	1	1
2	Able to understand the Lewis Structures for chemical species and determine the ionic/covalent character of chemical bonds	1	1	1	2	2	1	1
3	Develop the concepts of Valance- Bond Theory and Molecular Orbital Theory to predict electron arrangement and molecular shape	1	1	1	1	1	1	1
4	Recognize, rationalize and quantify the acid/base behavior and also calculate and interpret the solubility.	1	1	1	2	2	1	1
5	Understanding the development of theories resulting in Arrhenius temperature dependence of reaction rates	1	1	1	1	1	1	1
6	Able to understand how energy is stored by molecules and analyze closed system and open systems, steady and unsteady process	1	1	1	1	1	1	1
7	Understand the basic idea of electrochemistry, nuclear chemistry and organic chemistry	1	1	1	1	1	1	1
8	Develop an understanding of the application of the theoretical knowledge with practice application through laboratory works	1	1	1	1	1	1	1
	Total	1	1	1	1.25	1.25	1	1
	Average		- 4.9	) T	1.07	-1-4*		

#### En. Ene 0107 Drawing-I

Item موضوع	Description	توضيحات						
Title عنوان یا مضمون	En. Ene 0107	7 Drawing-I						
Credits and no. of hour	توليزه Total	عملي Theoretic نظري Practical توليزه Total						
د کرپدتونو او درسي ساعتونو شمير	3	1	2					
Offering year and semester د تدریس کال او سمستر	First year - F	First year - First semester						
Aim موخي	The principle aim is to introduce the concept of drawing. The course covers aspects of drawing diagrams and after completing this course the attendees will be able to easily understand and implement drawings on projects such as dimension, planning, sections, and details.							
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>In the completion of this course the student will be able to:</li> <li>Understand and draw basic geometric shapes and forms.</li> <li>Analyze and draw different projections systems (orthographic, oblique, perspective), and the projection different solid forms.</li> <li>Understand and use the development of solid forms to build a model.</li> <li>Read and understanding working drawings of a simple building.</li> <li>Drawing of layouts, sections, and elevations of a simple building.</li> </ul>							
Academic Staff Responsible د تدریس مسئول								
Syllabus مفردات	<ul> <li>I. <u>DRAWING INSTRUMENTS AND THEIR USES</u> <ol> <li>Drawing Board T-Square, Set Square, and Compass Divider</li> <li>Scales and Protractor French Curves</li> <li>Drawing Papers, Drawing Pencil, and Eraser</li> </ol> </li> <li>II. <u>LINES AND DIMENSION</u> <ol> <li>Types of Lines</li> <li>Thickness and Shade of Lines</li> <li>Dimensioning</li> <li>Exercises</li> </ol> </li> <li>III. <u>GEOMETRICAL CONSTRUCTION</u> <ol> <li>Bisecting A Line, Perpendiculars, Parallel and Lines</li> <li>Division of Lines, Angles, Arcs of Circles and Equilateral</li> <li>Squares, Regular Polygons Regular and Polygons Inscribed in Circles</li> <li>Tangents, Lengths of Arcs, Circles and Lines in Contact Inscribed Circles</li> <li>Exercises</li> </ol> </li> </ul>							

	IV.	SCALES
		1. Reducing and Increasing Scale
		2. Representative Fraction
		3. Types of Scales
		4. Plain Scales
		5. Exercises
	V.	CURVES USED IN ENGINEERING PRACTICE
		1. Tangent
		2. Shared Chapter
		3. Hoop
		4. Ellipse
		5. Parabola
		6. Hyperbola
		7. Exercises
	VI.	ORTHOGRAPHIC PROJECTION
		1. Projection and Orthographic Projection
		2. Planes of Projection
		3. First and Third Angle
		4. Exercises
N	VII.	PROJECTIONS OF POINTS
		1. Point the View
		2. Point Isometric
		3. Exercises
V	ΊΠ.	PROJECTIONS OF LINES
		1. Line Parallel to Planes
		2. Types of Line in the View
		3. Near Dimension of Two Lines
		4. Traces Of A Line
		5. Line Isometric
		6. True Length of A Line and Its Inclinations with the Reference
		7. Exercises
	IX.	PROJECTIONS OF PLANES
		1. Traces of Planes
		2. Types of Planes
		3. Planes Isometric
		4. True Length of A Planes and Its Inclinations with the Reference
		5. Exercises
	Х.	PROJECTIONS OF SOLIDS
		1. Polyhedron—Solids of Revolution
		2. Projections of Solid in Simple Position
		3. Axis Perpendicular to the Planes
		4. Sections of Pyramids, Cylinder and Cone
		5. Projections of Spheres
		6. Exercises
	XI.	DEVELOPMENT OF SURFACES
		1. Development of Surfaces of Cubes
		2. Development of Surfaces of Prisms
		3. Development of Surfaces of Cylinders
		4. Development of Surfaces of Cones

	I	5 Development Of Surfaces Of Spheres	
		5. Development of surfaces of spheres	
	VII	b. Exercises	
	XII.	ISOMETRIC PROJECTION	
		1. Isometric Axes ,Line and Planes Isometric Scale	
		2. Isometric Projection of Planes	
		3. Isometric Projection of Prisms	
		4. Isometric Projection of Cylinders	
		5. Isometric Projection of Cones	
		6. Isometric Projection of Spheres	
		7. Exercises	
	XIII.	SECTION OF SOLIDS	
		1. Section Planes	
		2. Section True Shape of Section	
		3. Section of Prisms	
		4. Section of Cylinders	
		5. Section of Cones	
		6. Section of Spheres	
		7. Exercises	
	XIV.	INTERSECTION OF SURFACES	
		1. Line of Intersection	
		2. Intersection of Prism and Prism	
		3. Intersection of Cylinder and Prism	
		4. Intersection of Cylinder and Cylinder	
		5. Intersection of Cylinder and Cone	
		6. Intersection of Prism and Cone	
		7. Intersection of Cone and Cone	
		8. Intersection of Sphere and Cylinder or Prism	
		9. Exercises	
	XV.	CONVERSION OF PICTORIAL VIEWS INTO ORTHOGRAPHIC	
		VIEWS	
		1. First-Angle Projection and Third-Angle Projection	
		2. Procedure for Preparing A Scale Drawing	
		3. Exercises	
	XVI.	PROJECTS	
		1. wall	
		2. Home	
		3. Culvert	
		4. Exercises	
Pre-requisite	None	e	
مخكيني اړين			
مضامين			
Related	Drawing-II (Auto CAD)		
Courses			
اړونده مضامين			
Teaching and	Lect	ures, tutorials, and assignments	
Learning			
methods			
د تدريس ميتود			

Computer Knowledge د کمپیوتر زده کړې ته اړتیا Course Materials and References د مضمون درسي مواد او اخځلیکونه	Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint, and CAD. <u>Text Books</u> : <u>درسی کتاب</u> <u>Reference</u> : <u>اخځلیکونه</u>				
Evaluation activities and Grades					
	فعاليتونه أو نمري	د ارزوني			
Activity فعاليت	Scope هدف	Marks نمری			
Attendance and class contribution حاضري او په درس کي برخه اخستل	Attending class, contributions to knowledge and relationships with the group.	5			
Assignments کورني دنده	Solving the indicated problems from the problem list and submitting on time.	5			
Laboratory and field trip reports د لابراتوار/ ساحي راپورونه	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.	15			
Quizzes صنفي ارزوني	Quizzes include teaching materials and assignments from two previous classes.	5			
Midterm exam منځنۍ ازموينه	The midterm exam includes the covered topics.	20			
Final exam وروستی ازموینه	The final exam includes the covered topics after the midterm exam.	50			
	Total Course Marks د کورس مجموعي نمري	100			

	Relationship of this Course to Program Learning Outcome							
	نوونيزو مو <b>خو سره</b>	له کليدي ښ	د څانگې	اړيکه	د مضمون			
		Program Outcomes						
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understand and draw basic geometric shapes and forms.	1	1	1	1	1	1	1
2	Analyze and draw different projections systems (orthographic, oblique, perspective), and the projection different solid forms.	2	2	2	2	2	2	2
3	Understand and use the development of solid forms to build a model.	2	2	2	2	2	2	2
4	Read and understanding working drawings of a simple building.	2	2	2	2	2	2	2
5	Drawing of layouts, sections, and elevations of a simple building	3	3	3	3	3	3	3
Total		2	2	2	2	2	2	2
	Average	2						
1= Some relation 2= Moderate relation 3=Extensive relation								

#### En.Ene 0207 Drawing-II: Computer-Aided Design (CAD)

Item موضوع	توضيحات Description					
Title عنوان یا مضمون	En.Ene 0207 Drawing-II: Computer-Aided Design(CAD)					
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical			
د کرپدتونو او درسي ساعتونو شمير	3	2	1			
Offering year and semester د تدریس کال او سمستر	First year - Second semester					
Aim موخي	This course introduces the use of computer-aided drafting techniques using AutoCAD software. Using CAD, student will be able to complete the current design and construction industry and this course will give to students the ability to draw, edit, and manage project drawings conveniently, efficiently, and quickly. This course will also contribute to conceptualization of 3D modeling and visual understanding					
Key Learning Outcomes کلیدی ښوونیز نتایچ	<ul> <li>Demonstrate basic concepts of AutoCAD software.</li> <li>Apply basic concepts to develop construction (drawing) techniques.</li> <li>Ability to manipulate drawings through editing and plotting techniques.</li> <li>Understand geometric construction.</li> <li>Produce template drawings.</li> <li>Produce 2D orthographic projections.</li> <li>Understand and demonstrate dimensioning concepts and techniques.</li> <li>Understand section and auxiliary views.</li> <li>Become familiar with the use of blocks, design center, and tool palettes.</li> </ul>					
Academic Staff Responsible د تدریس مسئول						
Syllabus مفردات	<ul> <li>I. <u>AUTO CAD 2D TOOLBARS</u> <ol> <li>Introduction and Installation of Auto CAD</li> <li>Introduction of 2D Toolbars and 3D Toolbars and Menu Bars</li> <li>Command Line</li> <li>Units</li> <li>Status Bar</li> </ol> </li> <li>II. <u>DRAW BAR</u> <ol> <li>Line</li> <li>Construction</li> </ol> </li> </ul>					
	3. Poly Line					
------	-------------------------------------					
	4. Polygon					
	5. Rectangle					
	6. Arc					
	7. Circle					
	8. Revision Cloud					
	9. Spline					
	10. Ellipse					
	11. Gradient					
	12. Region					
	13. Table					
	14. Multiline Text					
III.	MODIFY					
	1. Erase					
	2. Copy					
	3. Mirror					
	4. Offset					
	5. Array					
	6. Break at Point					
	7. Break					
	8. Join					
	9. Chamfer					
	10. Fillet					
IV.	DIMENSION					
	1. Linear					
	2. Angular					
	3. Arc Length					
	4. Ordinate					
	5. Radius					
	6. Logged					
	7. Continue					
	8. Dimension					
	9. Tolerance					
	10. Center Mark					
	11. Inspection					
	12. Jogged Linear					
	13. Dimension Edit					
	14. Dimension Text					
V.	FILE					
	1. New					
	2. New Sheet Set					
	3. Open					
	4. Save					
	5. Save As 6. Daga Satur Managar					
	7 Plot					
	7. 1101 8. Sent					
	9 Drawing Properties					
VI	EDIT					
, 1,	1. Undo Exitctrl+O					
	2. Copy with Base Point					
	3. Cop Link					
	4. Paste					
	5. Paste as Block					

	6. Select All
VI	I. <u>VIEWS</u>
	1. Redraw
	2. Regen All
	3. Zoom
	4. Clean Screen
	5. Viewports
	6. Named Views
	7. Display
	8. Toolbars
VII	I. INSERT
	1. Block
	2. Kaster Image Reference
	3. Layout
IV	4. OLE ODJECI
14	1 Lover
	1. Layer 2. Scale List
	3 Text Style
	4 Dimension Style
	5 Table Style
	6. Multileader Style
	7. Point Style
	8. Multiline Style
	9. Drawing Limits
	10. Rename
X	TOOLS
	1. Workspaces
	2. Toolbars
	3. Command Line
	4. Clean Screen
	5. Named UCS
	6. Options
X	I. <u>PARAMETRIC, WINDOW AND HELP</u>
	1. Geometric Constraints
	2. Lock Location
	3. Cascade
	4. The Horizontally
	5. The vertically
	6. Help 7. Exercises
VI	
	1 Blocks
	2 Text
	3 Lavout Tools
	4 Modify
	5 Draw
	6. Exercises of Wall Projects
	7. Exercises of Home Projects
	8. Exercises of Culvert Projects
XII	. <u>3D TOOLBAR VIEW</u>
	1. Top
	2. Bottom
	3. Left
	4. Right
	5. Front

	6 Deals	
	<ul> <li>7. SW Isometric</li> <li>8. SE Isometric</li> <li>9. NE Isometric</li> <li>10. NW Isometric</li> <li>XIV. <u>VISUAL STYLES AND ORBIT</u></li> <li>1. 2D Wireframe</li> <li>2. 3D Wireframe Visual Styles</li> <li>3. 3D Hidden Visual Styles</li> <li>3. 3D Hidden Visual Styles</li> <li>4. Realistic Visual Styles</li> <li>5. Conceptual Visual Styles</li> <li>6. Constrained Orbit</li> <li>7. Free Orbit</li> <li>8. Continues Orbit</li> <li>XV. <u>MODELING</u></li> <li>1. Poly Solid</li> <li>2. Box</li> <li>3. Wedge</li> <li>4. Cone</li> <li>5. Sphere</li> <li>6. Cylinder</li> <li>7. Loft</li> <li>8. Union</li> <li>9. Subtract</li> <li>10. Intersect</li> <li>11. 3D Move</li> </ul>	
Pre-requisite مخکینی اړین مضامین	None	
Related Courses اړونده مضامين	Drewing-I	
Teaching and Learning methods د تدریس میتود	Lectures, tutorials, and assignments	
Computer Knowledge د کمپيوتر زده کړې ته اړتيا	Moderate computer knowledge such as MS Word, PowerPoint, and Auto CAD.	MS Excel, MS
Course Materials and References د مضمون درسي مواد او اخځليکونه	<u>Text Books</u> : <u>درسی کتاب</u> <u>Reference:</u> اختلیکونه	
	Evaluation activities and Grades	
A stivity	د ارزوني فعاليتونه او نمري دوروي	Morko
فعاليت	هدف	نمري

Atten and	dance class	A		. 1	1 1	1				
contri او په	bution حاضري	relationships with the group.				and			5	
برکت نل	درس مي اخست									
Assign	nments	Solving the indicate	ed probler	ns from	the				5	
دنده	کورني	problem list and sub	omitting o	on time.						
	tory and	We also had a met a met	field takes		h . 4 1	مامدا				
rop	orta	weekiy laboralory/	neid trip	d rocult					15	
		and implication	m, metho	u, lesuit,	, concit	ISIOII			15	
ور مرمنه	ب د چر (م ساحہ ر اب	and implication.								
Oui	<u>ي راب</u> 7768	Ouizzes include tea	ching ma	terials at	nd					
ز <b>ونی</b>	صنفی ار	assignments from ty	vo previo	us classe	es.				5	
Midter	m exam									
موينه	منځنۍ از	The midterm exam	includes	he cove	red top	ics.			20	
Final	exam									
ىتى	وروس	The final exam incl	udes the c	covered	topics a	after			50	
بنه	ازموي	the midterm exam.								
		Total Course Marks	5					1	100	
		کورس مجموعي نمري	د					1	100	
		Relationship of this	Course to	o Progra	m Lear	ning O	utco	ome		
		نيزو موخو سره	کليدي ښوو	ځانګې له	اړيکه د	مضمون	د			
					Prog	ram Oi	utco	mes		
			1	2	3	4		5	6	7
			1	2	3	4		5	6	7
			and bus	2	iques 🖌	4 A other		5	6	<b>2</b> p and
			cience and	ata <b>Z</b>	techniques <b>2</b>	pply <b>b</b>		al and	ely 9	a group and <b>b</b>
No.	Co	urse Outcomes	s, science and	<b>7</b> Ze data	and techniques	nd apply <b>b</b> rence with other		sional and tity	ctively	in a group and <b>Z</b> ry team
No.	Cot	urse Outcomes	atics, science and	t alyze data	ols and techniques	g and apply <b>b</b> currence with other		ofessional and bility	effectively 9	ion in a group and <b>d</b> inary team
No.	Cor	ırse Outcomes	ematics, science and	duct kanalyze data	tools and techniques	king and apply <b>b</b> concurrence with other		professional and onsibility	• ate effectively	Inction in a group and ciplinary team
No.	Cor	ırse Outcomes	nathematics, science and ring	conduct ents/analyze data	dern tools and techniques	thinking and apply <b>b b b c o c o c o c o c o c d c d c d c d c d c d c d c d c d c d c d d d d d d d d d d</b>	les	and professional and esponsibility	nicate effectively	o function in a group and disciplinary team
No.	Cor	ırse Outcomes	ly mathematics, science and neering	gn/conduct riments/analyze data	modern tools and techniques	cal thinking and apply <b>k</b> vledge concurrence with other	plines	erstand professional and all responsibility	<b>o</b> municate effectively	ity to function in a group and ulti-disciplinary team
No.	Cor	ırse Outcomes	Apply mathematics, science and ngineering	Design/conduct xperiments/analyze data	Jse modern tools and techniques	Tritical thinking and apply howledge concurrence with other	lisciplines	Juderstand professional and thical responsibility	Sommunicate effectively	Ability to function in a group and a multi-disciplinary team
No.	Con	urse Outcomes	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Cor The st about th	utent will learn	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>o</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th enginee	utent will learn basic principle of ring drawing	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Cor The st about th enginee includin	udent will learn te basic principle of ring drawing g lettering, applied	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th enginee includin geometr	udent will learn te basic principle of ring drawing g lettering, applied y, orthographic	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th enginee includin geometr drawing sectiona	udent will learn te basic principle of ring drawing g lettering, applied y, orthographic the sketching,	Apply mathematics, science and engineering	Design/conduct         c           experiments/analyze data         0	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th enginee includin geometr drawing sectiona convent	udent will learn be basic principle of ring drawing g lettering, applied y, orthographic and sketching, l views and ions, detail	Apply mathematics, science and engineering	<b>D</b> esign/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th enginee includin geometr drawing sectiona convent drawing	udent will learn te basic principle of ring drawing g lettering, applied y, orthographic and sketching, l views and ions, detail g, assembly	Apply mathematics, science and engineering	Design/conduct         c           experiments/analyze data         0	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	<b>c</b> Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about the engineer including geometric drawing sectional conventic drawing drawing	udent will learn be basic principle of ring drawing g lettering, applied y, orthographic and sketching, l views and ions, detail g, assembly g, dimensioning;	Apply mathematics, science and engineering	Design/conduct         c           experiments/analyze data         c	Use modern tools and techniques	Critical thinking and apply the knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Con The st about th engineer includin geometr drawing sectiona convent drawing drawing	udent will learn be basic principle of ring drawing g lettering, applied y, orthographic g and sketching, l views and ions, detail g, assembly dimensioning;	Apply mathematics, science and engineering	Design/conduct         c           experiments/analyze data         c	Construction of the second sec	Critical thinking and apply the knowledge concurrence with other	disciplines	L     Understand professional and ethical responsibility     S	Communicate effectively 9	Ability to function in a group and in multi-disciplinary team <b>J</b>
No.	Con The st about th enginee includin geometr drawing sectiona convent drawing drawing drawing	udent will learn be basic principle of ring drawing g lettering, applied y, orthographic g and sketching, l views and ions, detail g, assembly dimensioning; dent will also learn ne basic descriptive	1       Apply mathematics, science and engineering	7     Design/conduct     7       6     experiments/analyze data     7	3     1     2	Critical thinking and apply     1     7	disciplines	T     Understand professional and ethical responsibility     S	Communicate effectively	The second se

	geometry dealing with points, lines & planes and their relationship in space and basic developed views							
3	Demonstrate knowledge and skills needed to design and draft projects ranging for two dimensional designs for commercial and residential buildings.	2	2	2	2	2	2	2
4	Demonstrate basic skills needed to view, print, edit, and create variations of two dimensional electronic designs.	2	2	2	2	2	2	2
Total		1.75	1.75	1.75	1.75	1.75	1.75	1.75
	Average 1.75							
	1= Some relation 2=	- Modera	ate relat	ion 3=	Extensiv	e relatio	n	

## En. Ene 0106 Introduction to Engineering & Computer

Item موضوع	Description	توضيحات cription			
Title عنوان یا مضمون	En. Ene 0106 Introduction to Engineering & Computer				
Credits and no. of hour	توليزه Total	عملي Theoretic نظري Practical توليزه Total			
د کرېدتونو او درسي ساعتونو شمير	3	2	1		
Offering year and semester د تدریس کال او سمستر	First year - F	irst semester			
Aim موخي	The principal objectives of the course are to provide a general introduction to the field of engineering; to convey the social, professional, and ethical responsibilities of engineers and why they are important to an engineering education; and to provide a general description of the skills needed to become a practicing engineer. The course is designed to identify various aspects and areas of engineering to freshman engineering students and open the door to their discussions, questions, and inquiries				
Key Learning Outcomes کلیدي ښوونیز نتايج	<ul> <li>open the door to their discussions, questions, and inquiries.</li> <li>Upon successful completion of this course, the student will be able to: <ul> <li>Discuss the history of engineering.</li> <li>Define engineering.</li> <li>Identify and describe the engineering fields of specialization.</li> <li>Discuss career paths and initial career profiles for engineers.</li> <li>Discuss engineering as a profession.</li> <li>Identify the engineer's ethical and societal responsibilities.</li> </ul> </li> </ul>				

	•	Practice the engineering approach to problem solving.
	•	Discuss the engineering method
		Discuss and apply angineering calculations
	•	Discuss and appry engineering calculations.
A 1 .	•	Discuss learning and creative thought as they relate to engineering.
Academic		
Staff		
Responsible		
د تدریس مسئول		
(ستاد	-	
	1.	HISTORY OF ENGINEERING
		1. Introduction
		2. Contribution of Greeks
		3. Contributions of the Romans
		4. Engineering in the Middle Ages
		5. The Advancement of Science:
		6. Advancements in Engineering:
		7. Engineering in the Twentieth Century
	II.	DEFINITION OF ENGINEERING
		1. Engineering
		2. Engineering Support Personnel
		3. Engineering Fields of Specialization
		4. Career Paths For Engineers
		5. Initial Career Profiles
	III.	THE ENGINEER AS A PROFESSIONAL
		1. Engineering as A Profession
		2. Ideals and Obligations of Professional Engineers
		3. Professional Registration
Syllabus		4. Professional Organizations
مفردات		5. Engineering Ethics
		6. Moral Foundations of Ethics
		7. The Framework of Engineering Ethics
	IV.	LEARNING AND CREATIVE THOUGHT
		1. Introduction
		2. The Learning Process
		3. Differences in the Way People Think
		4. On Creativity
	V.	KEY ELEMENTS OF ENGINEERING ANALYSIS
		1. Engineering Analysis
		2. The SI Unit System
		3. Force, Weight, and Mass
		4. Significant Figures
	VI.	SOLVING PROBLEMS AND SPREADSHEET ANALYSIS
		1. The Need-Know-How-Solve Method
		2. Spreadsheet Analysis
		3. Graphing in Spreadsheets
	VII.	THE ENGINEERING APPROACH TO PROBLEM SOLVING
		1. The Nature of Engineering Design
		2. The Engineering Method

	VIII. <u>ENGINEERING COMM</u>	<u>IUNICATIONS</u>			
	1. Introduction				
	2. The Engineer as W	/ritter			
	3. Graphical Commu	nications			
	4. The Engineer as S <sub>J</sub>	peaker			
	IX. ENGINEERING ECON	<u>OMICS</u>			
	1. Why is Economics	s Important?			
	2. The Cost of Money				
	3. When is an Investr	nent Worth it?			
Pre-requisite	None				
مخكيني اړين					
مضامين					
Related					
Courses	None				
اړونده مضامين					
Teaching and					
Learning	<b>T</b> , , , <b>1 1</b> ·				
methods	Lectures, tutorials and assignmer	115			
د تدريس ميتود					
Computer					
Knowledge	Moderate Computer Knowledge	such as, using MS word, MS Excel, MS			
د کمپيوتر زده کړې	PowerPoint and CAD.				
ته ارتيا					
_	Text Books:				
	درسی کتاب				
	• Paul H. Wright. (2002),	"Introduction to Engineering", 3rd			
Course	edition, John-Wiley & S	ons.			
Materials and	Reference:				
References	اخطيكونه				
د مضمون درسي	• Burghardt, M. David. (	(1995). "Introduction to the Engineering			
مواد او اخطیکونه	Profession", 2nd edition	HarperCollins.			
	• John Dustin Kemper. (	(1993) "Introduction to the Engineering			
	Profession", Second Edi	tion Oxford University Press Inc.			
	Evaluation activitie	s and Grades			
	فعالبتونه او نمر ي	د ار زونی			
Activity	Scope	Marks			
فعاليت	هدف	نمرى			
Attendance					
and class	A				
contribution	Attending class, contributions				
حاضري او يه	to knowledge and relationships	5			
درس کی برخہ	with the group.				
اخستل					
	Solving the indicated problems				
Assignments	from the problem list and	5			
کورني دنده	submitting on time.	č			
Laboratory and	Weekly laboratory/field trip				
field trin	reports that include abstract	15			
h	rr more about				

rer	orts	introduction meth	od resul	t					
//	د لابراتو	conclusion and im	olication						
ورونه	ساحي راپر	,	[	-					
Oui	7765	Quizzes include te	aching						
ونے	منفی ارز	materials and assig	gnments				5		
	, u	from two previous	classes.						
Midter	m exam	The midterm exam	1 include	S			20		
Final	<del>مصلی</del> (ر. exam	the covered topics							
1 Indi	وروسا	The exam includes	the cov	ered			50		
له ا	ازموين	topics after the mid	dterm ex	am					
		Total Course Mark	(S				100		
		کورس مجموعي نمري	د ک				100		
		Relationship of this	s Course	to Prog	gram L	earning Ou	itcome		
		يرو موجو سره	ليدي ښوو،	نکې له د		د مصمون اړي	000000		
					Pro		comes	-	-
			1	2	3	4	5	6	7
No.	o. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understa discipline	nding engineering es	1	1	1	2	2	1	1
2	Understa various f	nding engineering ields	1	1	1	2	2	1	1
	Able to	know the role of							
3	engineeri	ing fields in	1	1	1	2	2	1	1
	developm	nent							
	T	otal	1	1	1	3	3	1	1
	Av	erage	1.57						
	1= S	ome relation 2=	= Moder	ate rel	ation	3=Extens	ive relat	tion	

#### En. Ce 0310 Engineering Mechanics I: Statics

Item موضوع	Description		توضيحات		
Title عنوان یا مضمون	En. Ce 0310	En. Ce 0310 Engineering Mechanics I: Statics			
Credits and no. of hour	Total ټوليزه	Total Theoretic نظري Practical يوليزه			
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	3	0		
Offering year and semester د تدریس کال او سمستر	Second year	- First semester			
Aim موخي	This course mechanics in bodies in equ	is designed to prov n solving engineerin uilibrium.	vide an introduction to the application of ng problems related to particles and rigid		
Key Learning Outcomes کلیدي ښوونیز نتایج	<ul> <li>Key learning outcomes of this course follow:</li> <li>The student will learn about the concepts of center of mass, centroid, equilibrium of particles and the equilibrium of rigid bodies</li> <li>The student will learn about the concepts of forces and force systems, equilibrium of rigid bodies, center of gravity.</li> </ul>				
Academic Staff Responsible د تدریس مسئول استاد					
Syllabus مفردات	I. <u>INTRO</u> 1. Ba 2. De 3. Mu 4. Pr 5. Va II. <u>VECT</u> 1. Ve 2. De 3. Ge III. <u>FORC</u> 1. Ch 2. Cl 3. Eq IV. <u>PLAN</u> 1. De	DDUCTION asic Concepts Force efinition of Force oment and Couple inciple of Transmiss arignon's Theorem OR ectors and Compone of and Cross Produc eneral Principles – N ES AND FORCE S maracteristics and Re assification of Force juilibrium of Particl E TRUSSES egrees of Freedom	System and Equilibrium sibility ents ts; Mixed Triple Products Newton's Laws <u>YSTEMS</u> epresentation Of A Force es and Free-Body Diagrams e		

	2 Trues of Suggesting		
	2. Types of Loads		
	4 Analysis of Trusses-Method of Joints		
	5. Method of Sections		
	FRICTION		
	1 Introduction		
	2. Static Dry Friction		
	3. Simple Contact Friction Problems- Ladders, Wedges, Screws		
	and Belt Friction		
	VI. EQUILIBRIUM OF RIGID BODIES		
	1. Rigid Bodies and Equivalent Systems		
	2. General Systems of Forces in A Plane (2D) and Static		
	Equilibrium Conditions		
	3. General Systems of Forces in Space (3D) and Static		
	Equilibrium Conditions		
	VII. <u>CENTER OF GRAVITY, CENTER OF MASS, AND CENTROID</u>		
	1. Center of Forces		
	2. Center of Gravity and Center of Mass		
	3. Centroid of An Area and Centroid of A Line		
	VIII. <u>MOMENT OF INERTIA</u>		
	1. Moments of Inertia of An Area		
	2. Polar Moment of Inertia of An Area		
	5. Product of inertia of an Area		
	4. Paraner Axis Theorem 5. Composite Area		
	6 Rotated Set of Axes		
	7 Mohr's Circle		
	8. Moment of Inertia of A Mass		
	9. Product of Inertia of A Mass		
	10. Parallel Axis Theorem for A Mass		
	11. Composite Mass		
Pre-requisite			
مخكيني اړين	None		
مضامين			
Related Courses			
اړونده مضامين	Dynamics, Fluid Mechanics and Thermodynamics-I&II		
Teaching and			
Learning			
methods	Lectures, tutorials, and assignments		
د تدريس ميتود			
Computer	Mederate computer la cuile des meh - MCW-st MCE-st MC		
Knowledge	Moderate computer knowledge such as MS Word, MS Excel, MS		
د کمپيوتر زده کړې	PowerPoint, and CAD.		
ته ارتيا			

[	Text Books:				
	<u>در سے کتاب</u>				
	- Hibbler B.C. (2012) Engineering Machanics: Station and				
	• Hibbler, R.C. (2012). El	Prentice Hall			
Course	Reference:	. Frendee Han.			
Course Motorials and	اخطيكونه				
Materials and	Boar and Johnston (2008) Machanics for Engineers Statics (5th				
References	• Beer and Johnston (2008). Mechanics for Engineers-Statics (5th Edition) McGraw-Hill New York				
د مضمون درسي	• Beer, F. P., Johnston,	E. R., Eisenberg, E., Cornwell, P. and			
مواد او اخځليکونه	Mazurek, D. (2009). V	ector Mechanics for Engineers: Statics-			
	Dynamics (9th	Edition). McGraw-Hill			
	Science/Engineering/Ma	ath rise Malaon WC, and Maria Dattar			
	• Nelson, E., Best, Cha (2011) Schaum's Outli	ries, McLean, W.G., and Merle Potter			
	The McGraw-Hill Com	panies, Inc.			
	Evaluation activities	and Grades			
	ي فعاليتونه او نمري	د ارزونې			
Activity	Scope	Marks			
فعاليت	هدف	نمري			
Attendance and					
class	Attending class, contributions				
contribution حاضری او یه	to knowledge and	5			
درس کي برخه اخستل	relationships with the group.				
Assignments	Solving the indicated				
Assignments	problems from the problem	5			
کورني دنده	list and submitting on time.				
Laboratory and	Weekly laboratory/field trip				
field trip reports	reports that include abstract,				
د لابر إتو إر/ ساحي	introduction, method, result.	15			
رابه رونه	conclusion and implication				
	Ouizzes include teaching				
Quizzes	Quizzes include teaching	5			
صنفي ارزوني	materials and assignments	5			
	from two previous classes.				
Midterm exam	The midterm exam includes	20			
منځنۍ ازموينه	the covered topics.				
Final exam	The final exam includes the				
وروستي ازموينه	covered topics after the	50			
	Inderm exam.				
		100			
	د کورس مجموعي نمري				

	Relationship of this Course to Program Learning Outcome								
	د مضمون اړيکه د څانګې له کليدي ښوونيزو موخو سره								
		Program Outcomes							
		1	2	3	4	5	6	7	
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	The student will learn about the concepts of center of mass, centroid, equilibrium of particles and the equilibrium of rigid bodies	1	2	2	2	2	2	3	
2	The student will learn about the concepts of forces and force systems, equilibrium of rigid bodies, center of gravity	1	2	2	2	2	3	3	
	Total	1	2	2	2	2	2.5	3	
	Average		·		2.1	·			
	1= Some relation 2= Moderate relation 3= Extensive relation								

# En. Ce 0412 Engineering Mechanics II: Dynamics

Item موضوع	Description		توضيحات	
Title عنوان یا مضمون	En. Ce 0412 Engineering Mechanics II: Dynamics			
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical	
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	3	0	
Offering year and semester د تدریس کال او سمستر	Second year - Second semester			
Aim govern the dynamics of particles and rigid bodies; as well as an at use that understanding to solve engineering problems.			rstanding of the basic principles that d rigid bodies; as well as an ability to neering problems.	

Key Learning Outcomes کلیدي ښوونیز نتایج	<ul> <li>Key learning outcomes of this course follow:</li> <li>The student will learn about kinematics of a particle, kinetics of a particles, kinematics of a rigid body, planar kinetics of a rigid body</li> <li>The student will learn about energy and momentum in rigid body dynamics</li> </ul>
Academic Staff Responsible د تدریس مسئول	
Syllabus مغردات	<ul> <li>I. <u>KINEMATICS OF A PARTICLE</u> <ol> <li>Coordinate Systems and Position Vectors</li> <li>Displacement, Velocity, and Acceleration</li> <li>Rectilinear Motion</li> <li>Curvilinear Motion</li> </ol> </li> <li>II. <u>KINETICS OF A PARTICLE</u> <ol> <li>Newton's Law of Motion</li> <li>Equation of Motion for A System of Particles</li> </ol> </li> <li>III. <u>KINEMATICS OF A RIGID BODY</u> <ol> <li>Rigid Body and Types of Motion</li> <li>Rotation about A Fixed Axis</li> <li>General Motions</li> </ol> </li> <li>IV. <u>PLANAR KINETICS OF A RIGID BODY</u> <ol> <li>Moment of Inertia</li> <li>Planar Kinetic Equations of Motion</li> <li>Equations of Motion: Rotation about A Fixed Axis</li> <li>Equations of Motion: Rotation about A Fixed Axis</li> <li>Equations of Motion: General Plane Motion</li> </ol> </li> <li>V. <u>ENERGY AND MOMENTUM IN RIGID BODY DYNAMICS</u> <ol> <li>Work and Energy for System of Particles</li> <li>Kinetic Energy of A Rigid Body</li> <li>Potential Energy</li> <li>The General Energy Principle, Virtual Work</li> <li>Linear Momentum and Moment of Momentum</li> </ol> </li> </ul>
Pre-requisite	None
محكيني آړين مضامين	
Related Courses اړونده مضامين	Statics, Fluid Mechanics
Teaching and Learning methods د تدریس میتود	Lectures, tutorials, and assignments
Computer Knowledge د کمپيوتر زده کړې ته اړتيا	Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint, and CAD.
Course Materials and References	<u>Text Books</u> : درسی کتاب • Hibbler, R.C. (2012). Engineering Mechanics: Statics and Dynamics (13 <sup>th</sup> Edition). Prentice Hall.
مواد او اخطیکونه	الخذايكونه • Bedford, A. and Fowler, W. (2005). Engineering Mechanics:

Evaluation activities and Grades         Activity         Activity         Attendance and class         Class         Conclusion and relationships with the group.         Attendance and class, contributions to knowledge and relationships with the group.         Attendance and class         Class         Solving the indicated problems from the problem list and submitting on time.         Laboratory and field trip reports that include abstract, introduction, method, result, conclusion and implication.         Quizzes       Quizzes includes teaching classes.       15         Midterm exam       The midterm exam includes the covered topics.       20         Final exam         Total Course Marks give give give give give give give give			<ul> <li>Dynamics, 4<sup>th</sup> Edition. Prentice Hall.</li> <li>Beer, F. P., Johnston, E. R., Eisenberg, E., Cornwell, P. and Mazurek, D. (2009). Vector Mechanics for Engineers: Statics-Dynamics (9th Edition). McGraw-Hill Science/Engineering/Math</li> <li>Nelson, E., Best, Charles, McLean, W.G., and Merle Potter (2011). Schaum's Outline of Engineering Mechanics Dynamics. The McGraw-Hill Companies,</li> </ul>							
Activity       Scope       Marks         Activity       Scope       Marks         Activity       Scope       Marks         Activity       Scope       Marks         asia       Attending class, contributions to knowledge and relationships with the group.       Attending class, contributions to knowledge and relationships with the group.       5         Assignments       Solving the indicated problems from the problem list and submitting on time.       5         Laboratory and field trip reports       Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.       15         Quizzes       Quizzes includes teaching materials and assignments from two previous classes.       20         Midterm exam true covered topics.       20         Final exam       The midterm exam includes the covered topics.       20         Final exam       Total Course Marks g.g.jc.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g.g	Evalı	ation activ	ities and Grades							
انبري     نبري       Attendance and class contribution (assignments submitting on time.     Attending class, contributions to knowledge and relationships with the group.     5       Assignments submitting on time.     Solving the indicated problems from the problem list and submitting on time.     5       Laboratory and field trip reports introduction, method, result, occlusion and implication.     15       Quizzes Quizzes     Quizzes include stract, introduction, method, result, correctusion and implication.     15       Midterm exam two previous classes.     20       Final exam covered topics.     20       Final exam covered topics after the midterm exam.     100       Relationship of this Course to Program Learning Outcome exam.     100       Relationship of this Course to Program Learning Outcome signific and as a signific and asignific and	Activi	<del>يير.</del> tv.	Scope			Marks				
Attendance and class contribution atay 2 juicat     Attending class, contributions to knowledge and relationships with the group.     5       Assignments Assignments submitting on time.     Solving the indicated problems from the problem list and submitting on time.     5       Laboratory and Laboratory and Uzzes (juication)     Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.     15       Quizzes (Quizzes (Laboratory and august introduction, method, result, conclusion and implication.     15       Quizzes (Laboratory and august introduction, method, result, introduction, method, result, conclusion and implication.     20       Quizzes (Laboratory)     The midterm exam includes the covered topics.     20       The final exam (Lagust)     The final exam includes the covered topics after the midterm exam.     20       Total Course Marks (Lagust)     100       Relationship of this Course to Program Learning Outcome exam.     100       No.     Course Outcomes     1     2     3     4     5     6     7       International and the reaction (Laboratory and august and august and covered topics.     Internation august and covered topics after the midterm exam.     Solving the program Outcome august and august and covered topics are aver august and covered topics are aver august and covered topics after the abstrate august and august and covered topics are aver august and covered topics are aver aver aver aver aver aver aver	فعاليت	5	۔ هدف			نمري				
class contribution 4 solution 4 solution 4 submitting on time.     Attending class, contributions to knowledge and relationships with the group.     5       Assignments submitting on time.     Solving the indicated problems from the problem list and submitting on time.     5       Laboratory and field trip reports introduction, method, result, conclusion and implication.     15       Quizzes using conclusion and implication.     15       Quizzes final exam     The midterm exam includes the covered topics.     20       The final exam     The final exam includes the covered topics after the midterm exam.     100       Total Course Marks g.g.b     100       No.     Course Outcomes       No.     Course Outcomes	Attend	dance and								
contribution (a, y) (y, y, z) (y, y, z) Assignments (y, y, z) (y, y, z) Solving the indicated problems from the problem list and submitting on time.     5       Assignments (y, y, z) (y, z)	class		Attending class contri	hutions	to					
A dit     A dit     A dit     A dit     A dit       Assignments     No.     Solving the indicated problems from the problem list and submitting on time.     5       Assignments     Solving the indicated problems from the problem list and submitting on time.     5       Laboratory and field trip reports     Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.     15       Quizzes     Quizzes includes teaching materials and assignments from two previous classes.     15       Midterm exam alwain covered topics.     20       Final exam exam.     The final exam includes the covered topics after the midterm exam.     50       Relationship of this Course to Program Learning Outcome exam.     100       Relationship of this Course to Program Outcome situal and photologics after the program outcome exam.     1       No.     Course Outcomes     1       Interruption of this Course to Program Outcome situal and photologics after the program outcome exam.     1       No.     Course Outcomes     1     1       Interruption of this Course to Program Outcome and the group of the course out of the solution of the sol	contril	bution	knowledge and relation	ships v	vith	5				
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ii AD Co et Disk Kr. Ci   Us   E AD				Ap	De. exp	Us(	Cri knc dis(	Un eth	Col	Ab in r
1The student will learn about1223223	1	The stud	ent will learn about	1	2	2	3	2	2	3
Kinematics of a particle, kinetics		The student will learn about								

	of a particles, kinematics of a rigid body, planar kinetics of a rigid body							
2	The student will learn about energy and momentum in rigid body dynamics	2	2	2	3	2	3	3
Total		1.5	2	2	3	2	2.5	3
Average			2.9					
	1= Some relation 2= Moderate relation 3= Extensive relation							

## En.Ene 0413 Engineering Circuit Analysis I

Item موضوع	Description		توضيحات		
Title عنوان یا مضمون	En.Ene 0413 E	ngineering Circuit Analysis I			
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical		
د کرېدتونو او درسي ساعتونو شمير	3	2	1		
Offering year and semester د تدریس کال او سمستر	Second year - S	Second year - Second semester			
Aim	After studying	this course student will be able t	o understand working of		
موعي Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>To explain the different areas of electrical and electronics engineering</li> <li>To use the knowledge of mathematics, fundamental sciences, and engineering to electrical and electronics engineering problems To analyze the electric circuits and theorems To analyze series and parallel electric circuits</li> </ul>				
Academic Staff Responsible د تدریس مسئول استاد					
Syllabus مفردات	I. INTRODUCTION         1. Introducing the Course on Basic Electrical         2. Generation, Transformation and Distribution of Electric Power an Overview         3. Review of Kirchhoff's Law         II. ELECTRIC CIRCUITS         1. Introduction to Linear and Nonlinear Circuit         2. Loop Analysis of Resistive Circuit in the Context of Devoltages and Currents         3. Node-Voltage Analysis of Resistive Circuit in the Context of Devoltages and Currents         4. Transformations				

	5. Superposition Theorem in the Context of DC Voltage and
	Current Sources Acting in a Resistive Network
	6. Thevenin's and Norton's Theorems in the Context of DC
	Voltage And Current Sources Acting in a Resistive Network
	7. Analysis of DC Resistive Network in Presence of One Non-
	Linear Element
	III. R-L & R-C TRANSIENTS
	1 Study of DC Transients in R-L and R-C Circuits
	2. Study of DC Transients in R L C Circuits
	2. Study of DC Transients in K-L-C Circuits $W$ SINCLE DUASE AC CIDCUITS
	$\frac{1}{1} O = \frac{1}{1} O = \frac{1}$
	1. Generation of Sinusoidal voltage waveform (AC) and Some
	Fundamental Concepts
	2. Representation of Sinusoidal Signal by a Phasor and Solution
	of Current in R-L-C Series Circuits
	3. Solution of Current in R-L-C Series Circuits
	4. Solution of Current in AC Series and Parallel Circuits
	5. Solution of Current in AC Parallel and Series-parallel Circuits
	6. Resonance in Series and Parallel Circuits
	V THREE-PHASE AC CIRCUITS
	1 Magnetic Circuits
	2. Eddy Comment & Hystomesic Loss
	2. Eddy Culterit & Hystelesis Loss
	3. Phase Sequence
	4. Relation between line and phase voltages and currents in Star-
	Star, Delta-Delta, Star-Delta and Delta-Star balanced
	connections
	5. analysis of unbalanced three phase circuits
	6. measurement of active and reactive power
	VI. NETWORK PARAMETERS AND TWO PORT NETWORKS
	1. Driving point and transfer impedance function networks, poles
	and zeros necessary conditions for driving point function and
	for transfer function.
	2 Two port network parameters
	3 7 V hybrid inverse hybrid transmission and inverse
	transmission parameters
	A Polotion botwoon various parameters
	4. Relation between various parameters
	5. Condition for symmetry and reciprocity for above parameters,
	two port network parameters using transformed variables
	VII. <u>MEASURING INSTRUMENTS</u>
	1. Study of DC-AC Measuring Instruments
	2. Study of Electro-Dynamic Type Instruments
	3. Study of Single Phase Induction Type Energy Meter or Watt-
	hour Meter
	VIII. LABORATORY SESSION
	1. Characteristics of a Practical DC source
	2. Current vs. Voltage Graph
	3. Light Controlled Switch
	4. Rectifier and Voltage Regulator
	5. Frequency Response
	6 Time Constant Oscillator and Counter
	7 Operational Amplifiers
	7. Operational 7 infpiniers
Dre_requisite	Engineering Physics_III
	Lingmooring I mysics-ini
محميني آرين	
Related Courses	Basic Electronics
ارونده مضامین	
ww	

Teaching and Learning	Lectur	Lectures, tutorials, and assignments					
د تدریس میته د							
Computer	Mode	Moderate computer knowledge such as MS Word, MS Excel, MS					
Knowledge	Dowor	DowerDoint, and CAD					
د کمبیوت زده کری ته	Fower	Folint, and CAD					
ار تيا ار تيا							
		Text Books:					
		در سی کتاب					
Course Materials and References د مضمون درسي مواد او اخځليکونه		<ul> <li>Herrick, Robert J. (2003). DC/AC Circuits and Electronics: Principles and Applications. Thomson Delmar Learning, ISBN: 0-7668-2083-1</li> <li>Fundamentals of Electric Circuits by Charles K.Alexander, Matthew N.O.Sadiku, Tata McGraw Hill Company.</li> <li>Engineering Circuit Analysis by William H.Hayt.Jr, Jack E.Kemmerly and Steven M.Durbin by Tata McGraw Hill Company.</li> <li>Circuits and Networks by T.K.Nagasarkar and M.S.Sukhija, Oxford University Press</li> <li>Reference: <ul> <li>Cotton, H., Electrical Technology. Sir Isaac Pitman &amp; Sons</li> <li>Cook, Nigel P. (1998). Introductory AC/DC Circuits. Prentice-Hall</li> <li>Horowitz and Hill (1989). The Art of Electronics. Cambridge Press, ISBN 0-521-37095-7. Berube Richard H (1997) Computer Simulated</li> </ul> </li> </ul>					
		Electric Circuits Using Electroni	ics Workbench. Prentice				
		Hall, ISBN 0-13-359621-4					
		Evaluation activities and Grades					
Activity		د ارزوني تعاييونه او تمري	Morke				
فعاليت		هدف	نمر ی				
Attendance and	class		ç,				
contribution	1	Attending class, contributions to	-				
ی او به در س کې	حاضر	knowledge and relationships with the	5				
ي و پ و و و		group.					
Assignment	s.	Solving the indicated problems from the	_				
کورنی دندہ		problem list and submitting on time.	5				
Laboratory and	field						
trip reports		Weekly laboratory/field trip reports that					
د لابر اتو از / ساد		include abstract, introduction, method,	15				
رابورونه رابورونه	•	result, conclusion and implication.					
Quizzes		Ouizzes include teaching materials and					
منفی ارز و نے	۵	assignments from two previous classes	5				
Midterm exa	 m	The midterm exam includes the covered					
کنی از موینه	منا	topics	20				
		The final exam includes the covered					
Final exam		topics after the midterm exam	50				
وستي ازموينه	ور	Trees after the material exam.					
		Total Course Marks					
		د کورس مجموعی نمری	100				

Relationship of this Course to Program Learning Outcome								
	وبيرو موهو مره	ىيدى بىن	المحي ماد م	Pr	و مصوری اړي ogram Out	comes		
		1	2	3	4	5	6	7
No.	Course Outcomes		Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	To explain the different areas of electrical and electronics engineering	3	2	2	1	1	2	2
2	To use the knowledge of mathematics, fundamental sciences, and engineering to electrical and electronics engineering problems	3	3	2	2	2	2	1
3	To analyze the electric circuits and theorems	3	2	3	2	2	2	2
4	To analyze series and parallel electric circuits	3	2	1	2	1	2	2
	Total	3	2.25	2	1.75	1.5	2	1.75
	Average		-		2	-		
	1= Some relation 2= Moderate relation 3=Extensive relation							

## En. Ce 0311 Surveying

Item موضوع	Description		توضيحات
Title عنوان یا مضمون	En. Ce 0311 Survey		
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	2	1
Offering year and semester د تدریس کال او سمستر	Second year - First s	semester	

Aim	This course is designed to impart necessary knowledge and skills to
	perform surveying and leveling, and do the relevant drawing and
موهي	computations for engineering applications.
	Key learning outcomes of this course follow:
	• Understand basic principles of surveying
	• Able to get knowledge of the basic principle of chain surveying.
	leveling total station and theodolite traversing tachometry and
Key Learning	identify the erroneous measurements and the sources of these
Outcomes	errors
کلیدی شو و نیز نتایج	• Ability to use the chain tape level total station theodolite and
	other surveying equipment to performe field surveys produce
	relevant mans and drawings, and do associated computations
	required for engineering applications
	• Work afficiently in a group environment
Acadomic Staff	• Work efficiently in a group environment
Responsible	
د تد سر میندا	
	L BASICS OF SURVEYING
	1. Overview
	2 Surveying Defined
	3 Types of Surveys
	4. Classes of Surveys
	5. Definitions
	6. Surveying Instrumentation
	7. Overview of a Modern Surveying Data System—The Science of
	Geomatics
	8. Survey Geographic Reference
	9. Survey Grid Reference
	10. Survey Legal Reference
	11. Survey Vertical Reference
	12. Distance Measurement
	13. Units of Measurement
	14. Location Methods
	15. Accuracy and Precision
	16. Accuracy Ratio
Syllabus	17. Errors
مفردات	18. Mistakes
	19. Stationing
	20. Field Notes
	21. Field Management
	II. <u>LEVELING</u>
	1. General Background
	2. Theory of Differential Leveling
	3. Curvature and Refraction
	4. Types of Surveying Levels
	5. Leveling Rods
	7 Techniques of Leveling
	7. Techniques of Leveling 8. Denshmort Leveling (Vertical Control Surgeous)
	<ul> <li>Denominark Levening (vertical Control Surveys)</li> <li>Denofile and Cross Section Leveling</li> </ul>
	7. FIOHE and Closs-Section Levening
	10. Recipiocal Levening
	12. Three-Wire Leveling
	12. The component of the second secon
	14 Level Loop Adjustments

15. Suggestions for Rod Work
16. Suggestions for Instrument Work
17. Mistakes in Leveling
III. <u>DISTANCE MEASUREMENT</u>
1. Methods of Distance Determination
2. Distance Measuring Techniques
3. Other Indirect Measuring Techniques
4. Gunter's Chain
5. Taping
6. Taping Accessories
7. Taping Techniques
8. Standard Conditions for the Use of Steel Tapes
9. Taping Corrections: General Background
10 Systematic Slope Corrections
11 Erroneous Tane Length Corrections
12 Temperature Corrections
13. Tension and Sag Corrections
14. Pandom Errors Associated with Systematic Taning Errors
15. Bandom Taning Errors
15. Kaluolii Tapilig Ellois 16. Taabniquaa far Ordinam Taning Drasisian
10. recomputes for Ordinary raping Precision
17. Mistakes in Laping
18. Electronic Distance Measurement
19. Electronic Angle Measurement
20. Principles of Electronic Distance Measurement (EDM)
21. EDM Instrument Characteristics
22. Prisms
23. EDM Instrument Accuracies
24. EDM Instruments Without Reflecting Prisms
IV. ANGLES AND DIRECTIONS
1. General Background
2. Reference Directions for Vertical Angles
3. Meridians
4. Horizontal Angles
5. Azimuths
6. Bearings
7. Relationships Between Bearings and Azimuths
8. Reverse Directions
9. Azimuth Computations
10. Bearing Computations
11. Comments on Bearings and Azimuths
12. Magnetic Direction
V. TOTAL STATIONS AND THEODOLITES
1. Introduction
2. Electronic Theodolites
3 Total Station
4 Instrument Setup
5 Geometry of the Theodolite and the Total Station
6 Adjustment of the Theodolite and the Total Station
7 Laving Off Angles
8 Prolonging a Straight Line
0. Fromging a straight Line 0. Bucking In
7. DUCKIIIg-III 10. Interpretion of Two Studicht Lines
10. Intersection of 1 wo Straight Lines
11. Prolonging a Measured Line by Triangulation over an Obstacle
12. Prolonging a Line Past an Obstacle
13. Total Station Field Techniques
14. Summary of Typical Total Station Characteristics

15. Field Procedures for Total Stations
16. Motorized Total Stations
17. Handheld Total Stations
18. Summary of Modern Total Station Characteristics
19. Ground-Based LiDAR Imaging
20. Instruments Combining Total Station Canabilities and GPS
Receiver Capabilities
VI TRAVERSE SURVEYS
1 General Background
2 Onen Traverse
2. Open Haverse 3. Closed Traverse
J. Closed Havelse
4. Dataticity Angles
5. Latitudes and Departures
6. Computation of Latitudes and Departures to Determine the Error
of Closure and the Precision of a Traverse
7. Traverse Precision and Accuracy
8. Traverse Adjustments
9. Compass Rule Adjustment
10. Effects of Traverse Adjustments on the Original Data
11. Omitted Measurements
12. Rectangular Coordinates of Traverse Stations
13. Area of a Closed Traverse by the Coordinate Method
14. Review Problem
15. Geometry of Rectangular Coordinates
16. Illustrative Problems in Rectangular Coordinates
VII. <u>SATELLITE POSITIONING SYSTEMS</u>
1. General Background
2. United States' Global Satellite Positioning System (GPS)
3. GPS Codes, Signals, and Frequencies
4. Receivers
5. GPS Position Measurements
6. GPS Carrier Phase Measurement
7 Continuously Operating Reference Station (CORS)
8 Canadian Active Control System
9 Survey Planning
10 GPS Field Procedures
11 GPS Applications
12 Vertical Positioning
12. Conclusion
14 GPS Glossary
14. OF 5 Of 058al y 15. Decommended Decidings
VIII TOPOGRAPHIC SURVEVING AND MADDING
1 General Background
2. Mone and Diane
2. Maps and Praision
J. Dian Diotting
4. Fian Flouing
5. Introduction to Contours
o. Summary of Contour Characteristics
7. Topographic (Planimetric) Surveys
8. Cross Sections and Profiles
9. Cross Sections, End Areas, and Volumes
10. Prismoidal Formula
11. Construction Volumes
12. Area Computations
13. Area by Graphical Analysis
14. Hydrographic Surveys

IV GEOGRAPHIC INFORMATION SYSTEMS
1 Background
1. Dackground 2. Score of CIS
2. Scope of OIS
3. Day-to-Day GIS
4. What Surveyors Need to Know
5. Construction of Data
6. Basic Analysis of Data
7. Components of GIS
8. Types of Data
9. Glossary
10. Internet Websites
11. Publications
X. <u>CONTROL SURVEYS</u>
1. General Background
2. Plane Coordinate Grids
3. Lambert Projection
4. Transverse Mercator Grid System
5. Universal Transverse Mercator (UTM) Grid System
6. Use of Grid Coordinates
7. Illustrative Examples
8. Horizontal Control Techniques
9. Project Control
10 Control Survey Markers
11 Direction of a Line by Gyrotheodolite
XI SATELLITE IMAGERY
1 General Background
2 Techniques of Remote Sensing
3 Electromagnetic Spectrum
A Selection of Radiation Sensors
5 An Introduction to Image Analysis
6 Classification
7 Eastura Extraction
7. Fedule Extraction 8. Ground Truth or Accuracy Assessment
0. U.S. National L and Cover Data (NLCD) 2006
9. U.S. National Land-Covel Data (NLCD) 2000
10. Remote-Sensing Satellites
12. Satallita Imagany Varana Ainhanna Imagany
12. Satellite Imagery Versus Airborne Imagery
15. Remote Sensing Internet websites and Further Reading
14. Further Reading
XII. <u>AIRBORNE IMAGERY</u>
1. General Background
2. Aerial Camera Systems
3. Photographic Scale
4. Flying Heights and Altitude
5. Relief (Radial) Displacement
6. Flight Lines and Photograph Overlap
7. Ground Control for Mapping
8. Mosaics
9. Stereoscopic Viewing and Parallax
10. Photogrammetric Stereoscopic Plotting Techniques
11. Airborne Digital Imagery
12. LiDAR Mapping
13. Aerial Surveying and Photogrammetric Mapping
14. Aerial Photography Interpretation
15. Applications of Air Photo Interpretation for the Engineer and the

	Surveyor         16. Airborne Imaging Websites         17. Further Reading         XIII.       ENGINEERING SURVEYS         1.       Route Surveys and Highway Curves         2.       Circular Curves: General Background         3.       Circular Curve Geometry         4.       Circular Curve Deflections         5.       Chord Calculations         6.       Metric Considerations         7.       Field Procedure         8.       Moving Up on the Curve         9.       Offset Curves         10.       Vertical Curves: General Background         11.       Geometric Properties of the Parabola         12.       Computation of the High or Low Point on a Vertical Curve         13.       Procedure for Computing a Vertical Curve         14.       Municipal Services Construction Practices         15.       Highway Construction         16.       Sewer Construction         17.       Pipeline Construction         18.       Culvert Construction         19.       Building Construction         19.       Building Construction         10.       Other Construction Surveys         21.       Construction Survey Specifications         XIV. </td
Pre-requisite مخکینی اړین مضامین	None
Related Courses اړونده مضامین	Hydropower, Wind Energy, Biomass Energy, Solar Energy, Petrolum and Gas Engineering
ا eaching and Learning methods د تدریس میتود	Lectures, tutorials, and assignments
Computer Knowledge د کمپیوتر زده کړې ته اړتيا	Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint, and CAD.
Course Materials and References د مضمون درسي مواد او اخځليکونه	<u>Text Books</u> : <u>درسی کتاب</u> • Kavanagh, B. and Mastin, T. (2014), Surveying principles and <u>Application (9th Edition). Pearson.</u> <u>Reference:</u> <u>اخخلیکونه</u> • Davis, R.E., Surveying Theory and Practice. McGraw Hill • Irvine, W. (2006), Surveying for Construction (5th Edition). McGraw Hill

Evaluation activities and Grades د ارزونی فعالیتونه او نمری											
Activi فعاليت	ty	Scope هدف	<u>,,,,,</u>	<u> </u>	<u></u>		Marks نمری				
Attend class contri او په برخه	dance and bution حاضري درس کي و	Attending class, and relationships	Attending class, contributions to knowledge and relationships with the group.					5			
میں Assigi دندہ	nments کورنی	Solving the indic	ated pro	blems fr	om th	e	5				
Labor field t ساحي رونه	atory and rip reports د لابراتوار / س	Weekly laborator include abstract, conclusion and in	ry/field t introduc mplicatio	rip repo ction, me on.	rts tha	t result,	15				
ين Quizz روني	es صنفي ارز	Quizzes include assignments from	teaching n two pro	materia evious c	ls and lasses.		5				
Midte وينه	rm exam منځنۍ ازه	The midterm exa	ım incluo	des the c	overe	d topics.	20				
ہ Final وینہ	exam وروستۍ ازم	The final exam in after the midterm	ncludes 1 n exam.	the cove	red top	pics	50				
		Total Course Ma رس مجموعي نمري	rks د کو				100				
	Relationship of this Course to Program Learning Outcome د مضمون اریکه د څانګې له کلیدې ښوونیز و موخو سر ه										
				<u> </u>	Pro	ogram Out	comes				
			1	2	3	4	5	6	7		
No.	No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team		
1	Understand	ling the basic	1	2	2	3	2	2	3		
	principle of surveying			-	-	5	_	-	5		
2	Able to ge	et knowledge of									
	the basic p surveying, Theodolite tachometry erroneous	rinciple of chain Leveling, traversing, and identify the measurements	2	2	2	3	2	3	3		

	Average     2.14       1- Some relation     3- Extensive relation							
Total		1.25	1.75	2	2.75	2.25	2.5	2.5
4	Work efficiently in a group environment	1	1	2	2	2	3	2
3	errors Ability to use the chain, tape, level, theodolite and other surveying equipment to carry out field surveys, produce relevant maps and drawings, and do associated computations required for engineering applications	1	2	2	3	3	2	2
	and the sources of these							

# En. Ene 0519 Engineering Economics

Item موضوع	Description	توضيحات					
Title عنوان يا مضمون	En. Ene 0519 Enginee	En. Ene 0519 Engineering Economics					
Credits and no. of hour	d Total توليزه Theoretic انظري Practical						
د کرېدتونو او درسي ساعتونو شمير	3	3	0				
Offering year and semester د تدریس کال او سمستر	Fourth year - First semester						
Aim موخي	The aim of the course is to acquire and independently apply concepts and techniques of economic analysis used to form engineering decisions; to assess cost implication in engineering design and application; to select a preferred course of action based upon monetary and non-monetary considerations; to assess risks and uncertainty associated with energy						
Key Learning Outcomes کلیدي ښوونیز نتایج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Understand basic concepts in economic analysis</li> <li>Able to understand cost concepts and the time value of money</li> <li>Measure the worth of investment and comparison of alternatives</li> <li>Able to assess project feasibility analysis and ability to make decisions under risk and uncertainty</li> </ul>						
Academic Staff Responsible د تدریس مسئول							

	I. INTRODUCTION/ENGINEERING ECONOMIC DECISION
	1. Introduction
	2. Origins of Engineering Economics
	5. What Are the Principles of Engineering Economics?
	4. Engineering Economics and Design Process
	II. <u>COST CONCEPTS AND DESIGN ECONOMICS</u>
	1. Introduction 2. Cost Estimating and Cost Terminology
	2. Cost Estimating and Cost Terminology
	3. The General Economic Environment
	4. Cost-Driven Design Optimization III MONEY TIME DELATIONSLIDS AND EQUIVALENCE
	III. <u>MONET-TIME RELATIONSHIPS AND EQUIVALENCE</u>
	1. Introduction 2. Why Consider Paturn to Conital?
	2. Why Consider Return to Capital?
	5. Origin of interest, simple interest and Compound interest
	4. The Concept of Equivalence
	5. Notation and Cash-Flow Diagrams and Lables
	IV. <u>APPLICATIONS OF MONEY-TIME RELATIONSHIPS</u>
	1. Introduction
Syllabus	2. Determining the Minimum Attractive Rate of Return
مفرداّت	3. The Present Worth Method, The Future Worth Method and the
	Annual Worth Method
	4. The Internal Rate Of Return Method and External Rate of Return
	Method
	V. <u>COMPARING ALTERNATIVES</u>
	1. Introduction
	2. The Basic Concepts for Comparing Alternatives
	3. The Study (Analysis) Period
	4. Case 1: Useful Lives Are Equal to the Study Period
	5. Case2: Useful Lives Are Different Among the Alternatives
	VI. <u>PROJECT FEASIBILITY ANALYSIS</u>
	1. Financial Feasibility
	2. Market Price Analysis
	3. Cost of Capital and Weighted Average
	4. Benefit-Cost Analysis
	VII. <u>SENSITIVITY AND RISK MANAGEMENT</u>
	1. Introduction
	2. What Are Risk, Uncertainty and Sensitivity?
	3. Sources of Uncertainty
	4. Sensitivity Analysis
Pre-requisite	None
مخكيني أرين	
مضامين	
Related	Engineering Accounting
Courses	
ارونده مضامين	
Teaching and	Lectures, tutorials, and assignments
Learning	
methods	
د تدریس میتود	
q	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د کمپیوتر زده	
کړې ته اړتيا	

		Text Books:								
Course	-	درسی کتاب Doub Chan S (2004) Eundomentale of Encineering Economics								
Cours Mater	ials and	• Fark, Chairs Edition Upr	er Sadd	, runuz le Rive	r NI	Prentice	Hall	ig, Ecol		mes
Refere	ences	Reference:			1, 113.,	Tientiee	11411			
، درسی	د مضمون	اخطيكونه								
مواد او	1	• Sullivan, W.C	G., Wic	ks, E.I	M and	I J.T Luz	kor (2	003).	En	gineering
ظيكونه	اخذ	Economy (12 <sup>th</sup>	<sup>1</sup> Éditio	ı). Pren	tice H	all	,	,		5 0
		Pannerselvar	n, R. (	(2006).	Engi	neering E	Econor	nics (5	5 <sup>th</sup>	Edition).
		Prentice-Hal	l.							
Evalu	uation acti	vities and Grades								
تعري Activi	قعانيتونه او ity	د ارزوني Scone					Marl	- C		
فعاليت	ity	هدف					iviair نمر ی	10		
Attend	dance						<u>ري</u>			
and cl	ass									
contri	bution	Attending class, cont	ribution	s to kn	owledg	ge and		4	-	
او په	حاضري ا	relationships with the	e group.						)	
برخه	درس کي ب									
فستل	<u>.</u>		11	6	.1	1.1				
Assign	nments	Solving the indicated	l problei	ns fron	n the p	roblem		4	5	
Labor	<del>ورمي</del> atory	inst and submitting of	i time.							
and fie	eld trip	Weekly laboratory/fi	eld trip	reports	that ir	nclude				
report	S	abstract, introduction	, metho	d, resul	t, con	clusion		1	5	
توار (	د لابرا:	and implication.								
رونه	ساحي راپو	_								
Quizz	es	Quizzes include teach	hing ma	terials a	and			4	5	
<b>رويي</b> Midto	صنعي ارز منعم منت	assignments from two	o previc	us clas	ses.					
وينه المالية.	منځنۍ ازم	The midterm exam ir	ncludes	the cov	ered to	opics.		2	0	
Final	exam	The final exam inclu	des the o	covered	l topic	s after		_	_	
بىتى	ورو	the midterm exam.			, topic			5	0	
لوينه	ارم	Total Course Marks						1(		
		د کورس مجموعي نمري						П	0	
		Relationship of this	Course	to Prog	ram Lo	earning O	utcom	e		
		ونيزو موخو سره	کليدي ښو ا	انگې له ا	بکه د څ ح	مضمون اړې	د			
					Pr	ogram O	utcom	les		
			1	2	3	4	5	6	7	
			q		es	ther				pu
			an		iqu	h ol				ip a
			nce	ч	chn	ıly witl	anc			n
No.	Co	urse Outcomes	cie	data	l tec	app	nal	velv		a g tear
			S, S	ze	anc	nd ren	sio	scti		ni n ry 1
			atic	t Ialy	ols	ig a icur	ofes	effe		tior lina
			em	duc s/ar	n to	lkin con	pro	ons ate		unc
			nath ing	con	lerr	thir lge les	and	esp nicé		o fi dis
			y n ieer	gn/c rime	noc	cal /led plin	erst:			ity t ulti-
1			           	esi tpei	se 1	riti. now scij	nde			bili m
										· · -

	1= Some relation 2= M	oderat	e relati	on	3= E	xtensiv	e relati	ion
	Average		1	1	1.	60	1	l
Total			1.5	1	2.25	2	1.25	1.25
4	Able to get the idea of project feasibility analysis and capability of decision making under risk and uncertainty	2	2	1	3	2	2	2
3	Measuring the worth of investment and comparison of alternatives;	2	2	1	2	2	1	1
2	Able to understand the cost concepts and the time value of money	2	1	1	2	2	1	1
1	Understanding the basic concepts in economic analysis	2	1	1	2	2	1	1

# En. Ene 0625 Seminar I (Research Methodology)

Item	Description		ته ضبحات			
موضوع	Description					
Title	En Ene 062	25 Saminar I (Pasa	arch Methodology)			
عنوان يا مضمون	EII. EIIC 002		alen Methodology)			
Credits and no.	Total	Theoretic di	Practical des			
of hour	ټوليزه	Theoretic 2,				
د کرپدتونو او						
درسي ساعتونو	1	1	0			
شمیر						
Offering year						
and semester	Third year	Second semester				
د تدريس كال او	Tiniti year -	Second semester				
سمستر						
Aim	The objecti	ve of this course	is to provide a basic overview of research			
موخي	methods used in education in addition to those concepts needed to make those ideas and conclusions accessible to others.					
Key Learning	Key learning outcomes of this course follow:					
Outcomes	Understand research terminology					
كليدي ښوونيز	• Be and	• Be aware of the ethical principles of research, ethical challenges, and approval processes				

نتايج	• Describe quantitative, qualitative, and mixed methods approaches
Ċ.	to research
	• Identify the components of a literature review process
	• Critically analyze published research
Academic	
Staff	
Pasponsible	
Responsible	
د تدریس مسئول	
استاد	
	I. INTRODUCTION TO RESEARCH
	1. What is Research?
	2. Research Concepts
	3. Types of Research
	4. Research Questions
	5. Literature Reviews
	6. Research Ethics and Integrity
	II. <u>QUANTITATIVE RESEARCH METHODS</u>
	1. The Scientific Method
	2. Design of Quantitative Surveys
	3. Quantitative Research Methods
	III. <u>QUALITATIVE RESEARCH</u>
Syllabus	1. Introduction to Qualitative Research and Research Approaches
~11. i.	2. Qualitative Research Methods
معردات	3. Data Analysis and Theory in Qualitative Research Articles
	IV. <u>DATA COLLECTION AND SAMPLING</u>
	1. Descriptive and Inferential Statistics
	2. Constructing A Questionnaire
	V. <u>MIXED-METHODS DESIGN</u>
	1. Introduction to Mixed Methods Research
	2. Design of Mixed Methods Research
	3. Evaluation of Mixed Methods Research
	VI. <u>RESEARCH PROPOSAL</u>
	1. Writing A Research Proposal
<b>D</b>	2. Presentations and Proposals
Pre-requisite	
مخكيني اړين	None
مضامين	
Related	
Courses	Research/Project
ارونده مضامين	

Teaching and Learning methods د تدریس میتود Computer Knowledge	Lectures, tutorials, and assignments Moderate computer knowledge such as MS Word, MS Excel, MS PowerPoint and CAD				
د کمپيوتر زده کړې ته اړتيا					
	<u>Text Books</u> : <u>درسی کتاب</u> Johnson, R., B., & Chr <i>Quantitative, Qualitat</i> SAGE Publications	ristensen, L., (2010). <i>Educational Research:</i> <i>ive, and Mixed Approaches</i> (4th Edition).			
Course	Reference:				
Materials and	اخذليكونه				
References	American Psychologic	cal Association. (2009). Publication manual			
د مضمون درسي	of the American F	Psychological Association (6th Edition.).			
مواد او اخځليکونه	<ul> <li>Washington, D.C</li> <li>Creswell, J. W. (2013)</li> </ul>	3). Research design: Qualitative, quantitative			
	and mixed methods ap	proach (4th Edition). SAGE Publications			
	• Evans, I., Thornton, H	., & Chalmers, I. (2011). Testing treatments:			
	& Martin.	tter healthcare (2nd Edition) London: Pinter			
	• TRU Library (2011).	APA Citation Style - Quick Guide (6th			
	Edition)				
	Evaluation activit	tes and Grades			
	اليدونية أو تمري م	د ارزومي شع			
Activity	Scope	Marks			
فعاليت	هدف	لمري			
Attendance					
and class	Attending class,				
contribution	contributions to knowledge	5			
حاضري او په	and relationships with the				
درس کي برحه اخستل	group.				
	Solving the indicated				
Assignments	problems from the problem	5			
کورني دنده	list and submitting on time.	C.			

La and ۲ رنه	Laboratory and field trip reports / د لابراتوار د البراتورونه ساحي راپورونه Ouizzes include te			ip ct, ılt, n.			15		
) ئي	Quizzes include te materials and assi from two previous			3			5		
Midterm exam The midterm exam		m includ	es			20			
بنه	منځنئ ازموب	the covered topic	s.				20		
Fir	nal exam	The final exam in	cludes th	ne					
	وروستۍ	covered topics aft	ter the				50		
	ازموينه	midterm exam.							
		Total Course Mar	`ks				100		
		رس مجموعي نمري	د کو				100		
		Relationship of th	is Cours	e to Pro	gram	Learning	Outcon	ne	
		زو موخو سرہ	دي ښووني	ېې له کلي	له د څان	ضمون اړيک	د ما		
			Program Outcomes						
			1	2	3	4	5	6	7
No	Cour	se Outcomes	Apply mathematics, science and the engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical <b>c</b>	<b>C</b> ommunicate effectively	Ability to function in a group and in multi-disciplinary team
No 1	Cour	se Outcomes	1       Apply mathematics, science and engineering	<ul> <li>Design/conduct experiments/analyze</li> <li>data</li> </ul>	<b>3</b> Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	<ul> <li>Understand professional and ethical</li> <li>responsibility</li> </ul>	L Communicate effectively 9	Ability to function in a group and in4nulti-disciplinary team
No 1	Cour Understan terminolog	se Outcomes d research gy	1       Apply mathematics, science and engineering	<ul> <li>Design/conduct experiments/analyze</li> <li>data</li> </ul>	<b>3</b> Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	L Understand professional and ethical Fresponsibility	L Communicate effectively <b>9</b>	Ability to function in a group and in multi-disciplinary team
No 1 2	Cour Understan terminolog Be aware	se Outcomes d research gy of the ethical	1       Apply mathematics, science and engineering	<ul> <li>Design/conduct experiments/analyze</li> <li>data</li> </ul>	<b>3</b> Use modern tools and techniques	Critical thinking and apply knowledge <b>b</b> concurrence with other disciplines	L Understand professional and ethical <b>5</b> responsibility	L Communicate effectively <b>9</b>	Ability to function in a group and in 1 multi-disciplinary team
No 1 2	Cour Understan terminolog Be aware principles ethical chi	se Outcomes d research gy of the ethical of research, allenges and	1       Apply mathematics, science and       1       engineering	Design/conduct experiments/analyze       data	3     1     1	Critical thinking and apply knowledge       5       concurrence with other disciplines	2 Understand professional and ethical <b>5</b> responsibility	1     Communicate effectively	Ability to function in a group and in     L       7     multi-disciplinary team
No 1 2	Cour Understan terminolog Be aware principles ethical cha approval r	se Outcomes d research gy of the ethical of research, allenges and processes	1       Apply mathematics, science and       1       engineering	Design/conduct experiments/analyze       c       data	<b>3</b> 1     1	Critical thinking and apply knowledge       5       concurrence with other disciplines	2 Understand professional and ethical <b>5</b> responsibility	1     Communicate effectively	Ability to function in a group and in     L       7     nulti-disciplinary team
No 1 2 3	Cour Understan terminolog Be aware principles ethical cha approval p Describe of	se Outcomes d research gy of the ethical of research, allenges and processes nuantitative.	1     Apply mathematics, science and     1     engineering	The sign/conduct experiments/analyze     The sign/conduct experiments/analyze	3 Or Contract Contrac	Critical thinking and apply knowledge       5       concurrence with other disciplines	2 Understand professional and ethical <b>5</b> responsibility	1     1       Communicate effectively	Ability to function in a group and in     L       7     1     multi-disciplinary team

1= Some relation 2= Moderate relation 3= Extensive relation						ion			
	Average	1.48							
Total		1.4	1.6	1	2	1.8	1.2	1.4	
5	Critically analyze published research	2	2	1	2	2	1	1	
4	Identify the components of a literature review process		1	1	2	2	2	1	
	methods approaches to research								

# 4.6.3. Professional Courses {73 credits (50%)}

## En. Ene 0309 Thermodynamics-I

Item	Description						
موضوع	توضيحات						
Title عنوان یا مضمون	En. Ene 0309 Thermodynamics-I						
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical				
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	2	1				
Offering year and semester د تدریس کال او سمستر	Second Year-First Semester						
Aim موخي	This course introduces introductory level materials in engineering thermodynamics to all engineering students. A combination of visual demonstration, problem solutions and conceptual design approaches for engineering thermodynamic systems is used for enhancing fundamental understanding and engineering applications. Issues of communication skills and contemporary problems are also discussed.						
Key Learning Outcomes کلیدي ښوونیز نتایج	<ul> <li>Key learning outcomes of this course should be as follows:</li> <li>Use of surface and volume integration, ordinary and partial differentiation, conservation of mass and energy, concept of efficiency in energy utilization.</li> <li>Design of thermodynamic systems and components such as turbines, pumps, heat exchangers, nozzles and diffusers in addition to the other devices involving heat and fluid flow in industrial processing.</li> <li>Students learn how to conceive engineering problems, how to relate them to thermodynamic fundamentals, and finally how to express them in mathematical terms.</li> </ul>						
Academic Staff Responsible د تدریس مسئول استاد							
Meeting time and place دملاقات وخت او ځای	Student Can meet in office.	structor from 01:00 PM to 02	2:00 PM every day at his				
Syllabus مفردات	I. <u>INTRODUCTI</u> 1. Thermody 2. Importanc 3. Systems a 4. Properties 5. Density an 6. State and 7. Processes 8. Temperatu 9. Processes	ON AND BASIC CONCEP namics and Energy the of Dimensions and Units and Control Volumes to of a System and Specific Gravity Equilibrium and Cycles ure and the Zeroth Law of Th	<u>rs</u> nermodynamics				

10	. The Manometer
11	. The Barometer and Atmospheric Pressure
12	. Problem Solving Technique
II.	ENERGY CONVERSION AND GENERAL ENERGY
	ANALYSIS
1.	Introduction
2.	Forms of Energy
3.	Energy Transfer by Heat
4.	Energy Transfer by Work
5.	Mechanical Forms of Work
6.	The First Law of Thermodynamics
7.	Energy Conversion Efficiencies
8.	Energy and Environment
III.	PROPERTIES OF A PURE SUBSTANCE
1.	Pure Substance
2.	Phases of a Pure Substance
3.	Phase-Change Processes of Pure Substances
4.	Property Diagrams for Phase-Change Processes
5	Property Tables
5. 6	The Ideal-Gas Equation of State
0. 7	Compressibility Factor—A Measure of Deviation from Ideal-
7.	Gas Behavior
8	Other Equation of State
0.	Since Equation of State
IV.	ENERGY ANALYSIS OF CLOSED SYSTEM
1.	Moving Boundary Work
2.	Energy Balance for Closed Systems
3.	Specific Heats
4.	Internal Energy, Enthalpy, and Specific Heats of Ideal Gases
5.	Internal Energy, Enthalpy, and Specific Heat of Solids and
	Liquids
V	MASS AND ENERGY ANALYSIS OF CONTROL
۷.	WASS AND ENERGY ANALISIS OF CONTROL VOLUMES
1	<u>VOLUMES</u>
1.	Conservation of Mass
2.	Flow Work and the Energy of a Flowing Fluid
3.	Energy Analysis of Steady-Flow Systems
4.	Some Steady-Flow Engineering Devices
5.	Energy Analysis of Unsteady-Flow Processes
VI.	SECOND LOW OF THERMODYNAMICS
1.	Introduction to the Second Law
2.	Thermal Energy Reservoirs
3.	Heat Engines
4.	Refrigerators and Heat Pumps
5.	Perpetual-Motion Machines
6	Reversible and Irreversible Processes

	7 The Corner Cuels
	7. The Carnot Cycle
	<ol> <li>The Carnot Principles</li> <li>The Thermodynamic Temperature Scale</li> </ol>
	10. The Carnot Heat Engine
	11. The Carnot Refrigerator and Heat Pump
	The Carnot Kenngerator and freat rump
	VII. <u>ENTROPY</u>
	1. Entropy
	2. The Increase of Entropy Principle
	3. Entropy Change of Pure Substances
	4. Isentropic Processes
	5. Property Diagrams Involving Entropy
	6. What is Entropy?
	7. The Tds Relations
	8. Entropy Change of Liquids and Solids
	9. The Entropy Change of Ideal Gases
	10. Reversible Steady-Flow Work
	11. Minimizing the Compressor Work
	12. Isentropic Efficiencies of Steady-Flow Devices
Pre-requisite	13. Енгору Вагансе
rie-iequisite	None
مضامدن	None
Related Courses	
اړونده مضامين	Physics-II, Engineering Mechanics: Statics
Teaching and	
Learning	Lastures tutorials and assignments
methods	Lectures, tutomais and assignments
د تدريس ميتود	
Computer	Moderate Computer Knowledge such as, using MS Word, MS Excel, MS
Knowledge	PowerPoint and CAD,
د کمپيوتر زده کړې	
نه اړييا	Tayt Pooks:
	درسی حتب Vishaal A. Dalas (2015)
	• Yunus, A. Çengel and Michael A. Boles (2015).
	McGraw-Hill
Course Materials	
and References	Reference:
د مضمون درسي	
مواد او اخطیکونه	• Nag, P. K. (2008). Engineering Thermodynamics. Tata McGraw
	Halrich Corl S (2000) Modern Thermodynamics with Statistical
	• Henten, Carr S. (2007). Modern Intermodynamics with Statistical Machanics XIV 402 p. 111 illus. ISBN: 078-2-540-85417-2
	<ul> <li>Cencel Vunus A (2008) Introduction to Thermodynamics and</li> </ul>
	- Conger, 1 unus A. (2000). Introduction to Intermodynamics and Heat Transfer (2 <sup>nd</sup> Edition). McGray, Hill
	neui munsjer (2 Eunion). WieGraw-fill

		Evaluation ac بنه او نمري	tivities کی فعالیتو	s and ( ارزوني	Grads د				
A	ctivity	Scope				Ν	larks		
	فعاليت	هدف				ي	نمر		
ar con مدرس سنتل	ttendance nd class atribution حاضري او په کي برخه اذ	Attending the class, contr knowledge and relationsh	ibution to the ip with the group.				5		
2. As	signments	Solving the indicated problems from the					5		
3 Lah	حور ہے دند oratory and		ig on t	ime.					
field ا احي	voratory and trip reports include abstract, introduct conclusion and implicatio			orts th nethod	at , resul	t,	5		
4.	Quizzes	The quiz includes teachin	g mate	rials a	ind			5	
<del>ي</del> 5. Mic	lterm exam	The midterm exam includ	es the	cover	ed top	ics		20	
6. Fi	متحلق ارموی inal exam	The exam includes the co	vered topics after the				60		
مويده	وروسنۍ اره	midterm exam	حمو عي	100 د کورس محمو عر					
	F	Relationship of this Course	to Pro	gram I	Learni	ng Outo	come		
		ليدي ښوونيزو موخو سره	کې له ک	وه د څان	ون اړيک	د مضم			
					Pro	gram (	Outcom	es	
			1	2	3	4	5	6	-
	Course Outcomes							U	1
No.	C	ourse Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi- disciplinary team
	1= Some relation 2= Moderat	e rela	tion	3=	Extens	ive rel	ation		
---	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------	------	-----	--------	---------	-------	-----	
	Average	2.9							
	Total	2.9	2.9	2.9	2.9	3.0	3.0	3.0	
7	Define a new property called entropy to quantify the second law effects.	3	3	3	3	3	3	3	
0	Introduce the second law of thermodynamics. Identify valid processes as those that satisfy both the first and second laws of thermodynamics.		3	3	3	3	3	3	
5	Develop the conservation of mass principle.		3	3	3	3	3	3	
4	Examine the moving boundary work or P dV work commonly encountered in reciprocating devices such as automotive engines and compressors.		3	3	3	3	3	3	
3	Introduce the concept of a pure substance. Discuss the physics of phase change processes. Illustrate the P-v, T-v, and P-T property diagrams and P-v-T surfaces of pure substances.		3	3	3	3	3	3	
2	Introduce the concept of energy and define its various forms.	3	3	3	3	3	3	3	

### En.Ene 0409 Thermodynamics-II

Item موضوع	توضيحات Description							
Title عنوان یا مضمون	En.Ene 0409	En.Ene 0409 Thermodynamics-II						
Credits and no. of hour	توليزه Total	عملي Practical نظري Theoretic ذ						
د کرېدتونو او درسي ساعتونو شمير	3	2	1					
Offering year and semester د تدریس کال او سمستر	Second Year - Second semester							
Aim موخي	This course thermodynar visual dem approaches fundamental communicat	e introduces intr nics only to energ onstration, prob for engineering th understanding a ion skills and cont	roductory-level materials in engineering gy engineering students. A combination of lem solutions, and conceptual design nermodynamic systems is used to enhance and engineering applications. Issues of emporary problems are also discussed.					
Key Learning Outcomes کليدي ښوونيز نتايچ	<ul> <li>Key learning</li> <li>Underst decreas</li> <li>Analyze refriger</li> <li>Underst</li> </ul>	g outcomes of this tand entropy, incr e of exergy princip e gas power cycle ation cycles tand the thermody	course follow: rease of entropy principle, exergy and the ple. es, vapor and combined power cycles and namic property relations					

A 1	
Academic	
Staff	
Responsible	
د تدريس مسئول	
استاد	
	L EXERGY: A MEASURE OF WORK POTENTIAL
	1 Evergy: Work Potential of Energy
	2. Deversible Work and Imagensibility
	2. Reversible work and meversionity
	5. Second Law Efficiency, $\eta f$
	4. Exergy Change of a System
	5. Exergy Transfer by Heat, Work and Mass
	6. The Decrease of Exergy Principle and Exergy Destruction
	7. Exergy Balance: Closed Systems
	8. Exergy Balance: Control Volumes
	II. GAS POWER CYCLES
	1. Basic Consideration in the Analysis of Power Cycles
	2. The Carnot Cycle and Its Value in Engineering
	3 Air-Standard Assumptions
	An Overview of Pagiprogeting Engines
	<ol> <li>All Overview of Recipiocating Engines</li> <li>Otto Cycle: The Ideal Cycle for Spork Ignition Engines</li> </ol>
	5. Otto Cycle. The Ideal Cycle for Spark-Ignition Engines
	6. Diesei Cycle: The Ideal Cycle for Compression-Ignition Engines
	7. Stirling and Ericsson Cycle
	8. Brayton Cycle: The Ideal Cycle for Gas-Turbine Engines
	9. The Brayton Cycle with Regeneration
	10. The Brayton Cycle with Intercooling, Reheating and
	Regeneration
Syllabus	11. Ideal Jet-Propulsion Cycles
مفردات	12. Second-Law Analysis of Gas Power Cycles
	III. VAPOR AND COMBINED POWER CYCLES
	1 The Carnot Vapor Cycle
	2 Rankine Cycle: The Ideal Cycle for Vanor Power Cycle
	2. Runking Cycle. The Real Cycle for Vapor Power Cycles from the Idealized
	S. Deviation of Actual vapor rower Cycles from the idealized
	Unes
	4. How Can we increase the Efficiency of the Rankine Cycle
	5. The Ideal Reneat Rankine Cycle
	6. The Ideal Regenerative Rankine Cycle
	7. Second-Law Analysis of Vapor Power Cycle
	8. Cogeneration
	9. Combined Gas-Vapor Power Cycles
	IV. <u>REFRIGERATION CYCLES</u>
	1. Refrigerators and Heat Pumps
	2. The Reversed Carnot Cycle
	3. The Ideal Vapor-Compression Refrigeration Cycle
	4. Actual Vapor-Compression Refrigeration Cycle
	5. Second Law Analysis of Vapor-Compression Refrigeration
	Cycle
	6. Selecting the Right Refrigerant
	7. Heat Pump Systems
	8. Innovative Vapor-Compression Refrigeration Systems
	<ol> <li>REFRIGERATION CYCLES         <ol> <li>Refrigerators and Heat Pumps</li> <li>The Reversed Carnot Cycle</li> <li>The Ideal Vapor-Compression Refrigeration Cycle</li> <li>Actual Vapor-Compression Refrigeration Cycle</li> <li>Second Law Analysis of Vapor-Compression Refrigeration Cycle</li> <li>Selecting the Right Refrigerant</li> <li>Heat Pump Systems</li> <li>Innovative Vapor-Compression Refrigeration Systems</li> </ol> </li> </ol>

	9. Gas Refrigeration Cy	ycles					
	10. Absorption Refrigera	ation Systems					
	V. <u>THERMODYNAN</u>	MIC PROPERTY RELATION					
	1. A Little Math-Partia	l Derivatives and Associated Relations					
	2. The Maxwell Relation	ons					
	3. The Clapeyron Equa	tion					
	4. General Relations for Du, Dh, Ds, $C_v$ and $C_p$						
	5. The Joule-Thomson Coefficient						
	6. The $\Delta$ H, $\Delta$ U and $\Delta$ S of Real Gases						
Pre-requisite	Thermodynamics I						
مخكيني اړين							
مضامين							
Related	Physics-II, Power plant Eng	ineering, Heat Transfer and Engineering					
Courses	Mechanics: Statics	-					
اړونده مضامين							
Teaching and	Lectures, tutorials, and assignn	nents					
Learning							
methods							
د تدريس ميتود							
Computer	Moderate computer knowled	ge such as MS Word, MS Excel, MS					
Knowledge	PowerPoint, and CAD.						
د کمپيوتر زده کړی							
ته ارتيا							
	Text Books:						
	درسی کتاب						
	• Yunus. A. Cengel and	Michael A. Boles (2015). Thermodynamics					
	an Engineering Appro-	ach (8 <sup>th</sup> Edition). McGraw-Hill					
Course	Reference:						
Materials and	اخطيكونه						
References	• Nag. P. K. (2008). En	gineering Thermodynamics. Tata McGraw					
د مضمون درسي	Hill						
مواد او اخځليکونه	Helrich Carl S (2009)	Modern Thermodynamics with Statistical					
	Mechanics XIV 402 p	111 illus ISBN: 978-3-540-85417-3					
	• Cengel Yunus A (2008	A) Introduction to Thermodynamics and					
	Heat Transfer (2 <sup>nd</sup> Editi	on) McGraw-Hill					
	Evaluation activit	ies and Grades					
	بالبتونه او نمر ع	د ارزه ندر فع					
Activity	Scope	Marks					
فعاليت	هدف						
		<u> </u>					
and class	Attending class						
contribution	contributions to knowledge						
حاضر ی او به	and relationships with the	5					
د س کې د ځه	group						
درس مي برك- اخستان	group.						
,	Solving the indicated						
Assignments	problems from the problem	5					
کورن <i>ي</i> دنده	list and submitting on time	5					
	list and submitting on time.						

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Midt	term exam	The midterm exam in	cludes							
بنه	منځنئ ازموي	the covered topics.					20			
Fir	nal exam وروستی ازموینه	The final exam includ covered topics after th midterm exam.	les the ne			5	0			
		Total Course Marks				10	00			
		د کورس مجموعي سري Relationship of this Co	ourse to	Program	nLea	rning Auto	ome			
		موونیزو موخو سره	له کليدي بن	. <b>څانگې</b> ا	اړ <b>يکه د</b>	د مضمون	one			
					Prog	gram Outo	comes			
			1	2	3	4	5	6	7	
No.	Cor	ırse Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Define exe	ergy.	2	2	2	2	2	2	2	
2	Evaluate the power cyc	he performance of les.	3	3	3	3	3	3	3	
3	Analyze b	oth closed and open	3	3	3	3	3	3	3	
4	Perform se power cyc	econd-law analysis of les.	3	3	3	3	3	3	3	
5	Analyze power generation coupled with process heating called cogeneration.		3	3	3	3	3	3	3	
6	Introduce refrigerato and the me performan	the concepts of ors and heat pumps easure of their ce	3	3	3	3	3	3	3	

8	8     Develop fundamental relations       between commonly		3	3	3	3	3	3
	encountered thermodynamic properties.	5	5	5	5	5	5	5
	Total	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	Total Average	2.9	2.9	2.9	2.9 2.9	2.9	2.9	2.9

### En. Wee 0414 Fluid Mechanics

Item موضوع	توضيحات Description						
Title عنوان یا مضمون	En. Wee 0414 Fluid Mechanics						
Credits and no. of hour	ټوليزه Total	عملي Practical يتوليزه Fotal متوليزه Theoretic					
د کرېدتونو او							
درسي ساعتونو	3	2	1				
شمیر							
Offering year and semester د تدریس کال او سمستر	Second year - Second semester						
Aim موخي	This course covers the principles of continuity, momentum, and energy concepts applied to fluid motion. Topics include properties of fluids, fluid statics, kinematics and dynamics, flow in open channels and pressure conduits (pipes) and turbines, fluid measurements, and similitude and dimensional analysis						
Key Learning Outcomes کليدي ښوونيز نتايج	Key learning o • Understa • Able to u • Develop • Understa • Understa • Able to u • Understa	utcomes of this course follow: anding the basic of fluid properties understand fluid kinematics the idea of conservation of mass anding the basic of flow in open of anding the basic of pipe flow understand turbo machinery and and similitude and dimensional a	es and hydrostatics; s, momentum, and energy channels fluid measurements nalysis				
Academic Staff Responsible د تدریس مسئول استاد							

	I. <u>F</u> L	UID PROPERTIES
	1.	Fluid Mass, Weight, Density, and Volume
	2.	Viscosity
	3.	Vapor Pressure
	4.	Surface Tension
	II. HY	TOROSTATICS
	1.	Pressure Variation in Fluid at Rest and in Motion
	2.	Forces on Plane and Curved Surfaces
	3.	Buoyancy and Flotation
	III. FL	UID KINEMATICS AND DYNAMICS
	1.	Concepts of Systems and Control Volume
	2.	Conservation of Mass - Continuity Equation
	3.	Newton's 2nd Law – Momentum Equation
	4	1st Law of Thermodynamics – Energy Equation
	5	Bernoulli Equation
Syllabus	5.	Bernoum Equation
مفردات	IV. SI	MILITUDE AND DIMENSIONAL ANALYSIS
	100 <u>511</u>	Dimensional Homogeneity
	1. 2	The Pi Theorem
	2.	Correlation of Experimental Data
	Д	Modeling and Similitude
	4. V TI	
	<b>v.</b> <u>10</u> 1	Classification of Pumps
	1.	Mixed and Axial Elay Dumps. The Specific Speed
	2. 2	Contributed and Axial Flow Pullips – The Specific Speed
	5. 4	Dependence of Linguise Turkings
	4. VI EI	LUD MEASUDEMENTS
	VI. <u>FL</u>	UID MEASUREMENTS
	1.	Velocity Measurement – Gurrent Meters
	2. 2	Velocity Measurement – Current Meters
	3. 4	Discharge Measurement – Orifice, weirs, Flumes
	4.	Viscosity Measurement
Pre-requis	site	None
ي اړين مصامين	محكيب	
Related Cou	irses	Engineering Mechanics I & II
بده مضامین	اړو	
Teaching and L	earning	
methods	8	Lectures, tutorials, and assignments
دریس میتود	دت	
Computer Kno	wledge	Moderate computer knowledge such as MS Word, MS Excel,
زده کری ته ارتبا	د کمیته تر	MS PowerPoint, and CAD.
	<b>-</b>	
	Text Boo	<u>ks</u> :
Course	در سی کتاب	
Materials and	• \	White, F. (2010). Fluid Mechanics (7th Edition). McGraw-Hill
References	S	cience/Engineering/Math
د مضمون درسي	Reference	<u>e:</u>
مواد او اخځليکونه	اخطيكونه	
	• [	Daugherty, R.L., Franzine, J.B. and Finnemore, E.J. (1985). Fluid
	l	

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	Mechanics with Engineering Applications (8th Edition) McGraw Hill, New York.								cGraw	
	• Munson, B.R., Okiishi, T.H., Rothmayer, Alric P. and Huebsch, Wade W. (2012). Fundamentals of Fluid Mechanics (7th Edition)								ebsch,	
		John Wiley and Sons.								
		• Elger, Donald F., Williams, Barbara C., Crowe, Clayton T. and								
		Roberson, John A. (2012). Engineering Fluid Mechanics (10th								
		Edition)	Edition). Wiley							
		• Streeter, V., Wylie E.B, and Bedford, K. (1997). Fluid Mechanics,								
	McGraw-Hill									
	د ارزونے فعالیتونه او نمری									
	Activity	Scope	<b>2</b> 00	<u> </u>		Mark	as and a second s			
	فعاليت	هدف				نمري				
At	tendance and	Attending	class com	tributions	to					
clas	ss contribution	knowledge	and relati	ionships v	with the	2	5			
کي	حاضري او په درس	group.		F			-			
	برکه اکسین	Solving the	indianta	1 problem	n from	tha				
F	کو <u>رن</u> ی دندہ	problem lis	t and sub	mitting or	n time.	ule	5			
Labo	pratory and field	T 11 1 1				1 .				
	trip reports	weekly lab	boratory/field trip reports that							
4	د لابراتوار/ ساح	result conc	suact, mu	oduction,	ation	u,	15			
	راپورونه	result, conc	liusion, ai	ia impire	ation.					
	Quizzes	Quizzes inc	clude teac	hing mat	erials a	nd	5			
N	صنفي ارزوني	assignment	s from tw	o previou	is class	es.				
IV	Airoail isia	topics	m exam 1	ncludes ti	ne cove	red	20	)		
	Final exam	The final e	xam inclu	des the c	overed					
	وروستي ازموينه	topics after	the midte	erm exam	l.		50	50		
		Total Cours	se Marks				1.0/	<u> </u>		
		ہموعي نمري	د کورس مج				100	J		
	Rela	ationship of t	his Cours	e to Prog	ram Le	arning Outc	come			
		و موخوً سره	دي ښوونيزو	انگې له کليه	يکه د څ	د مضمون اړ				
					Prog	ram Outco	mes			
			1	2	3	4	5	6	7	
					s					
			and		ique	Ч			d m	
	Course Ou	<b>4</b> 000000	suce	a	chn	oly witi	and	y	grou / tea	
No.	Course Ou	tcomes	scie	c dat	id te	l apj nce	onal	ivel	n a g nary	
			tics,	lyze	s ar	anc urre	essi oility	fect	on i ipli	
			emat	uct 'ana	tool	king onc ines	prof	te ef	ncti disc	
			athe ing	ond snts/	ern	hinl ge c cipli	ods;	iicat	o fu ulti-	
			y m teeri	gn/c rime	nod	cal t /led, dis(	ersta al re	mun	ty tí n m	
			lqqv ngin	Jesi xpei	Jse 1	litic now ther	Jnde thic:	jomi	hili nd i	
		ki C   C   S Ď   B Ă							A. al	

1	Understanding the basic of							
	Fluid properties and	3	2	3	2	2	2	2
	Hydrostatics							
2	Able to understand the	3	1	3	2	2	2	2
	fluid kinematics	5	1	5	2	~	2	2
3	Develop the idea of							
	conservation of mass,	3	2	3	2	2	1	2
	momentum and energy							
4	Understanding the basic of	3	1	3	2	2	2	2
	flow in open channels	5	1	5	2	-	2	2
5	Understanding the basic of	3	2	2	2	1	2	2
	pipe flow	5	2	2	2	1	2	2
6	Able to understand the							
	turbo machinery and fluid	3	2	3	2	1	2	2
	measurements							
7	Understanding the							
	similitude and dimensional	3	2	3	2	1	2	2
	analysis							
	Total	3	1.7	2.9	2	1.5	1.9	2
	Average		2.2					
	1= Some relation 2=	= Modera	ate relati	on	3= Extens	ive relati	on	

# En. Ene 0515 Energy Conversion I

Item موضوع	توضيحات Description							
Title عنوان یا مضمون	En. Ene 0515 Ener	En. Ene 0515 Energy Conversion I						
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical					
د کرېدتونو او درسي ساعتونو شمېر	3	2	1					
Offering year and semester د تدریس کال او سمستر	Third year- First So	emester	-					
Aim موخي	This course is designed to the system of the system of the principles of the	gned: the fundamentals of electrical nat meets specific need. of of physics and electricity the conversion of energy.	machines for designing a the basic concepts and					

	• To	o examine the need of various machines like AC, machines, DC achines, and transformer						
	• D	evelop strong problem-solving skills through an effectively						
	or	ganized approach.						
	•	• To meet these objectives, we emphasize well-organized physical						
	ar	• To meet these objectives, we emphasize well-organized physical arguments and a focused problem-solving strategy. At the same						
	tiı	me, we attempt to motivate the student through practical examples						
	th	at demonstrate the role of electrical machines in other disciplines.						
	On success	On successful completion of this course, students should be able to:						
Key Learning	• Apply the electrical machines theory to energy conversion							
Outcomes	pr	inciples.						
سیدی جنوبیر نتایج	• A	esign energy machines based on the problem requirements and						
C	re	alistic constraint						
Academic								
Staff	Eng Ahm	ad Shah Irshad						
د تدريس مسئو ل	Elig. Allina							
استاد								
		This course will introduce and discuss the following topics:						
		I ELEMENT OF ELECTRO MECHANICAL ENERCY						
		CONVERSION						
		1. Introduction						
		2. Salient aspects of conversion						
		3. Energy Balance						
		4. Magnetic Field System: Energy and Co-energy						
		<ol> <li>Linear System</li> <li>A simple Electromechanical System</li> </ol>						
		7. In Term of Field Energy						
		8. In Term of field Co Energy						
Course Content	s & Topics	9. Energy in Term of Electrical Parameters						
فردات	٩	10. Rotary Motion						
		11. Description of Simple System						
		13 Different Categories						
		14. One Coil each on Stator and on Rotor						
		15. Vital Role of Air gap						
		16. Statically Induced emf and Dynamically Induced emf.						
		II. D.C GENERATORS						
		1. Generator Principle						
		2. Simple Loop Generator						
		3. Practical Generator						
		4. Yoke						
		5. Pole Cores and Pole Shoes						

	6. Pole Coils
	7. Armature Core
	8. Armature Winding
	9. Bushes and Bearings
	10. Pole Pitch
	11. Conductor Coil and Winding Element
	12. Coil Span or Coil Pitch
	13. Pitch of a Winding
	14. Bach Pitch
	15 Front Pitch
	16 Resultant Pitch
	17 Commutator Pitch
	18 Single Laver Winding
	19. Two Layer Winding
	20 Degree of Reentrancy of an Armature Winging
	20. Degree of Rechtrancy of an Armature Winging
	22. Lon and Waya Winding
	22. Lap and wave winding
	23. Simplex – Lap winding
	24. Numbering of Colls and Commutator Segments
	25. Simplex wave winding
	26. Dummy od Idle Coils
	27. Uses of Lap and Wave Winding
	28. Types of Generators
	29. Bruch Contact Drop
	30. Generated E.M.F or E.M.F Equation of a Generator
	31. Iron Losses in Armature
	32. Total Losses in a D.C Generator
	33. Stray Losses
	34. Constant or Standing Losses
	35. Power Stages
	36. Condition for Maximum Efficiency
III.	ARMATURE REACTION AND COMMUTATION
	1. Armature Reaction
	2. Demagnetizing and Cross Magnetizing Conductors
	3. Demagnetizing AT per Pole
	4. Cross Magnetizing AT per Pole
	5. Compensating Winding
	6. Number of Compensating Wings
	7. Commutation
	8. Value of Reactance Voltage
	9. Methods of Improving Commutation
	10. Resistance Commutation
	11. E.M.F Commutation
	12. Inter poles or Com poles
	13. Equalizing Connections
	14. Parallel Operation of shunt Generators
	15. Parallel D.C Generators
	16. Load Sharing
	-

	17. Procedure for Paralleling D.C Generators
	18. Compound Generators in Parallel
	19. Series Generator in Parallel
IV.	GENERATOR CHARACTERISTICS
	1. Characteristics of D.C Generators
	2. Separately Excited Generator
	3. No Load Curve for Self Excited Generator
	4. How to Find Critical Resistance R? How to Draw
	O.C.C at Different Speeds?
	5. Critical Speeds
	6. Voltage Building up a Shunt Generator
	7 Condition for building up Shunt Generator
	8 Other Factors Affecting Voltage Building of a D C
	Ganarator
	9 External Characteristics
	10. Voltage Degulation
	10. Voltage Regulation
	12. Service Concenter
	12. Series Generator
	13. Compound wound Generators
	14. How to Calculate Required Series Turns
	15. Uses of D.C Generators Question and Answer on
	D.C Generators
	<ol> <li>Motor Principle</li> <li>Compression of Generator and Motor Action</li> <li>Significance of Back emf</li> <li>Voltage Equation of a motor</li> <li>Condition for Maximum Power</li> <li>Torque</li> <li>Armature Torque of a Motor</li> <li>Shaft Torque</li> <li>Speed of a D.C Motor</li> <li>Speed of a D.C Motor</li> <li>Speed Regulation Torque and Speed of a D.C. Motor</li> <li>Motor Characteristics</li> <li>Characteristics of Series Motor</li> <li>Characteristics of Shunt Motors</li> <li>Compound Motors</li> <li>Performance Curves</li> <li>Compression of Shunt and Series Motors</li> <li>Losses and Efficiency</li> </ol>
VI.	<ol> <li>SPEED CONTROL D.C MOTORS</li> <li>Factor Controlling Motor Speed</li> <li>Speed Control of Shunt Motors</li> <li>Speed Control of Series Motors</li> <li>Merits and Demerits of Rheostat Control Method</li> </ol>

	5. Series Parallel Control
	6. Electric Braking
	7. Electric Braking of Shunt Motor
	8. Electric Braking of Series Motor
	9. Electronic Speed Control Method for D.C Motor
	10. Uncontrolled Rectifier
	11. Controlled Rectifiers
	12. Thyristor Choppers
	13. Thyristor Inverter
	14. Thyristor Speed Control of Separately Excited D.C
	Motor
	15. Thyristor Speed Control of D.C Motor
	16. Full Wave Speed Control of Shunt Motor
	17. Thyristor Control of Shunt Motor
	18. Thyristor Speed Control of a Series D.C Motor
	19. Necessity of a Starter
	20. Shun Motor Starter
	21. Three Point Starter
	22. Four Point Starter
	23. Starting and Speed Control of Series Motor
	24. Grading of Starting Resistance
	25. Shunt Motors
	26. Series Motor Starters
	27. Thyristor Controller Starter
VII.	TESTING OF D.C MACHINES
	1. Brake Test
	2. Swinburne's Test
	3. Advantages of Swinburne's Test
	4. Main Disadvantage
	5. Regenerative or Hopkinson Test
	6. Alternative Connection for Hopkinson Test
	7. Merits of Hopkinson Test
	8. Retardation or Running Down Test
	9. Field Test for Series Motors
	10. Objective Tests
	11. Question and Answer on D.C Motors
VIII	TRANSFORMER
,	1. Working Principle of Transformer
	2. Transformer Construction
	3 Core Type Transformer
	4. Shell Type Transformer
	5. Elementary Theory of an Ideal Transformer
	6. E.M.F. Equation of Transformer
	7. Voltage Transformer Ratio
	8 Transformer with Losses but no Magnetic Leakage
	9. Transformer on no Load
	10. Transformer on Load
1	

	11 Transformer with Winding Resistance but no
	magnetia Leakage
	12 Environment Devictories
	12. Equivalent Resistance
	13. Magnetic Leakage
	14. Transformer with Resistance and Leakage Reactance
	15. Simplified Diagram
	16. Total Approximate Voltage Drop in Transformer
	17. Exact Voltage Drop
	18. Equivalent Circuit Transformer Test
	19. Open Circuit or no Load Test
	20. Separation of Core Losses
	21. Short Circuit or Impedance Test
	22. Why Transformer Rating in KVA
	23. Regulation of a Transformer
	24. Percentage Resistance, Reactance and Impedance
	25. Kapp Regulation Diagram
	26. Sumpner or Back to Back Test
	27. Efficiency of a Transformer
	28. Condition for Maximum efficiency
	29. Variation of Efficiency with Power Factor
	30. All Day Efficiency
	31. Auto Transformer
	32. Conversion of Two Winding Transformer to Auto
	Transformer
	33. Parallel Operation of Single Phase Transformer
	34. Questions and Answers on Transformers
	IX TRANSFORMER THREE PHASE
	1 Three Phase Transformer
	2 Three Phase Transformer Connection
	3 Star/Star or V/V Connection
	4 Delta - Delta Connection
	<ol> <li>5. V/Delta or V Connection</li> </ol>
	6 Dalta/V or /V Connection
	7. Open Delta or V. V. Connection
	7. Open Dena of V-V Connection
	8. Fower Supplied by V-V Balk
	10. Three Dhese to Two Dhese Conversion and Vice
	Vortee
	VCISA
	11. Faramer Operation of Three Phase Transformer
	12. Instrument Transformer
	15. Current Hanstormer
Due as '''	14. Potential Transformer
Pre-requisite	Fundamental of Electric circuit, Electrical Physics
محكيني اړين مصامين	
Related Courses	Electric Physic, Basic electronics, Differential & Integral
ار و نده مضامین	Calculus, Multivariable Calculus for Engineers, Linear Algebra,
<b></b>	Probability & Statistics

Teaching and Learn methods د تدریس میتود	ng Lectures, tutorials and assignments					
Computer Knowled	e Basic computing skills using MS Word. Excel. Mathlab. and					
میپوتر زده کری ته ارتیا	CAD.					
	Text Books:         درسی کتاب         A Text Book of Electrical Technol         AC and DC Machines by (B.L THER)         Reference:         اخذلیکونه         ۱         • Gerling D (2008) Analysis of the la         a Three-Phase Winding with Concol         Different Symmetry Features. In:         on Electrical Machines and System	logy in S.I Unit Volume 2 AJA and A.K. THERAJA) Magneto motive Force of centrated Coils and International Conference ns (ICEMS), Wuhan,				
Course Materials an	nd China					
References	• Libert F, Soulard J (2004) Investi	gation on pole-slot				
مصمون درسي مورد رو اخطيكونه	combinations for permanent-magr	net machines with				
	concentrated windings. In: Interna	concentrated windings. In: International Conference on				
	Electrical Machines (ICEM), Crac	cow, Poland				
	• Dajaku G, Gerning D (2011) A no winding topology for electric mac	hines In IEEE				
	International Electric Machines an	d Drives Conference				
	(IEMDC), Niagara Falls, Ontario,	(IEMDC), Niagara Falls, Ontario, Canada				
	Chapman, S. J. 1999. Electric mac	• Chapman, S. J. 1999. Electric machinery fundamentals.				
	New York: McGraw.	New York: McGraw.				
	Trzynadlowski, A. M. (1994). The     Dringing in Control of Induction M	e Field Orientation				
	Kluwer Academic Publishers	Principle in Control of Induction Motors. Norwell, MA:				
	Evaluation activities and Grads	Evaluation activities and Grads				
	د ارزوني فعاليتونه او نمري					
Activity	Scope	Marks				
فعاليت	هدف	نمري				
1. Attendance and	Attending the class, contribution to the					
class contribution	knowledge and relationship with the	5				
کے بر خہ اخستل	group.					
2. Assignments	Solving the indicated problems from the	10				
کورن <i>ي</i> ڏنده	problem list and submitting on time.	10				
3. Laboratory and	Weekly laboratory/field trip reports that					
field trip reports	include abstract, introduction, method,	10				
د لابراتوار / ساحي ۱۰ ایم ۱۰ فله	result, conclusion and implication.					
4. Ouizzes	The quiz includes teaching materials and					
صنفى ارزونى	assignments from two previous classes.	5				
5. Midterm exam	The midterm exam includes Chapters X, X	20				
منخنى ازموينه	and X.	20				

6. 4	6. Final exam وروستی ازموینه The exam includes Chapters X, X, and X.			d X. 5	50				
	Total Course Marks د کورس مجموعي نمري					]	100		
	Relat	ionship of this Co وونیزو موخو سرہ	ourse to کليدي ښ	Progra ( ڈانګې له	m Le ړيکه د	earning ( . مضمون ا	Dutcom	е	
	Program Outcomes								
			1	2	3	4	5	6	7
No.	Course	Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Apply the electrical machines theory to energy conversion		2	2	2	2	2	2	2
	principles.								
2	Analyze the economic problem in ele	conomic dispatch	3	3	3	3	3	3	3
3	Design energy based on the p requirements a constraint	y machines roblem and realistic	3	3	3	3	3	3	3
Total		2.7	2.7	2.7	2.7	2.7	2.7	2.7	
	Avera	ge			<u> </u>	2.7		<u> </u>	<u> </u>
	1= Some relation 2= Moderate relation 3= Extensive relation								

Item موضوع	Description		توضيحات					
Title عنوان یا مضمون	En. Ene 0516 Combustion Technology and Materials							
Credits and no. of hour	Total ټوليزه	Total مطي Theoretic نظري Practical توليزه						
د کرېدتونو او درسي ساعتونو شمير	3	2 1						
Offering year and semester د تدریس کال او سمستر	Third year - First semester							
Aim موخي	<ul> <li>By completing this course the student will be able to accomplish the following:</li> <li>Know different types of fuel resources.</li> <li>Know the type of gaseous fuels, Liquid fuels and Solid fuels.</li> <li>Know the Basic Combustion Calculations</li> <li>Know the environmental impact of fossil fuels.</li> <li>Know the measurement methods of flame and energy contents</li> </ul>							
Key Learning Outcomes کلیدي ښوونیز نتايچ	<ul> <li>Key learning outcomes of this course follow:</li> <li>Knowledge of different types of fossil fuel resources.</li> <li>Understanding and analyze of different fossil fuels to energy process.</li> <li>Understanding the Basic Combustion Calculations.</li> <li>Understanding the usage of Burners, Boilers and Industrial Technologies.</li> <li>Understanding the Safety Issues of fire and combustion</li> </ul>							
Academic Staff Responsible د تدریس مسئول	- Enderstanding the Safety Issues of the and combustion.							
Syllabus مفردات	I.       HISTORY OF COMBUSTION         1.       Introduction         2.       Timetable         3.       Outlook         II.       FUELS         1.       Introduction         2.       Gaseous Fuels         3.       Liquid Fuels         4.       Solid Fuels         III.       COMBUSTION PRINCIPLES         1.       Basic Combustion Calculations         2.       Heat-, Mass- and Momentum Transport and Balance         3.       Ignition         IV.       ENVIRONMENTAL IMPACTS         1.       Pollutants: Formation and Impact         2.       Combustion and Climate Change							

#### En. Ene 0516 Combustion Technology and Materials

	V. MEASUREMENT METHODS
	1. Introduction
	2. In Situ versus Ex Situ Measurements
	3. Fuel Characterization
	4. Proximate and Ultimate Analysis
	5. Investigation of Combustion Processes
	er mitestigation of compusiton recesses
	VI. APPLICATIONS
	1. Burners
	2. Industrial Boilers
	3. Industrial Technologies
	VII. Safety Issues
	1. Introduction
	2. Fundamentals
	3. Fire Classes
	4. Working Mechanism of Fire Extinguishing Media
	5. Fire Detectors
	<ul> <li>Definitions and Detonations</li> <li>Dust Explosions</li> </ul>
	7. Dust Explosions 8. Legal Framework: Example of ATEX in Europe
	9. Preventing and Mitigating the Effect of Explosions in Industry
	10. Aspects of Preventive Fire Protection
	11. Fire Suppression by Oxygen Reduction
	12. Safety by Process Design
Pre-requisite	None
مذكيني اړين	
مضامين	
Related	Physics-I&II, Engineering Chemistry, Thermodynamics-I&II and Heat
Courses	Transfer and Biomass
اړونده مضامين	
Teaching and	Lectures, tutorials, and assignments
Learning	
methods	
د تدريس ميتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د کمپيوتر زده	
كړې ته اړتيا	
	Text Books:
	درسی کتاب
	• Maximilian Lackner, Aacute;rpád Palotás, Franz Winter (2013).
Course	Combustion: From Basics to Applications 1st Edition
Materials and	Reference:
References	الخطيكونه
د مضمون درسي	• Stephen R. Turns, (2012). An Introduction to Combustion
مواد او	Concepts and Applications 3rd Ed.
اخطيكونه	• F. EL Mahallawy and Saad El- Din Habik (2002).
	FUNDAMENTALS AND TECHNOLOGY OF COMBUSTION.
	• Kenneth K. Kuo (2005). Principles of combustion. Second Edition

	Evaluation activities and Grades د ارزونی فعالیتونه او نمری									
Ac	ctivity	Scope			Ma	urks				
ت	فعاليد	هدف			ري	نم				
Atte and د ontr و په رخه	ndance l class ribution حاضري او درس کي با اخستل	Attending class, contributions to knowledge and relationships with the group.						5		
Assig ندہ	gnments کورني دن	Solving the indicate problems from the p list and submitting of	d problem on time.	l				5		
Lab and f re ار/	oratory ield trip ports د لابراتوا ساحي رايورون	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.						15		
Qu وني	nizzes صنفي ارز	Quizzes include teaching materials and assignments from two previous classes.			5					
Mi e وينه	dterm xam	The midterm exam includes the covered topics.			20					
ہے۔ ی ا	ا exam وروستو ازموينا	The final exam includes the covered topics after the midterm exam.			50					
		Total Course Marks . کورس مجموعي نمري	د		100					
		Relationship of this نیزو موخو سرہ	Course يدي ښوو	to l نه کا	Prog نګې	gram L که د څا	earning O. مضمون اړي	utcome د		
						Pr	ogram O	utcomes		
			1	2		3	4	5	6	7
No.	No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct	experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	To understand the 2			2	2	2	3	3	3	3

	Average			1	2.6		1	
Total		2.0	2.2	2.6	2.8	3.0	2.8	2.8
To understanding the Safety5Issues of fire and combustion.		1	2	3	2	3	3	3
4	To understand the usage of4Burners, Boilers andIndustrial Technologies.		3	3	3	3	2	2
3	To understand the Basic Combustion Calculations.	2	2	3	3	3	3	3
2	To understand and analyze of different fossil fuels to energy process.	2	2	2	3	3	3	3
	Knowledge of different types of fossil fuel resources.							

# En. Ene 0517 Heat Transfer

Item موضوع	توضيحات Description							
Title عنوان يا مضمون	En. Ene 051	En. Ene 0517 Heat Transfer						
Credits and no. of hour	Total ټوليزه	Total مطي Practical نظري Theoretic توليزه						
د کرېدتونو او درسي ساعتونو شمير	4 3 1							
Offering year and semester د تدریس کال او سمستر	Third year -	Third year - First semester						
Aim موخي	Upon comp fundamenta convection, solve proble especially h important pr applicable th	Upon completing this course, students will be able to (i) describe the fundamental physical principles underlying heat flow by conduction, convection, and radiation mechanisms; and (ii) apply this knowledge to solve problems relevant to the design of energy engineering systems, especially heat exchangers. This course will also help students develop important problem-solving and critical thinking skills that will be broadly applicable throughout their lives and careers.						
Key Learning Outcomes کليدي ښوونيز نتايچ	<ul> <li>Key learnin</li> <li>Descrit convection</li> <li>Identif</li> </ul>	<ul> <li>applicable throughout their lives and careers.</li> <li>Key learning outcomes of this course follow:</li> <li>Describe the physical mechanisms of heat transport by conduction convection, and radiation.</li> <li>Identify heat transfer processes and energy flows</li> </ul>						

	• Apply relevant rate equations, conservation laws, and material						
	properties to solve problems involving heat transfer by conduction,						
	convection, and radiation.						
	• Apply critical and creative thinking skills to solve complex						
	problems with multiple transport modes						
	• Apply fundamentals of heat transfer to understand the design of heat						
	• Appry fundamentals of near transfer to understand the design of heat						
	exchangers and to be able to specify the type and size of heat						
	exchanger to satisfy the needs of a particular engineering proces						
	application.						
	• Gain enhanced capabilities for treating steady-state and transient						
	one- and two-dimensional conduction problems						
	• Solve the governing ordinary and partial differential equations for						
	each of the boundary value problems above.						
	• Apply computer solutions and parametric studies that explore						
	related design or operating conditions.						
Academic Staff							
Responsible							
د تدريس مسَئول							
استاد							
	I. INTRODUCTION AND BASIC CONCEPTS						
	1. Thermodynamics and Heat Transfer						
	2. Engineering Heat Transfer						
	3 Heat and Other Forms of Energy						
	4 The First Law of Thermodynamics						
	5 Heat Transfer Mechanisms						
	6 Conduction						
	7 Convection						
	8 Radiation						
	9 Simultaneous Heat Transfer Mechanisms						
	10 Prevention Through Design						
	11. Problem Solving Technique						
	11. Floblem-Solving Technique						
Syllabus	II. <u>HEAT CONDUCTION EQUATION</u>						
مفردات							
	2. One-Dimensional Heat Conduction Equation						
	3. General Heat Conduction Equation						
	4. Boundary and Initial Conditions						
	5. Solution of Steady One-Dimensional Heat Conduction						
	Problems						
	6. Heat Generation in a Solid						
	7. Variable Thermal Conductivity, k(T)						
	III. <u>STEADY HEAT CONDUCTION</u>						
	1. Steady Heat Conduction in Plane Walls						
	2. Thermal Contact Resistance						
	3. Generalized Thermal Resistance Networks						
	4. Heat Conduction in Cylinders and Spheres						
	5. Critical Radius of Insulation						

6. Heat Transfer from Finned Surfaces
7. Bioheat Transfer Equation
8. Heat Transfer in Common Configurations
IV. <u>TRANSIENT HEAT CONDUCTION</u>
1. Lumped System Analysis
2. Transient Heat Conduction in Large Plane Walls, Long
Cylinders, and Spheres with Spatial Effects
3. Transient Heat Conduction in Semi-Infinite Solids
4. Transient Heat Conduction in Multidimensional Systems
V. <u>FUNDAMENTALS OF CONVECTION</u>
1. Physical Mechanism of Convection
2. Classification of Fluid Flows
3. Velocity Boundary Layer
4. Thermal Boundary Layer
5. Laminar and Turbulent Flows
6. Heat and Momentum Transfer in Turbulent Flow
7. Derivation of Differential Convection Equations
8. Solutions of Convection Equations for a Flat Plate
9. Nondimensionalized Convection Equations and Similarity
10. Functional Forms of Friction and Convection Coefficients
11. Analogies Between Momentum and Heat Transfer
VI. <u>EXTERNAL FORCED CONVECTION</u>
Drag and Heat Transfer III External Flow     Derelled Flow over Flet Distant
2. Fatallel Flow over Flat Flates
5. Flow across Cylinders and Spheres
4. Flow across Tube Balks
VII. INTERNAL FORCED CONVECTION
1. Introduction
2. Average Velocity and Temperature
3. The Entrance Region
4. General Thermal Analysis
5. Laminar Flow in Tubes
6. Turbulent Flow in Tubes
VIII. <u>NATURAL CONVECTION</u>
1. Physical Mechanism of Natural Convection
2. Equation of Motion and the Grashof Number
3. Natural Convection over Surfaces
4. Natural Convection from Finned Surfaces and PCBs
5. Natural Convection Inside Enclosures
6. Combined Natural and Forced Convection
IX. <u>BOILING AND CONDENSATION</u>

	1 Boiling Heat Transfer
	2 Pool Boiling
	3 Flow Boiling
	4 Condensation Heat Transfer
	5. Film Condensation
	5. Film Condensation Incide Herizentel Tubes
	<ol> <li>Film Condensation Inside Horizonial Tubes</li> <li>Description Condensation</li> </ol>
	7. Dropwise Condensation
	X. <u>HEAT EXCHANGERS</u>
	1. Types of Heat Exchangers
	2. The Overall Heat Transfer Coefficient
	3. Analysis of Heat Exchangers
	4. The Log Mean Temperature Difference Method
	5. The Effectiveness–NTU Method
	6. Selection of Heat Exchangers
	XI. <u>FUNDAMENTALS OF THERMAL RADIATION</u>
	1. Introduction
	2. Thermal Radiation
	3. Blackbody Radiation
	4. Radiation Intensity
	5. Radiative Properties
	6. Atmospheric and Solar Radiation
	XII. <u>RADIATION HEAT TRANSFER</u>
	1. The View Factor
	2. View Factor Relations
	3. Radiation Heat Transfer: Black Surfaces
	4. Radiation Heat Transfer: Diffuse, Gray Surfaces
	5. Radiation Shields and the Radiation Effects
	6. Radiation Exchange with Emitting and Absorbing Gases
Pre-requisite	None
مخكيني اړين	
مضامين	
Related Courses	Thermodynamics, Thermal Power plant, Solar and HVAC
اړونده مضامين	
Teaching and	Lectures, tutorials, and assignments
Learning	
methods	
د تدريس ميتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د کمبیوتر زده کړی	
پيو وي يو پ	
Course	Text Books:
Materials and	در سے کتاب
References	• Vunue A Cencel and Afshin I Chaiar (2015) Heat and Mass
د مضمون در س	Transfer Fundamentals & Applications (5th Edition) McCrow
<u>و مصحوں در سي</u>	Hill
مورت رو ر <u>هــــــــــــــــــــــــــــــــــــ</u>	11111

	<ul> <li><u>Reference</u>: الخذليكونة</li> <li>F.D. Incropera, D.P. DeWitt, T.L. Bergman, A.S. Lavine, Fundamentals of Heat and Mass Transfer, 7e, John Wiley &amp; Sons, 2011, ISBN 9780470501979.</li> <li>Janna, William S., Engineering Heat Transfer, 2e. Yunus A. Cengel, Heat Transfer (A practical approach), 2e.</li> <li>Morris G. Davies, Building Heat Transfer John Wiley &amp; Sons, Ltd, 2004, ISBN: 0-470-84731-X.</li> <li>Inroduction to Thermodynamics and Heat Transfer (2nd Edition). McGraw-Hill</li> </ul>							
	Evaluation activitie فعالیتونه او نمری	es and Grades د ارزونی ف						
A atiatity	Sacre	Marka						
	Scope	Marks						
فعاليت	هدف	ىمري						
Attendance and								
class	Attending class,							
contribution	contributions to knowledge	5						
حاضري او په	and relationships with the	~						
درس کي برخه	group.							
اخستل								
Assignments	Solving the indicated							
کورني دنده	problems from the problem	5						
	list and submitting on time							
	inst and submitting on time.							
Laboratory and								
field trip reports	Weekly laboratory/field trip							
د لابراتوار/	reports that include abstract,	15						
ساحي راپورونه	introduction, method, result,							
	conclusion and implication.							
Quizzes	Quizzes include teaching							
صنفي ارزوني	materials and assignments	5						
	from two previous classes.							
Midterm exam								
منخني از موينه	The midterm exam includes	20						
	the covered topics	20						
Final ayam	the covered topics.							
	The final exam includes the							
وروسني ارمويت	covered topics after the	50						
	midterm exam							
	Total Course Marks	100						
	د کورس مجموعي نمري							

			]	Progr	am Ou	itcome	s	
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Describe the physical mechanisms of heat							
	transport by conduction, convection, and	2	2	2	2	3	3	3
2	radiation.							
2	energy flows.	3	3	3	3	3	3	3
3	Apply relevant rate equations, conservation laws, and material properties to solve problems involving heat transfer by conduction, convection, and radiation.	3	3	3	3	3	3	3
4	Apply critical and creative thinking skills to solve complex problems with multiple transport modes.	3	3	3	3	3	3	3
5	Apply fundamentals of heat transfer to understand the design of heat exchangers and to be able to specify the type and size of heat exchanger to satisfy the needs of a particular engineering process application.	3	3	3	3	3	3	3
6	Gain enhanced capabilities for treating steady-state and transient one- and two- dimensional conduction problems	3	3	3	3	3	3	3
7	Solve the governing ordinary and partial differential equations for each of the boundary value problems above.	3	3	3	3	3	3	3
	Total	2.9	2.9	2.9	2.9	3.0	3.0	3.0

### En. Ene 0518 POWER SYSTEM I

Item موضوع	توضيحات Description								
Title عنوان یا مضمون	En. Ene 0518	Power system I							
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical						
د کرېدتونو او درس <i>ي</i> ساعتونو شمېر	3	2	1						
Offering year and semester د تدریس کال او سمستر	Third year- F	Third year- First Semester							
Aim موخي	This course is To 1 syste princ To k To k To e short trans Deve organ To phys the s pract analy	<ul> <li>This course is designed:</li> <li>To learn the fundamentals of power system for designing a system that meets specific need. of the basic concepts and principles of physics and electricity</li> <li>To know the necessity of load flow in a regulated system.</li> <li>To examine the need of various analysis like fault analysis, short circuit analysis stability analysis, steady state and transient analysis.</li> <li>Develop strong problem-solving skills through an effectively organized approach.</li> <li>To meet these objectives, we emphasize well-organized physical arguments and a focused problem-solving strategy. At the same time, we attempt to motivate the student through practical examples that demonstrate the role of power system</li> </ul>							
Key Learning Outcomes کلیدي ښوونیز نتایج Academic Staff Basponsible	<ul> <li>On successful completion of this course, students should be able to:</li> <li>apply the load flow application to various power system problems like minimization of transmission line losses, minimization of the total fuel cost etc.,</li> <li>analyze the economic dispatch problem in thermal power plant</li> <li>design a power system solution based on the problem requirements and realistic constraint</li> </ul>								
Responsible د تدریس مسئول استاد	Eng. Anmad	Shah Irshad							
Course Contents & Topics مفردات	I.       INTRODUCTION         1.       Importance of Electrical Energy         2.       Generation of Electrical Energy         3.       Source of Energy         4.       Comparison of Energy sources         5.       Units of Energy         6.       Relationship Among Energy Units         7.       Efficiency         8.       Calorific Value of Evelo								

	9. Advantages of Liquid Fuels Over Solid fuels
	10. Advantages of Solid Fuels Over Liquid Fuels
II.	GENERATING STATIONS
	1. Generating Station
	2. Steam Power Station (Thermal Station)
	3. Schematic Arrangement of steam Power Station
	4. Choice of Site for Steam Power Stations
	5. Efficiency of Steam Power Station
	6. Equipment of Steam Power Station
	7. Hydro-electric Power Station
	8. Schematic Arrangement of Hydro-electric Power Station
	9. Choice of Site for Hydro-electric Power Stations
	10. Constituents of Hydro-electric Plant
	11. Diesel Power Station
	12. Schematic Arrangement of Diesel Power Station
	13. Nuclear Power Station
	14. Schematic Arrangement of Nuclear Power Station
	15. Selection of Site for Nuclear Power Station
	16. Gas Turbine Power Plant
	17. Schematic Arrangement of Gas Turbine Power Plant
	18. Comparison of the Various Power Plants
111.	VARIABLE LOAD ON POWER STATIONS
	1. Structure of Electric Power Station
	2. Variable Load on Power Station
	3. Load curves
	4. Important Terms and Factors
	5. Units Generated Per Annum
	6. Load Duration Curve
	7. Types of Loads
	8. Typical Demand and Diversity factors
	9. Load Curves and Selection of Generating units
	10. Important Points in the Selection of Units
	11. Base Load and Peak Load on Power Station
	12. Method of Meeting the Load
	13. Interconnected Grid System
IV.	ECONOMICS OF POWER GENERATION
	1. Economics of Power Generation
	2. Cost of Electrical Energy
	3. Expressions for Cost of Electrical Energy
	4. Methods of Determining Depreciation
	5. Importance of High Load Factor
V.	TARIFF
	1. Tariff
	2. Desirable Characteristics of a Tariff
	3. Types of Tariff
	II. III. V.

VI	POWER FACTOR IMPROVEMENT
	1. Power Factor
	2. Power Triangle
	3. Disadvantages of Low Power Factor
	4. Causes of Low Power Factor
	5. Power Factor Improvement
	6. Power Factor Improvement Equipment
	7. Calculation of Power Factor Correction
	8. Importance of Power Factor Improvement
	9. Most Economical Power Factor
	10. Meeting the Increased KW Demand on Power Stations
VII	SUPPLY SYSTEMS
	1. Electric Supply System
	2. Typical a.c Power Supply Scheme
	3. Comparison of D.C and A.C Transmission
	4. Advantages of High Transmission Voltage
	5. Various Systems of Power Transmission
	6. Comparison of Conductor Material in Overhead system
	7. Comparison of Conductor Material in Underground system
	8. Comparison of Various Systems of Transmission
	9. Elements of a Transmission line
	10. Economics of Power Transmission
	11. Economics Choice of Conductors Size
	12. Economics Choice of Transmission Voltage
	13. Requirements of Satisfactory Electric Supply
VIII	MECHANICAL DESIGN OF OVERHEAD LINES
	1. Main components of Overhead Lines
	2. Conductor Materials
	3. Line Supports
	4. Insulators
	5. Types of Insulators
	6. Potential Distribution over Suspension Insulator String
	7. String Efficiency
	8. Methods of Improving String Efficiency
	9. Important Points
	10. Corona
	11. Factors Affecting Corona
	12. Important Terms
	13. Advantages and Disadvantages of Corona
	14. Methods of Reducing Corona Effects
	15. Sag in Overhead Lines
	16. Calculation of Sag
	17. Some Mechanical Principle
	ELECTRICAL DESIGN OF OVERHEAD LINES
	1. Constants of a Transmission Line

	Resistance of a Transı	nission
	Skin Effect	
	Flux Linkages	
	Inductance of a Single	Phase Two-Wire Line
	Inductance of a 3-Pha	se Overhead line
	Concept of Self-GMD	and Mutual-GMD
	Inductance Formulas i	n Terms of GMD
	Capacitance of a Sing	le Phase Two-Wire Line
	Capacitance of a 3-Ph	ase Overhead line
Х.	FORMANCE OF TRA	ANSMISSION LINES
	Classification of Over	head Transmission Lines
	Important Terms	
	Performance of Single	Phase Short Transmission Lines
	Three-Phase Short Tra	ansmission Lines
	Effect of Load p.f on I	Regulation and Efficiency
	Medium Transmissior	Lines
	End condenser Metho	d
	Nominal T Method	
	Nominal $\pi$ Method	
	Long Transmission Li	nes
	Analysis of Long Tran	smission Line (Rigorous Method)
	Generalized Circuit co	onstants of Transmission Line
	Determination of Ge	neralized Constants for Transmission
	Lines	
XI.	DERGROUND CABL	Е
	Underground Cables	=
	Construction of Cable	s
	Insulating Materials for	or Cables
	Classification of Cable	es
	Cables for 3-Phase Se	rvice
	Laving of Undergrour	d Cables
	Insulation Resistance	of a Single-Core Cable
	Capacitance of a Sing	le-Core Cable
	Dielectric Stress in a S	Single-Core Cable
	Most Economical Cor	ductor Size in a Cable
	Grading of Cables	
	Capacitance Grading	
	Inters heath Grading	
	Capacitance of 3-Core	Cables
	Measurements of $C_{a}$ a	nd Ca
	Current-carrying Cana	acity of Underground Cables
	Thermal Resistance	
	Thermal Resistance of	Dielectric of Single-Core Cable
	Permissible Current I	oading
	Types of Cable Faults	0
	Loop Tests for Location	on of Faults in Underground Cables
	Murray Loop Test	

	23. Varley Loop Test
	<ul> <li>XII. <u>Distribution System- General</u></li> <li>1. Distribution System</li> <li>2. Classification of Distribution System</li> <li>3. A.C Distribution</li> <li>4. D.C Distribution</li> <li>5. Methods of Obtaining 3-Wire D.C. System</li> <li>6. Overhead Versus Underground System</li> <li>7. Connection Schemes of Distribution System</li> <li>8. Requirements of a Distribution system</li> <li>9. Design Considerations_in Distribution System</li> </ul>
	<ul> <li>XIII. <u>D.C DISTRIBUTION</u></li> <li>1. Types of D.C. Distribution</li> <li>2. D.C. Distribution Calculation</li> <li>3. D.C. Distributor Fed at one End-Concentrated Loading</li> <li>4. Uniformly Loaded Distributor Fed at one End</li> <li>5. Distributor Fed at Both Ends-Concentrated Loading</li> <li>6. Uniformly Loaded Distributor Fed at Both Ends</li> <li>7. Distributor with Both Concentrated and Uniform Loading</li> <li>8. Ring Distributor</li> <li>9. Ring Main Distributor with Interconnector</li> <li>10. 3-Wire D.C. System</li> <li>11. Current Distribution in 3-Wire D.C. System</li> <li>12. Balancers in 3-Wire D.C. System</li> <li>13. Booster</li> <li>14. Comparison of 3-Wire and 2-Wire D.C. Distribution</li> </ul>
Pre-requisite	Fundamental of Electric circuit,
محمینی (رین مصامین Related Courses اړونده مضامین	Electric Physic, Basic electronics, Differential & Integral Calculus, Multivariable Calculus for Engineers, Linear Algebra, Probability & Statistics
Teaching and Learning methods د تدریس میتود	Lectures, tutorials and assignments
Computer Knowledge د کمپیوتر زده کړې ته اړتيا	Basic computing skills using MS Word, Excel, Mathlab, power system software, CAD, and/or SolidWorks with applications to electrical engineering computing
Course Materials and References د مضمون درسي مواد او اخځليكونه	Text Books:         درسی کتاب         Economic Principle of power system by (V.K Mehta and Rohit Mehta.)         Reference:         اخطيكونه         • Hadi Saadat, "Power System Analysis", Tata Mc Graw-Hill Publishing Company Limited, 2nd Edition, New Delhi, 2009.         • Gupta, B.R., "Power System Analysis and Design", S.Chand & Company Ltd., Reprint Edition, New Delhi, 2007.         • 1. Weedy B.M., Cory B.J., "Electric Power Systems". John Wiley

<ul> <li>&amp; Sons Limited, 4th Edition, Reprint, England, 2009.</li> <li>2. Wadhwa C. L., "Electrical Power Systems", New Age International Private Limited, 6th Edition, New Delhi, 2010.</li> <li>3. Nagsarkar T.K., Sukhija M.S., "Power system Analysis" Oxford University Press, 1st Edition, London, 2007.</li> <li>4. Arthur R. Bergen, Vijay Vittal., "Power System Analysis", Pearson Education Inc., 2nd Edition, New Delhi, 2000.</li> <li>5. Kothari. D. P., Nagrath. I. J., "Power System Engineering", Tata McGraw-Hill Publishing Company Limited, 2nd Edition, Third Reprint, New Delhi, 2008.</li> </ul>										
تمري Activ	وني تعاليتون» او itv	Scope						Ma	rke	
فعالت	Ity	مدف Scope							1K5 1	
Atten	dance and							مري ا	_	
class رس رس	contribution حاضري او په د کې برخه اذ	Attending the cla and relationship	ass, con with the	tributior e group.	n to th	e knowledge	e	5		
Assig	nments	Solving the indic	cated pr	oblems f	from t	he problem				
دنده	کورنی	list and submittin	ng on ti	me.		1		10		
Labor field t باحي رونه	ratory and crip reports د لایراتوار/ س راپور	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion10and implication.10								
Quizz	zes	The quiz include	s teachi	ing mate	rials a	ind		~		
وني	صنفي ارز	assignments from	n two p	revious	classe	s.		5		
Midte وينه	erm exam منځنۍ ازم	The midterm exa	ım inclu	ides Cha	pters	X, X and X		20		
Final وينه	exam وروستۍ ازم	The exam includ	les Chaj	oters X,	X, and	1 X.		50		
		Total Course Ma	ırks					100		
		س مجموعي نمري	د کور					100		
	Rela	ationship of this (	Course	to Prog	ram L	earning Ou	utco	ome		
		ونيزو موخو سره	ليدي ښو. ا	فانګې له د	يکه د د	د مضمون اړ				1
					Pro	gram Outc	om	es		
			1	2	3	4	-	5	6	7
No.	Course	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical	responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	

1	Explain concept of energy and its resources.	2	2	2	2	2	2	2
2	Analyze the economic problem in power system.	3	3	3	3	3	3	3
3	Design a power system solution based on the problem requirements and realistic constraint	3	3	3	3	3	3	3
4	Prepare economical solutions for power system.	3	3	3	3	3	3	3
5	Design a power system network for base don standard regulations.	3	3	3	3	3	3	3
6	Apply the load flow application to various power system problems like minimization of transmission line losses, minimization of the total fuel cost etc.	3	3	3	3	3	3	3
	Total	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	Average	adamat	o molo44		2.8	aino nal	ation	
	1= Some relation 2= Moderate relation 3= Extensive relation							

# En. Ene 0626 Power System II

Item موضوع	Description	توضيحات							
Title عنوان یا مضمون	En. Ene 0620	En. Ene 0626 Power system II							
Credits and no. of hour	تولیزہ Total	نظري Theoretic	عملي Practical						
د کرېدتونو او درس <i>ي</i> ساعتونو شمېر	3	2	1						
Offering year and semester د تدریس کال او سمستر	Third year- S	Second Semester							
Aim	This course i	This course is designed to:							
موخي	• Exp	lain concept of ener	rgy and its resource	es					

	<ul> <li>Analyze the economic problem in power system.</li> <li>Design a power system solution based on the problem requirements and realistic constraint.</li> <li>To meet these objectives, we emphasize well-organized</li> </ul>
	physical arguments and a focused problem-solving strategy. At the same time, we attempt to motivate the student through practical examples that demonstrate the role of power system analysis in other disciplines.
	On successful completion of this course, students should be able to:
	Prepare economical solutions for power system
Key Learning	• Design a power system network for base don standard
Outcomes	regulations design.
كليدي بنىوونيز نتايج	• a power system solution based on the problem requirements
	and realistic constraint
Academic Staff	
Responsible	Eng.Ahmad Shah Irshad
د تدريس مسئول استاد	
	I. <u>A.C Distribution</u>
	1. A.C Distribution Calculation
	2. Methods of Solving A.C. Distribution Problems
	3. 3-Phase Unbalanced Loads
	4. Four-Wire Star-Connected Unbalanced Loads
	5. Ground Detectors
	II. <u>Voltage Control</u>
	1. Importance of Voltage Control
	2. Location of Voltage Control Equipment
	3. Methods of Voltage Control
	4. Excitation Control
	5. Terrill Regulator
	6. Brown-Boveri Regulator
Course Contents &	7. Tap-Changing Transformers
Topics	8. Auto-Transformer Tap-Changing
مفردات	9. Booster Transformer
	10. Induction Regulators
	11. Voltage Control by Synchronous Condenser
	III. INTRODUCTION TO SWITCHGEAR
	1. Switchgear 2. Essential Eastures of Switchgear
	2. Essential Features of Switchgear
	4 Bus-Bar Arrangements
	5 Switchgear Accommodation
	6 Shor-Circuit
	7. Short-Circuit Currents
	8. Faults in a Power System
	IV. <u>SYMMETRICAL</u> FAULT CALCULATION
	1. Symmetrical Faults on 3-Phase System
	2. Limitation of Fault Current
	3. Percentage Reactance

4.	Percentage Reactance and Base kVA
5.	Short-Circuit kVA
6.	Reactor Control of Short-Circuit Currents
7.	Location of Reactors
8.	Steps for Symmetrical Fault Calculations
V. <u>I</u>	INSYMMETRICAL FAULT CALCULATION
1.	Unsymmetrical Faults on 3-Phase System
2.	Symmetrical Components Method
3.	Operator 'a'
4.	Symmetrical Components in Terms of Phase Currents
5.	Some Facts about Sequence Currents
6.	Sequence Impedances
7.	Sequence Impedances of Power System Elements
8.	Analysis of Unsymmetrical Faults
9.	Single Line-to-Ground Fault
10.	Line-to-Line Fault
11.	Double Line-to-Ground Fault
12.	Sequence Networks
13	Reference Bus for Sequence Networks
VI C	IRCUIT BREAKERS
1	Circuit Breakers
2	Arc Phenomenon
2.	Principles of Arc Extinction
З. Д	Methods of Arc Extinction
т. 5	Important Terms
5.	Classification of Circuit Breakers
0. 7	Oil Circuit Breakers
7. 8	Types of Oil Circuit Breakers
0.	Plain Break Oil Circuit Breakers
). 10	Are Control Oil Circuit Breakers
10.	Low Oil Circuit Breakers
11.	Low On Circuit Dicakers
12. 12	Air Blast Circuit Breakers
13. 17	Types of Air Blast Circuit Proskers
14. 1 <i>5</i>	1 ypes of All- Diast Cilcuit Dicakets Sulphur Havafluarida (SEG) Circuit Dreations
13. 12	Vacuum Circuit Brookers (VCD)
10. 17	witch goor Components
17.	Switchgear Components
10.	Problems of Circuit Interruption
19. 20	Circuit Preaker Datings
20. VII	Clicuit bleaker Railings
V II. 1	FUSES
1.	ruses
2.	Desirable Unaracteristics of Fuse Element
<i>5</i> .	ruse Element Materials
4.	Important Terms
5.	Types of Fuses
6. 7	Low voltage Fuses
7.	High Voltage Fuses
8	Current Carrying Capacity of Fuse Element

9.	Difference Between a Fuse and Circuit Breaker
VIII.	PROTECTIVE RELAYS
1.	Protective Relays
2.	Fundamental Requirements of Protective Relaying
3.	Basic Relays
4.	Electromagnetic Attraction Relays
5.	Induction Relays
6.	Relay Timing
7.	Important Terms
8.	Time/P.S.M. Curve
9.	Calculation of Relay Operating Time
10.	Functional Relay Types
11.	Induction Type Overcurrent Relay (non-directional)
12.	Induction Type Directional Power Relay
13.	Induction Type Directional Overcurrent Relay
14.	Distance or Impedance Relays
15.	Definite – Distance Type Impedance Relay
16.	Time – Distance Impedance Relay
17.	Differential Relays
18.	Current Differential Relay
19.	Voltage Balance Differential Relay
20.	Trans lay System
21.	Types of Protection
IX.	PROTECTION OF ALTERNATORS AND
	<u>TRANSFORMERS</u>
1.	Protection of Alternators
2.	Differential Protection of Alternators
3.	Modified Differential Protection for Alternators
4.	Balanced Earth-Fault Protection
5.	Stator Inter-Turn Protection
6.	Protection of Transformers
7.	Protection Systems for Transformers
8.	Buchholz Relay
9.	Earth-Fault or Leakage Protection
10.	Combined Leakage and Overload Protection
11.	Applying Circulating-Current System to Transformers
12.	Circulating-Current Scheme for Transformer Protection
Х.	PROTECTION OF BUS-BARS AND LINES
1.	bus bar Protection
2.	Protection of Lines
3.	Time-Graded Overcurrent Protection
4.	Differential Pilot-Wire Protection
5.	Distance Protection
XI.	PROTECTION AGAINST OVER VOLTAGES
1.	Voltage Surge
2.	Causes of Overvoltage
3.	Internal Causes of overvoltage
4.	Lightning
5.	Mechanism of Lightning Discharge

	6	Types of Lightning Strokes	
	0. 7	Harmful Efforts of Lightning	
	/. Q	Protoction Against Lightning	
	0.	The Earthing Screen	
	9. 10	Overhead Ground Wires	
	10.	Lightning Arrestors	
	11.	Lightning Arresters	
	12.	Types of Lightning Arresters	
	15. VII	Surge Adsorber	
		SUB-STATIONS	
	1.		
	2.	Classification of Sub-Stations	
	3.	Comparison between Outdoor and Indoor Sub-Stations	
	4.	I ransformer Sub-Stations	
	5.	Pole-Mounted Sub-Station	
	6. 7	Underground Sub-Station	
	7.	Symbols for Equipment in Sub-Stations	
	8.	Equipment in a Transformer Sub-Station	
	9.	Bus-Bar Arrangements in Sub-Stations	
	10.	Terminal and Through Sub-Stations	
	11.	Key Diagram of 66/11 kV Sub-Station	
	12.	Key Diagram of 11kV/400 V Indoor Sub-Station	
	XIII.	NEUTRAL GROUNDING	
	1.	Grounding or Earthing	
	2.	Equipment Grounding	
	3.	System Grounding	
	4.	Ungrounded Neutral System	
	5.	Neutral Grounding	
	6.	Advantages of Neutral Grounding	
	7.	Methods of Neutral Grounding	
	8.	Solid Grounding	
	9.	Resistance Grounding	
	10.	Reactance Grounding	
	11.	Arc Suppression Coil Grounding (or Resonant Grounding)	
	12.	Voltage Transformer Earthing	
	13.	Grounding Transformer	
Pre-requisite	Power sy	vstem I	
مخكيني اړين مضامين			
	Fundame	ntal of Electric Circuit, Electric Physic, Basic electronics,	
Related Courses	Different	ial & Integral Calculus, Multivariable Calculus for	
اړونده مضامين	Engineer	s, Linear Algebra, Probability & Statistics	
Teaching and	Lectures,	tutorials and assignments	
Learning methods			
د تدریس میتود			
Computer	Basic co	mputing skills using MS Word, Excel, Mathlab, power	
Knowledge	system software, CAD, and/or SolidWorks with applications to		
د کمپيوتر زده کړې ته	electrical	engineering computing	
ارتيا			

Course Materials and References د مضمون درسي مواد او اخځليکونه	Text Books:         درسی کتاب         Principle of power system by V.K Mehta and Rohit Mehta.)         Reference:         افخلیکونه         • Hadi Saadat, "Power System Analysis", Tata Mc Graw-Hill Publishing Company Limited, 2nd Edition, New Delhi, 2009.         • Gupta, B.R., "Power System Analysis and Design", S.Chand & Company Ltd., Reprint Edition, New Delhi, 2007.         • 1. Weedy B.M., Cory B.J., "Electric Power Systems", John Wiley & Sons Limited, 4th Edition, Reprint, England, 2009.         • 2. Wadhwa C. L., "Electrical Power Systems", New Age International Private Limited, 6th Edition, New Delhi, 2010.         • 3. Nagsarkar T.K., Sukhija M.S., "Power system Analysis" Oxford University Press, 1st Edition, London, 2007.         • 4. Arthur R. Bergen, Vijay Vittal., "Power System Analysis", Pearson Education Inc., 2nd Edition, New Delhi, 2000.         • 5. Kothari. D. P., Nagrath. I. J., "Power System Engineering", Tata McGraw-Hill Publishing Company Limited, 2nd Edition, Third Reprint, New Delhi, 2008.								
Evaluation activities and Grads د ارزوني فعاليتونه او نمري									
Activity	Scope	Marks							
Attendance and		ىمري							
class contribution حاضري او په درس کي برخه اخستل	Attending the class, contribution to the knowledge and relationship with the group.	5							
Presentation سمینار	Preparing and presenting the presentation which is selected by the lecturer.	8							
Projects پروڙي	Estimation of the electrical design	7							
Midterm exam منځنۍ ازموينه	The midterm exam includes Chapters X, X and X.	20							
Final exam وروستی ازموینه	The exam includes Chapters X, X, and X.	50							
	Total Course Marks د کورس مجموعي نمري	100							
Relationship of this Course to Program Learning Outcome د مضمون اړيکه د څانګې له کليدي ښوونيزو موخو سره									
		Program Outcomes							
------------------------	-------------------------------------------------------------	--------------------------------------------	--------------------------------------------	---------------------------------	--------------------------------------------------------------------------------	-------------------------------------------------------	-------------------------	------------------------------------------------------------------	--
		1	2	3	4	5	6	7	
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Explain basic equipment and								
	methods of distribution	2	2	2	2	2	2	2	
	system.								
2	Analyze fault condition in	3 3		3	3	3	3	3	
	power system.								
3	Select suitable equipment for	3	3	3	3	3	3	3	
1	Property accompany solutions								
4	for protection of power	3	3	3	3	3	3	3	
	system.	5	5	5	5	5	5	5	
5	Design a power system								
	network based on standard	3	3	3	3	3	3	3	
	regulations.								
6	Apply standard methods to								
	maximize efficiency and	3	3	3	3	3	3	3	
minimize network cost.									
	Total			2.8	2.8	2.8	2.8	2.8	
	Average	2.8							
	1= Some relation 2= Moderate relation 3= Extensive relation								

### En. Ene 0620 Biomass Energy Engineering

Item موضوع	Description		توضيحات			
Title عنوان یا مضمون	En. Ene 0620	) Biomass Energy E	Engineering			
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical			
د کرېدتونو او درسي ساعتونو شمير	3	2	1			
Offering year and semester د تدریس کال او سمستر	Third year -	Second semester				
Aim موخي	By completi following: • Kno conv • Iden gene • Estin • Anal tech	ng this course the w different types version processes. tify the right usage ration. nate biomass resound tyze and design nologies.	student will be able to accomplish the of biomass resources and energy of different types of biomass for energy rces for energy generation. different kinds of biomass energy			
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Knowledge of different types of biomass resources.</li> <li>Understanding and analyze of different biomass to energy processes.</li> <li>Understanding the appropriate use of biomass for energy generation.</li> <li>Estimation of biomass resources for energy generation.</li> <li>Analyze and design of biomass-based energy technologies.</li> </ul>					
Academic Staff Responsible د تدریس مسئول استاد						
Syllabus مفردات	VIII.         BIC           1.         Int           2.         W           3.         Fu           4.         Ac           5.         So           IX.         BI           1.         Int           2.         Ov           3.         Ct           4.         Bi           5.         Hy           6.         Ap           X.         BI           1.         Int	OMASS AS ENERC roduction orld Energy Use and ture of Agriculture lvantages and Disac urces of Biomass A OMASS CONVER roduction verview of Biomass nemical Conversion ological Conversion vbrid Conversion Pr oplication of Bioma OMASS PROPERT roduction	<u>BY SOURCE</u> d Needs dvantages in Use Of Biomass Source vailable for Energy Use <u>SION PROCESSES</u> Conversion Processes Processes ocesses ss Conversion Products <u>TES FOR THERMAL CONVERSION</u>			

2.	Physical Properties of Biomass
3.	Important Thermal Related Properties
4.	Other Standard Methods for Biomass Analysis
XI.	BIOMASS PROPERTIES FOR BIOLOGICAL
	CONVERSION
1.	Introduction
2.	Properties of Biomass Important for Biological Conversion
3.	Standard Method for Analysis
4.	Summary of ASTM Procedures for Compositional Analysis
5.	Biomass Pretreatment
XII.	BIODIESEL PRODUCTION
1.	Introduction
2.	Available Oil Production in the World
3.	Vegetable Oil and Animal Fat Characteristics
4.	Fatty Acid Composition
5.	Other Basic Oil Properties
6	Oil Extraction Process
0. 7	Oil Refining Process
7. 8	Transesterification
0. Q	ASTM Characteristics
9. 10	Engine Derformance and Exhaust Emissions
10.	Design of Piodiesal Diant
11. VIII	Design of Diodiesel Flam
АШ. 1	<u>BIOETHANOL PRODUCTION</u>
1.	Introduction
2.	Sugar Crops
5.	Starchy Crops
4.	Cellulosic Biomass
5.	Biomass Pretreatment Process
6. 7	Household and Village Level Ethanol Production System
1.	Pilot Scale Ethanol Production Systems
8.	Cellulosic Ethanol Studies
XIV.	BIOGAS PRODUCTION
1.	Introduction
2.	Biomass/Waste Parameters Important in Anaerobic Digestion
3.	Acid and Methane Farming Microbes
4.	Advantages and Disadvantages of Anaerobic Digestion Process
5.	Biogas Conversion Process and Digester Designs
6.	First and Second Generation Biogas Digesters
7.	Design of Biogas Digester
XV.	TORREFACTION
1.	Introduction
2.	Bio-Physico-Chemical Changes in Biomass During
	Torrefaction
3.	Torrefaction Products
4.	Physical Properties of Torrefied Biomass
5.	Compression Between Torrefied Biomass and Pelleted
	Biomass
6.	Thermal Gravimetric Analysis Studies of Biomass
7.	Chemical Composition Changes During Torrefaction of

	Biomass
8.	Advantages and Disadvantages of Torrefaction Process
XVI.	PYROLYSIS
1.	Introduction
2.	Various Pyrolysis Processes Based on Heating Rates
3.	Effect of Temperature on Product Yields From Pyrolysis of
	Microalgae
4.	Application of Products From Fast Pyrolysis
5.	Bio-Oil Characterizations Process
6.	Bio-Oil Upgrade Processes
7.	Studies on Pyrolysis of Varies Biomass Resources
XVII.	GASIFICATION
1.	Introduction
2.	Chemistry of Biomass Gasification
3.	Various Types of Gasifiers
4.	Application of Biomass Gasifiers
5.	Gasifiers TDR and Throughput
XVIII.	ADVANCE GASIFICATION
1.	Introduction
2.	Determining Average Particle Size of Bed Material
3.	Minimum Fluidizing Velocity, Terminal Velocity and Pressure
	Drop in Fluidized Bed Reactors
4.	Operation of 0.3048 Fluidized Bed Gasifier
5.	Designing Dimensions of Fluidized Bed Gasifier
6.	Designing Dimensions of Series Cyclone Char Removal
7	Direct Use Of Synthesis Gas for Heat and Steam Production
8.	Electrical Power Production from Fluidized Bed Gasification
VIV	
	BIOMASS LIQUEFACTION
	Introduction
2.	Direct Liquefaction Process
3.	Direct Liquefaction Process
4.	Advantages and Disadvantages of Biomass Liquefaction
	Process
XX.	BIOMASS COMBUSTION
1.	Introduction
2.	Types of Biomass Combustion Systems
3.	Co-Combustion of Biomass and Co-Firing with Coal
4.	Slagging and Fouling Issues with Agricultural Biomass
5.	Deterring Melting Point of Biomass Ash Pellets
6.	Application of Biomass Combustion Systems
XXI.	BIOMASS SUSTAINABILITY ISSUES
1.	Introduction

	2. Well-To-Wheel Appro	oach					
	3. Discussion of Softwa	are and Programs for LCA and Related					
	Biomass Analysis						
	4. Biofuels Economics						
	5. Sustainability of Biof	uels Production					
Pre-requisite	None						
مخكينى اړين							
مضامين							
Related Courses	Physics-I&II, Engineering Che	mistry, Thermodynamics-I&II and Heat					
ارونده مضامين	Transfer						
Teaching and	Lectures, tutorials, and assignme	ents					
Learning							
methods							
د تدريس ميتود							
Computer	Moderate computer knowledg	e such as MS Word, MS Excel, MS					
Knowledge	PowerPoint, and CAD.						
د کمپيوتر زده کړی							
ته ارتيا							
	Text Books:						
	در سی کتاب						
Course	• Sergio Capareda (2014). Introduction to Biomass Energy						
Materials and	Conversion CRC Press						
References	Reference:						
د مضمون در سی	اخدلدکه نه						
مواد او اخطيكونه	• Kassebom T Afghanistan	n Biogas Construction Manual MRRD					
	Nijaguna B T <i>Biogas</i>	Technology New Age International (P)					
	I to Publishers	reennology. New Age international (1)					
	Evaluation activities	and Grades					
	فعاليته نه او نمر ي	داره					
Activity	Scope						
فعاليت	هدف						
Attendance and		~~~					
class							
contribution	Attending class, contributions						
	to knowledge and	5					
ديسيري او په	relationships with the group.						
درس مي برف اخستان							
,	Solving the indicated						
Assignments	problems from the problem	5					
کورني دنده	list and submitting on time	5					
	inst and submitting on time.						
Laboratory and	Weekly laboratory/field trip						
field trip reports	reports that include abstract,	15					
د لابراتوار/ ساحي	introduction, method, result,						
راپورونه	conclusion and implication.						
Onicara	Quizzes include teaching						
Quizzes	materials and assignments	5					
صنفي ارزوني	from two previous classes.						

Midterm examThe midterm examمنځنی ازموینهthe covered topics			n incluc	includes 20					
Final exam وروستی ازموینه midterm exam.			cludes t er the	udes the 50					
		Total Course Mar ورس مجموعي نمري	ks د ک				100		
		Relationship of this نیزو موخو سرہ	Course يدي بنوو	to Prog نګې له کا	gram I که د څا	earning Ou۔ د مضمون اړيا	itcome		
				Program Outcomes					
			1	2	3	4	5	6 '	7
No.	Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	To gain the knowledge of different types of biomass resources		2	3	2	2	2	2	3
2	To understa the differ energy proc	and and to analyze ent biomass to cesses.	3	3	3	3	3	3	3
3	To und appropriate for energy g	To understanding the appropriate use of biomass for energy generation.		3	3	3	3	3	3
4	To estima resources generation.	ate of biomass for energy	3	3	3	3	3	3	3
5 To analyze and design of biomass-based energy technologies.		3	3	3	2	2	2	2	
	Тс	otal	2.8	3.0	2.8	2.6	2.6	2.6	2.8
	Ave	erage			ı	2.7			
	1= Some relation 2= Moderate relation 3=Extensive relation								

Item موضوع	Description		توضيحات						
Title عنوان یا مضمون	En. Ene 0621 Heating Ventilating and Air-conditioning (HVAC)								
Credits and no. of hour	Total ټوليزه	نظري Theoretic	عملي Practical						
د کرېدتونو او درسي ساعتونو شمير	3	2	1						
Offering year and semester د تدریس کال او سمستر	Third year -	Second semester							
Aim موخي	<ul> <li>Upon comp</li> <li>Unders transfe</li> <li>Unders buildin</li> <li>Unders geome</li> <li>Apply thermod</li> <li>Apply find the</li> <li>Analyz buildin</li> <li>Analyz system</li> <li>Evalua load pe</li> <li>Analyz This cour critical the lives and other set of the se</li></ul>	leting this course, t stand and apply the r through the build stand psychrometric gs stand and apply try, insulations and this knowledge odynamics and fluid this knowledge to a e annual energy con- te and design the gs (primary system the and design due and design due b) te different heating erformances. the and design the co- se will also help y inking skills that w careers.	he students will be able to: e fundamental physical mechanism of heat ing geometry. ics, comfort, and health-related issues in the knowledge of solar radiation, solar windows. to solve problems relevant to the l mechanics processes in buildings, determine the heating and cooling loads and nsumption of buildings. e heating and cooling equipment of the n). cts and pipes of the HVAC (Secondary g and cooling systems based on their part- ontrol systems of HVAC rou develop important problem-solving and ill be broadly applicable throughout student						
Key Learning Outcomes کلیدي ښوونیز نتايج	<ul> <li>Key learnin</li> <li>Explai buildir</li> <li>Descri conduct</li> <li>Identif buildir</li> <li>Understans</li> <li>associa</li> <li>Understand approble</li> </ul>	g outcomes of this n the basics of H ng in the world econ be and apply the ction, convection, a y and understand t ngs stand the psychron ated with buildings. stand the fundamen oply critical and ms associated with	course should be as follows: IVAC and understand the importance of nomy. physical mechanisms of heat transport by nd radiation through the building geometry. he various processes of thermodynamics in metrics, comfort, and health-related issues ntals of fluid mechanics in building systems creative thinking skills to solve complex h flow measurements, pressure, pressure						

### En. Ene 0621 Heating Ventilating and Air-Conditioning (HVAC)

	losses in piping and pipe fittings and ducts.
	• Understand and apply the fundamentals of solar radiation, solar
	geometry, extraterrestrial insolation, insolation data and models,
	windows and the glazing effects.
	• Determine the heating and cooling loads of a building and set design
	conditions for the specific cases
	conditions for the specific cases.
	• Apply methods to determine the annual energy consumption of
	buildings.
	• Analyze and design of primary system of HVAC.
	• Evaluate heating and cooling equipment based on part-load
	performances.
	• Analyze and design the secondary system of HVAC
	• Analyze and design the systems to control the overall HVAC systems
Academic	
Staff	
Responsible	
د تدریس مسئول	
استاد	
	I INTRODUCTION
	1 A Bit of History
	2 Importance of Buildings in the World Economy
	2. Polo of UVAC Design Engineer
	5. Kole of HVAC Design Engineer
	4. A Note on the Economics of Energy Efficiency
	5. Units and Conversions
	6. Orders of Magnitude
	II. ELEMENTS OF HEAT TRANSFER FOR BUILDINGS
	1. Introduction to Heat Transfer
	2 Conduction Heat Transfer
	3 Convection Heat Transfer
	A Radiation Heat Transfer
	5 Evaporation and Moistura Transfor
Syllabus	
Gynabus	
	1 Introduction and Definitions
	1. Introduction and Definitions
	2. Inermodynamic Fundamentals
	3. The Psychometric Chart and Tables of Air Properties
	4. Psychometric Processes for Buildings
	5. Thermal Comfort
	6. Air Quality and Ventilation
	IV. HEAT GAINS THROUGH WINDOWS
	1. Importance and Design Consideration
	2. Optical Properties
	3 Thermal Properties
	4 Solar Heat Gains
	5 External and Internal Shading
	6 Uigh Derformance Clazing
1	

INFILIRATION AND NATURAL VENTILATION     Importance and Pasia Definitions
1. Importance and Basic Definitions
2. Infiltration Rates across Building Stock
3. Basic Flow Equation
4. Induced Pressure Differences
5. Engineering Component Models for Air Infiltration
6. Simplifies Physical Models for Single zone Air Infiltration
7. Molt zone Models
8. Natural Ventilation Airflow through Large Openings
9. Measuring Air Infiltration and Inter zone Flows
10. Infiltration Heat Recovery
VI. HEATING AND COOLING LOADS
1. Introduction to Load Calculations
2 Heating Versus Cooling Load Calculations
3 Methods of Estimating Cooling Loads on Buildings
4 Heating Load Calculations
5 Estimation of the System Cooling Canacity
5. Estimation of the System Cooling Capacity
VII. ANNUAL ENERGY ESTIMATION AND INVERSE
MODELING
1. General Approach
2. Degree-Days Method
3. Models for Estimating Degree-Days under Different Base
Temperatures
4. Bin Method
5. Inverse Modeling
VIII. HEAT GENERATION AND TRANSFER EQUIPMENT
1. Introduction
2. Natural Gas and Fuel Oil–Fired Equipment
3. Electric Resistance Heating
4. Electric Heat Pumps
5. Heat Exchanger Design and Selection
6. Low-Temperature Radiant Heating
7. Solar heating
8. Cogeneration Definition and Overview
IX. <u>COOLING EQUIPMENT</u>
1. Introduction
2. Rankine Retrigeration Cycle
3. Absorption Cycle
4. Mechanical Cooling Equipment—Chillers
5. Part-Load Performance of Chillers
6. Rules for Chiller System Operation and Control in Commercial
Buildings
7. Evaporative Cooling Equipment

	<ol> <li>Air Distribution Systems</li> <li>Duct Design</li> </ol>
	2. Duct Design
	6
	3. Piping Design
	4. Complete HVAC Systems for Commercial Buildings
Dra requisite	None
in the insta	None
مصحيصي اړين	
Balatad	Thermodynamics I & H. Heat Transfer Elvid Machanics and Energy
Courses	Audit of Building Systems
courses	Audit of Bunding Systems.
روعات مطالبین, Tooshing and	Lasturas tutorials and assignments
Learning and	Lectures, tutoriais, and assignments
methoda	
methods	
د ندریس میبود	Mederate connector branch de content MC Word MC Freed MC
Computer	Moderate computer knowledge such as MS word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د حمپيونر رده حړې	
نه اړييا	
Course Materials and References د مضمون درسي مواد او اخځليکونه	<ul> <li>لارسی کتاب <ul> <li>Jan F. Kreider, Peter S. Curtiss, and Ari Rabl, Heating and Cooling of Buildings: Design for Efficiency, Revised Second Edition, CRC Press, 2010, ISBN: 9781439811511 with CD-ROM of Appendices</li> </ul> </li> <li>Reference: <ul> <li>لخفليكونه</li> </ul> </li> <li>T. Agami Reddy, Jan F. Kreider, Peter S. Curtiss, Ari Rabl, Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, 3rd Edition, CRC Press.</li> <li>Joseph B. Wujek, Mechanical and Electrical Systems in Architecture, Engineering, and Construction, 5th Edition, Pearson.</li> <li>Ashrae Handbook of Heating, Ventilating and Air-Conditioning Systems and Equipment Si edition, 2016, ISBN-13: 978- 1939200273.</li> <li>Ashrae Handbook, Fundamentals, SI edition, 2013, ISBN 978-1- 936504-46-6</li> <li>Ashrae 55-213, Thermal Environmental Conditions for Human Occupancy, ASIN: B00Q63TV2S</li> <li>Ashrae 62.1-2013, Ventilation for Acceptable Indoor Air Quality, 2013, ASIN: B00Q64H5CA</li> <li>Rechad R. Janis, William K.Y.Tao, Mechanical and Electrical System in Buildings, 4e, Pearson, ISBN-13:0-9780135130131.</li> </ul>

Evaluation activities and Grades د از زوند، فعالیتونه او نمری									
Activ	vitv	Scope	- 5/ -5	ي M	Marks				
فعاليت	1	هدف		يى	نمرى				
Atter	ndance								
and c	lass	Attending class,							
contr	ibution	contributions to knowledge					5		
ي په	حاضري او	and relationships wi	th the				5		
خه	درس کي بر	group.							
ستل	اخ								
Assig	gnments	Solving the indicated	ed						
ئندە	تريني دنده problems from the						5		
list and submitting on t			n time.						
Labo field	ratory and	Weekly laboratory/f	ield trip	,					
reports		reports that include a	abstract	,			15		
د لابراتوار/		introduction, method	l, result	,			10		
ساحي راپورونه		conclusion and impl	ication.						
Quizzes Quizzes include teac			hing						
وني	صنفي ارز	materials and assignments			5				
		from two previous classes.							
Midterm exam The midterr		The midterm exam i	ncludes		20				
ينه	منځنۍ ازمو	the covered topics.							
Final	exam	The final exam inclu	ides the		50				
ىتى	وروس ۱۰	covered topics after the			50				
يبه	ارمو	Total Course Marke							
		د کورس مجموعی نمری			100				
			~	_					
		Relationship of this C	Course t	o Prog	ram Le	arning Out	come		
		ونيرو موحو شره	حيدي ہم	الكي له	23.00	د مصمون اړ			
					Pro	ogram Out	comes		
			1	2	3	4	5	6	7
				e					
				ılyz	s	ler.	ical		d ir
			and	/ans	due	oth	eth		o an
			JCe	ents	inni	ly vith	and		Inoj
No.	Cou	irse Outcomes	cieı	ime	l tec	app ce v	nal	vely	a gi m
			s, s	thei	and	nd	sio	sctiv	n in tea
			latic	st ey	ols	ng a ncui	ofes	effe	tior ary
			lem 5	que	n to	nkir cor	l pro ity	ate	unc plin
			natl ring	'con	den	thii dge nes	ibil	mic	to f iscij
			ly r nee	ign/	mo	ical wle iplii	lerst	JML	lity ti-di
			Apf engi	Des data	Use	Crit kno disc	Unc resp	Con	Abi mul

							-	
1	Explain the basics of HVAC and understand the importance of building in the world economy.	1	1	1	3	2	2	2
2	Describe and apply the physical mechanisms of heat transport by conduction, convection, and radiation through the building geometry.	3	2	1	1	1	2	2
3	Identify and understand the various processes of thermodynamics in buildings	2	2	1	2	1	2	2
4	Understand the psychrometrics, comfort, and health-related issues associated with buildings.	2	1	1	2	1	2	2
5	Understand the fundamentals of fluid mechanics in building systems and apply critical and creative thinking skills to solve complex problems associated with flow measurements, pressure, pressure losses in piping and pipe fittings and ducts.	3	2	2	2	2	2	2
6	Understand and apply the fundamentals of solar radiation, solar geometry, extraterrestrial insolation, insolation data and models, windows and the glazing effects.	3	2	2	3	2	1	2
7	Determine the heating and cooling loads of a building and set design conditions for the specific cases.	3	3	3	2	2	2	3
8	Apply methods to determine the annual energy consumption of buildings.	3	3	3	3	3	3	3

9	Analyze and design of primary							
	system of HVAC (cooling equipment).	3	3	3	3	3	3	3
10	Evaluate heating and cooling equipment based on part-load performances.	3	3	3	3	3	3	3
11	Analyze and design the secondary system of HVAC	3	3	3	3	3	3	3
12	Analyze and design the systems to control the overall HVAC systems	3	3	3	3	3	3	3
Total		2.7	2.3	2.2	2.5	2.2	2.3	2.5
	Average				2.4			
	$1 = \text{Some relation} \qquad 2 = \text{Me}$	Inderate relation         3= Extensive relation						

# En. Ene 0622 Solar Energy Engineering

Item موضوع	توضيحات Description						
Title عنوان یا مضمون	En. Ene 0622 So	En. Ene 0622 Solar Energy Engineering					
Credits and no. of hour	ټوليزه Total	نظري Theoretic	عملي Practical				
د کرېدتونو او درسي ساعتونو شمير	3	2	1				
Offering year and semester د تدریس کال او سمستر	Third year - Second semester						
Aim موخي	Upon completing this course, students will be able to (i) understand solar geometry, radiation and characteristics of solar radiations. (ii) assess solar energy resources (iii) apply solar energy principles and analyze of various solar energy technologies (iv) Estimate heating loads and design appropriate solar energy technology for it. This course will also help students develop important problem-solving and critical thinking skills that will be broadly applicable throughout their lives and						
Key Learning Outcomes کلیدي بنوونیز نتايچ	<ul> <li>Key learning outcomes of this course follow:</li> <li>Understand the concepts in solar energy engineering.</li> <li>Understand solar geometry, radiation and characteristics of sol radiations.</li> <li>Learn principles and analyze of various solar energy technologies</li> <li>Estimate energy needs for solar energy applications and choose t appropriate engineering system and technology</li> </ul>						

	• Develop knowledge of engineering analysis for solar thermal and
	PV systems
	• Balance theoretical and practical aspects of solar thermal design
	<ul> <li>Understand the solar resource and he able to use this knowledge for</li> </ul>
	• Onderstand the solar resource and be able to use this knowledge for
	design of solar thermal systems
Academic	
Staff	
Responsible	
د تدريس مسئول	
استاد	
	I. SOLAR RADIATION
	1. The Sun
	2 The Solar Constant
	2. Spectral Distribution of Extratograstrial Padiation
	4. Variation of Extratamentrial Dediction
	4. Variation of Extraterrestrial Radiation
	5. Definitions
	6. Direction of Beam Radiation
	7. Angles for Tracking Surfaces
	8. Ratio of Beam Radiation on Tilted Surface
	to That on Horizontal Surface
	9. Shading
	10. Extraterrestrial Radiation on a Horizontal Surface
	II. AVAILABLE SOLAR RADIATION
	1 Definitions
	2 Pyrheliometers and Pyrheliometric Scales
	2. Tyrichometers and Tyrichometric Seales
	5. Fylanometers 4. Maccurement of Duration of Sunchine
0 11 1	4. Measurement of Duration of Sunshine
Synabus	5. Solar Radiation Data
مفردات	6. Atmospheric Attenuation of Solar Radiation
	7. Estimation of Average Solar Radiation
	8. Estimation of Clear-Sky Radiation
	9. Distribution of Clear and Cloudy Days and Hours
	10. Beam and Diffuse Components of Hourly Radiation
	11. Beam and Diffuse Components of Daily Radiation
	12. Beam and Diffuse Components of Monthly Radiation
	13 Estimation of Hourly Radiation from Daily Data
	14 Rediction on Sloped Surfaces
	15. Padiation on Sloped Surfaces: Isotropic Sky
	16. Rediction on Sloped Surfaces: Anisotropic Sky
	17. Dediction Augmentation
	18. Beam Radiation on Moving Surfaces
	19. Average Radiation on Sloped Surfaces: Isotropic Sky
	20. Average Radiation on Sloped Surfaces: KT Method
	21. Effects of Receiving Surface Orientation on $\overline{H}_{T}$
	22. Utilizability
	23. Generalized Utilizability
	24. Daily Utilizability

	III RADIATION CHARACTERISTICS OF OPAQUE
	MATERIALS
	1 Absorptance and Emittance
	2 Kirchhoff's Law
	3 Reflectance of Surfaces
	4 Relationships among Absorptance, Emittance, and Reflectance
	5 Broadband Emittance and Absorptance
	6 Calculation of Emittance and Absorptance
	7 Measurement of Surface Radiation Properties
	8 Selective Surfaces
	9. Machanisms of Salactivity
	10. Optimum Proportion
	10. Optimum Properties
	12. Absorption of Covity Descivers
	12. Absorptiance of Cavity Receivers
	13. Specularly Kellecting Surfaces
	ΙΥ ΡΑΠΙΔΤΙΩΝ ΤΡΑΝΩΜΙΩΣΙΩΝ ΤΗΡΩΠΩΗ ΟΙ ΑΖΙΝΙΟ.
	APSORPED RADIATION
	1 Deflection of Dediction
	1. Reflection of Radiation
	2. Adsorption by Glazing
	3. Optical Properties of Cover Systems
	4. Transmittance for Diffuse Radiation
	5. Transmittance-Absorptance Product
	6. Angular Dependence of $(\tau \alpha)$
	7. Spectral Dependence of Transmittance
	8. Effects of Surface Layers on Transmittance
	9. Absorbed Solar Radiation
	10. Monthly Average Absorbed Radiation
	11. Absorptance of Rooms
	12. Absorptance of Photovoltaic Cells
	V FLAT-PLATE COLLECTORS
	1 Description of Flat-Plate Collectors
	2 Basic Flat-Plate Energy Balance Fountion
	3 Temperature Distributions in Flat-Plate Collectors
	4 Collector Overall Heat Loss Coefficient
	5 Temperature Distribution between Tubes and the Collector
	Efficiency Factor
	6. Temperature Distribution in Flow Direction
	7 Collector Heat Removal Factor and Flow Factor
	8 Critical Radiation Level
	9 Mean Fluid and Plate Temperatures
	10 Effective Transmittance-Absorptance Product
	11 Effects of Dust and Shading
	12 Heat Canacity Effects in Flat-Plate Collectors
	13 Liquid Heater Plate Geometries
	1/ Air Heaters
	15 Measurements of Collector Performance
1	

16. Collector Characterizations
17. Collector Tests: Efficiency, Incidence Angle Modifier, and
Time Constant
18. Test Data
19. Thermal Test Data Conversion
20. Flow Rate Corrections to FR( $\tau \alpha$ )n and FR UL
21. Flow Distribution in Collectors
22. In Situ Collector Performance
23. Practical Considerations for Flat-Plate Collectors
24. Putting it all Together
VI CONCENTRATING COLLECTORS
1 Collector Configurations
2 Concentration Ratio
3 Thermal Performance of Concentrating Collectors
4 Ontical Performance of Concentrating Collectors
5 Cylindrical Absorber Arrays
6 Ontical Characteristics of Nonimaging Concentrators
7 Orientation and Absorbed Energy for CPC Collectors
8 Performance of CPC Collectors
9. Linear Imaging Concentrators: Geometry
9. Entear integring Concentrators. Geometry
11. Images from Imperfact Linear Concentrators
12. Day Trace Methods for Evoluting Concentrators
12. Ray-Trace Methods for Evaluating Concentrators
14. Developidal Concentrators
14. Falabololdal Concentrators
15. Central-Receiver Conectors
10. Tractical Considerations
VII. <u>ENERGY STORAGE</u>
1. Process Loads and Solar Collector Outputs
2. Energy Storage in Solar Process Systems
3. Water Storage
4. Stratification in Storage Tanks
5. Packed-Bed Storage
6. Storage Walls
7. Seasonal Storage
8. Phase Change Energy Storage
9. Chemical Energy Storage
10. Battery Storage
VIII. SOLAR PROCESS LOADS
1. Examples of Time-Dependent Loads
2. Hot-Water Loads
3 Space Heating Loads Degree-Days and Balance Temperature
4 Building Loss Coefficients
5 Building Energy Storage Canacity
6 Cooling Loads
7 Swimming Pool Heating Loads
7. Swimming i our ricanny Loads

	<ul> <li>IX. <u>SYSTEM THERMAL CALCULATION</u></li> <li>1. Component Models</li> <li>2. Collector Heat Exchanger Factor</li> </ul>
	3 Duct and Pine Loss Factors
	4 Controls
	5 Collector Arrays: Series Connections
	6 Performance of Partially Shaded Collectors
	7. Series Arrays with Sections Having Different Orientations
	8. Use of Modified Collector Equations
	9. System Models
	10. Solar Fraction and Solar Savings Fraction
	X. SOLAR WATER AND SPACE HEATING
	1. Service Water Heating
	2. Space Heating
	3. Mathematical Modeling of Typical Liquid-Based Solar Heating
	System
	4. Performance of Liquid Systems
	5. Liquid System Design: The f-chart method
	6. Performance and Design of Air-Based Solar Heating Systems
	7. Performance and Design of Service Water System
	8. The Utilizability Concept
	9. The $\overline{\emptyset}_{i}f$ -chart Design Method
	10. Economic Optimization of Solar Heating System
Pre-requisite	
مخكيني اړين	
مضامين	
Related	
Courses	Thermodynamics-I&II, Heat Transfer and Fluid Mechanics
اړونده مضامين	
Teaching and	
Learning	Lectures, tutorials, and assignments
methods	
د ندریس میبود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د حمپیونر رده کرم ته ارتبا	
تړې ت. ژبې	Text Books:
Course	• John A Duffie William A Beckman Solar Engineering of
Materials and	Thermal Processes 4th Edition Wilev
References	Reference:
د مضمون در سی	اخځليکو نه
مواد او	• D Yogi Goswami Principles of Solar Engineering 3rd Edition
اخطيكونه	CRC Press.
~ -	Kalogirou, Soteris A. Solar Energy Engineering Processes and
	Systems Second Edition Academic press

Evaluation activities and Gr د ارزونی فعالیتونه او نمري				rades						
Ac	tivity	دف هدف				Marks نمر ور				
Attend and cl contri او په برخه	dance ass bution حاضري درس کي ا	Attending class, contributions to knowledge and relationships with the group.				5				
Assign دنده	nments کورنی	Solving the indicated problems from the problem list and submitting on time.					5			
Labor and fi report توار/ ساحي رونه	atory eld trip s د لابران سرايو	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.				15				
Quizz ونی	es صنفی ارز	Quizzes includes teaching materials and assignments from two previous classes				5				
Midterm exam منځنی ازموینهThe midterm exam includes the cove topics.			vered	20						
Final examThe final exam inوروستیtopics after the nازموینه		The final exam includes the topics after the midterm ex	the covered exam.			50				
		Total Course Marks د کورس مجموعي نمري					100			
		Relationship of this Cours دي ښوونيزو موخو سره	e to Prog نګې له کلي	gram L که د څا	earnir. ون اړي	ng Outc د مضم	ome			
					Prog	ram Ou	itcome	S		
			1	2	3	4	5	6	7	
No.	No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	

7	energy technologies Total	3	2 2.0	3	2	2 2.4	3 2.3	3
6	To understand the solar resource and be able to use this knowledge for design of solar thermal systems To learn principles of various solar	3	2	3	3	2	2	3
5	To balance theoretical and practical aspects of solar thermal design	3	2	3	2	2	2	2
4	To develop knowledge of engineering analysis for solar thermal systems.	3	3	3	3	3	2	2
3	To estimate energy needs for solar energy applications and choose the appropriate engineering system and technology.	3	2	3	2	3	3	3
2	To understand the solar geometry	3	2	2	2	3	2	3
1	To understand the concepts in solar energy engineering.	3	1	2	3	2	2	3

# En. Ene 0623 Hydropower Engineering

Item موضوع	توضيحات Description				
Title عنوان یا مضمون	En. Ene 0623 Hydro	power Engineering			
Credits and no. of hour	عملي Theoretic نظري Practical توليزه Total				
د کربدتونو او درس <i>ي</i> ساعتونو شمير	3	2	1		
Offering year and semester د تدریس کال او سمستر	Third year - Second semester				
Aim موخي	This course introduces the concepts and methods of analysis of hydropower systems with a bias to micro and mini plants. It covers types of schemes, planning, background measurements, economic analysis, impacts and the design of hydropower plants.				
Key Learning Outcomes	After a successful co	mpletion of the course, the st	udent should be able to:		

كليدي بنىوونيز نتايج	•	Describe the water flow through a power station,
	•	Perform theoretical calculations on hydropower dams and spillway
		discharge,
	•	Analyze and perform calculations on hydraulic parameters for
		different turbine concepts and hydraulic transients occurring in the
		waterways,
	•	describe the principles of the electrical components and perform
	•	Explain voltage and turbine regulation and how these affect the
		electrical grid and the mechanical system with turbine and
		generator.
	•	Discuss the environmental effects of hydropower installations,
	•	Work together in a project related to the course contents.
Academic Staff		
Responsible		
د تدريس مسئول		
استاد		
	I.	DEVELOPMENT OF HYDROPOWER
		1. Ancient History of Waterpower
		2. Waterpower's Contribution to the Industrial Revolution
		3. Drivers of and Deterrents to Hydropower Development
	п	Basics of Hydropower
	11.	1 Hydropower Types and Their Components
		2. Power Output from Hydroelectric Power Plants
		3. Types and Components of Hydropower
		4. Storage Type Hydroelectric Plants
	III.	Site Selection and Feasibility Study for Hydropower Projects
		1. Overview
		2. Measurement of Head
Syllabus		3. Measurement Procedure
مفردات		4. Flow Measurement Using Float Method
		5. Sizing of a Micro or Mini Hydropower Plant
		6. Site Selection
		/. Project Implementation Schedule
	IV	Intake and Diversion Works
	1 .	1 Overview
		2. Types of Intake
		3. Trash Racks for Intakes
		4. River Training Works
		-
	V.	Headrace
		1. Overview
		2. Basic Criteria for Headrace Sizing
		3. Other Considerations for Headrace Canals

	4. Headrace Canal Design
	5. Spillways
	6. Headrace Pipe
VI.	Gravel Trap, Settling Basin, and Forebay
	1. Overview
	2. Sediment Transport Capacity of River
	3. Theory of Sedimentation
	4. Gravel Trap
	5. Settling Basin
	6. Forebay
	7. Spillway
	8. Structural Design of Settling Basin and Forebay
VII.	Penstocks
·	1. Overview
	2 Selection of the Penstock Alignment
	3 Profile of the Selected Alignment
	4 Selection of Pine
	5. Surge Pressure in Penstock
	6 Dina Wall Thickness
	7 Denstook Accessories
	<ol> <li>Pensiock Accessories</li> <li>Ding Lainting</li> </ol>
	8. Pipe Jointing
	9. Pipe Lengins
	10. Exposed versus Burled Penstock
	11. Expansion Joints
	12. Painting
	13. Installation
	14. Maintenance
	15. Checklist for Penstock Work
VIII. <u> </u>	Powerhouse
	1. Overview
	2. Classification of the Powerhouse
	3. Equipment and Accessories in the Powerhouse
	4. Layout of Powerhouse
	5. Components of Powerhouse Structure
	6. Site Selection of the Powerhouse
	7. Design of the Powerhouse
	8. Design of Machine Foundation
	9. Design of Superstructure
	10. Construction of Powerhouse
	11. Tailrace
IX.	Hydraulic Turbines
	1. Basic Theory
	2. Types of Turbines
	-
<b>X</b> .	Impulse Turbines
-	1. Pelton Turbines

	2 Turner Turkinge
	2. Turgo Turbines
	3. Cross-Flow Turbine
	XI. <u>Reaction Turbines</u>
	1. Basic Calculations
	2. Draft Tubes
	3. Cavitation
	4. Francis Turbine
	5. Axial Flow Reaction Turbines: Propeller and Kaplan
	6. Governors
	7. Pumps as Turbines
	8. Reversible Pump Turbines for Pumped Storage
	XII. Very Low Head and River Current Turbines
	1. Very Low Head Turbines
	2. Water Current Turbines
	XIII. Electrical Power
	1. Fundamentals of Electricity and Magnetism
	2. Generators
	3. Electronic Control of Hydropower Systems
	4. Transmission and Distribution
Pre-requisite	None
مخکینی ارین	
مضامين	
Related Courses	Electrical Machines and Drives and Fluid Mechanics
ار و نده مضامین	
Teaching and	Lectures, tutorials, and assignments
Learning	
methods	
د تدریس میتود	
Computer	Moderate computer knowledge such as MS Word, MS Excel, MS
Knowledge	PowerPoint, and CAD.
د کمپيوتر زده کړی	
ته ارتيا	
	Text Books:
	درسی کتاب
	• Bikash Pandey and Ajoy Karki, HYDROELECTRIC ENERGY.
	Renewable Energy and the Environment, CRC Press
Course	
Materials and	
	<u>Reference</u> :
References	<u>Reference</u> : اخځليکونه
References	<u>Reference</u> : <u>اخځلیکونه</u> • Bryan Leyland. Small Hydroelectric Engineering Practice 1st
References د مضمون درسي	<u>Kererence</u> : <u>اخخلیکونه</u> • Bryan Leyland. Small Hydroelectric Engineering Practice 1st Edition, ISBN-13: 978-1138000988, ISBN-10: 1138000981
References د مضمون درسي مواد او اخځليکونه	Kererence:         الخطيكونه         • Bryan Leyland. Small Hydroelectric Engineering Practice 1st Edition, ISBN-13: 978-1138000988, ISBN-10: 1138000981         • K N Sharma & M Dandekar. Water Power Engineering, Second
References د مضمون درسي مواد او اخځليکونه	Reference:         (Active Power Engineering Practice 1st Edition, ISBN-13: 978-1138000988, ISBN-10: 1138000981         • K N Sharma & M Dandekar. Water Power Engineering, Second Edition, ISBN 9789325968981
References د مضمون درسي مواد او اخځليکونه	Keterence:         (Action is the state of the stat
References د مضمون درسي مواد او اخځليکونه	<u>Kererence</u> :         ()         • Bryan Leyland. Small Hydroelectric Engineering Practice 1st Edition, ISBN-13: 978-1138000988, ISBN-10: 1138000981         • K N Sharma & M Dandekar. Water Power Engineering, Second Edition, ISBN 9789325968981         • Subahash Chander Mittal. Hydropower for common understanding,

	Evaluation activities and Grades د ارزونی فعالیتونه او نمري									
Ac ت	tivity فعاند	یے هدف					Marks نمری			
Attend	ance and						<u>ç</u> ,			
c	lass ibution	Attending class, con	ntributi	ons to k	nowle	dge and		_		
و په	حاضري ا	relationships with the	he grou	p.		C		5		
ېرخه ،	درس کي برخه اخستل									
Assig نده	gnments	Solving the indicate	ed probl	lems fro	om the	;		5		
Labora	atory and	Weekly laboratory/	field tri	n report	e that	include				
field tri	ip reports	abstract, introductio	on, meth	nod, resi	ult,	literude		15		
د لابراتوار/ ساهي راپورونه			lication	l <b>.</b>						
Qu ونبي	Quizzes Quizzes include teaching materials and							5		
Midter	rm exam	The midterm exam includes the covered topics.					20			
Fina	Final exam     The final exam includes the covered topics after						50			
وروستی ازموینه the midterm exam.										
ا Otal Course Marks رکورس محمو عرب نمر ی				د د				100		
		Relationship of this	Course	to Prog	ram L	earning Ou	tcome			
	Γ	ونيزو موخو سره	لليدي ښو ا	انګې له ک	بکه د څ م	د مضمون اړي				
			1	2	Pr	ogram Out	comes	6	-	
			1	2	3	4	3	0	1	
No.	Cou	rse Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	To descri	be the water flow	1	2	2	2	2	2	3	
	To perfor	rm theoretical			1	<u> </u>				
2	calculatio	ons on hydropower	3	3	3	3	3	3	3	
		i spiiiway								
	discharge	·,								

	Average 2.4							
	Total	2.3	2.4	2.0	2.4	2.6	2.6	2.7
7	To work together in a project related to the course contents.	3	3	3	3	3	2	2
6	To discuss the environmental effects of hydropower installations,	2	2	2	2	3	3	3
5	To explain voltage and turbine regulation and how these affect the electrical grid and the mechanical system with turbine and generator,	2	2	2	2	2	2	2
4	occurring in the waterways To describe the principles of the electrical components and perform calculations of the parameters of the electrical system,	2	2	2	2	2	2	2
	parameters for different turbine concepts and hydraulic transients							

# En. Ene 0624 Thermal Power Plant

Item	Description		ته مند دات					
موضوع	Description	<del>_</del> <del>_</del>						
Title	En Ene 062	24 Thermal Power I	Plant					
عنوان يا مضمون								
Credits and no. of	Total	Total Theoretic , a til Practical , las						
hour	ټوليزه	Theoretic Q_						
د کرېدتونو او درسي	3	2	1					
ساعتونو شمېر	5	2	1					
Offering year and								
semester	Third Year -Second Semester							
د تدریس کال او سمستر								
A :	This course introduces the concept of power plants and analysis steam							
Aim	power plan	ts, fuels and comb	ustion, diesel power plant, Gas turbine					
موخي	power plant	, nuclear power pla	int, Hydro-electric power plant and their					
	Key learnin	$\sigma$ outcomes of this	course should be as follows:					
	• Use of Thermodynamics knowledge to analyze and solve problem							
Key Learning	Ose of Thermodynamics knowledge to analyze and solve problem related to power plants							
Outcomes	• Unders	stand the various ty	pes of power plants and the appropriate					
كليدي بنىوونيز نتايج	energy	resources for them						
	• Studen	ts learn energy pla	anning and will be able to analyze and					
	design	design the selected power plants.						

Academic Staff	Engineer
Desponsible	Engineer
د تاریس مسول است	I EUNDAMENTAL OF DOWED DI ANT
	1. Introduction
	1. Infoduction 2. Concert of Device Plants
	2. Classification of Power Plants
	3. Classification of Power Plants
	4. Energy
	5. Types of Energy
	6. Power
	7. Resources for Power Generation
	8. Present Power Position in Afghanistan
	9. Future Planning for Power Generation
	10. Review of Thermodynamics Cycles Related to Power
	Plants
	11. Classification of Power Plant Cycle
	12. Fuels and Combustion
	13. Steam Generators
	14. Steam Prime Movers
	15. Steam Condensers
	16. Water (Hydraulic) Turbines
	II. POWER PLANT ECONOMICS AND VARIABLE LOAD
	PROBLEM
	1. Terms and Factors
Syllabus	2. Factor Effecting Power Plant Design
مفرداتٌ	3. Effect of Power Plant Type on Costs
•	4. Effect of Plant Type on Rates (Tariffs or Energy Element)
	5. Effect of Plant Type on Fixed Elements
	6. Effect of Plant Type on Customer Elements
	7. Investor's Profit
	8 Economics in Plant Selection
	9 Economic of Power Generation
	10 Industrial Production and Power Generational Compared
	11. Load Curves
	12 Ideal and Realized Load Curves
	12. Ideal and Realized Load on Dower Dian Design
	13. Effect of Variable Load on Power Plant Operation
	14. Effect of Variable Load on Power Plant Operation
	III. <u>STEAM POWER PLANT</u>
	2. Essentials of Steam Power Plant Equipment
	3. Coal Handling
	4. Fuel Burning Furnaces
	5. Method of Fuel Firing
	6. Automatic Boiler Control
	7. Pulverized Coal
	8. Pulverized Coal Firing
	9. Pulverized Coal Burners

	10. Water Walls
	11. Ash Disposal
	12. Smoke and Dust Removal
	13. Types of Dust Collectors
IV.	STEAM GENERATOR
	1. Introduction
	2. Types of Boilers
	3. Cochran Boilers
	4. Lancashire Boiler
	5. Locomotive Boiler
	6. Babcock Wilcox Boiler
	7. Industrial Boilers
	8. Merits and Demerits of Water Tube Boilers over Fire Tube
	Boilers
	9. Requirements of a Good Boiler
	10. High Pressure Boilers
V.	STEAM TURBINE
	1. Principle of Operation of Steam Turbine
	2. Classification of Steam Turbine
	3. The Simple Impulse Turbine
	4. Compounding of Impulse Turbine
	5. Pressure Compounded Impulse Turbine
	6. Simple Velocity-Compounded Impulse Turbine
	7. Pressure and Velocity Compounded Impulse Turbine
	8. Impulse-Reaction Turbine
	9. Advantages of Steam Turbine over Steam Engine
	10. Steam Turbine Capacity
	11. Capability
	12. Steam Turbine Governing
	13. Steam Turbine Performance
	14. Steam Turbine Testing
	15. Choice of Steam Turbine
	16. Steam Turbine Generators
	17. Steam Turbine Specifications
VI	FUELS AND COMBUSTION
V1.	1 Introduction
	2 Coal
	3 Coal Analysis
	4 Coal Firing
	5. Mechanical Stokers
	6. Pulverized-Coal Firing
	7. Cyclone Furnaces
VII.	DIESEL POWER PLANT
	1. Introduction
	2. Operating Principle
	3. Basic Types of IC Engines

4. Advantage of Diesel Power Plant
5. Disadvantage of Diesel Power Plant
6. Application of Diesel Power Plant
7. General Layout of Diesel Power Plant
8. Performance of Diesel Engine
9. Fuel System of Diesel Power Plant
10. Lubrication System of Diesel Power Plant
11. Air Intakes and Admission System of Diesel Power Plant
12. Supercharging System of Diesel Power Plant
13. Exhaust System of Diesel Power Plant
14. Cooling System of Diesel Power Plant
15. Diesel Plant Operation
16. Efficiency of Diesel Power Plant
17. Heat Balance Sheet
VIII. GAS TURBINE POWER PLANT
1. Introduction
2. Classification of Gas Turbine Power Plant
3. Elements of Gas Turbine Power Plants
4. Regeneration and Reheating
5. Cogeneration
6. Auxiliary Systems
7 Control of Gas Turbines
8 Gas Turbine Efficiency
9 Operations and Maintenance Performance
10 Troubleshooting and Remedies
11 Combined Cycle Power Plants
12 Applications of Gas Turbine
13 Advantages of Gas Turbine Power Plant
14 Disadvantages of Gas Turbine Power Plant
IX Nuclear Power Plant
1 Introduction
2. General History and Trand
2. Concratinistory and Trend
5. The Atomic Structure
4. Summary of Nuclear Energy Concepts and Terms
5. Ethical Problems III Nuclear Power Regulation
<ol> <li>Chemical and Nuclear Equations</li> <li>Nuclear Engine and Engine</li> </ol>
7. Nuclear Fusion and Fission
8. Energy From Fission and Fuel Burn Op
9. Radioactivity
10. Nuclear Reactor
11. Conservation Ratio
12. Neutron Flux
13. Clasification of Reactors
14. Cost of Nuclear Power Plant
15. Nuclear Power Station in India
16. Light Water Reactor (LWR) and Heavy Water Reactor
(HWR)
17. Site Selection
18. Comparison of Nulcear Power Plant and Steam Power Plant

19. Multiplication Factor								
	20. Uranium Enrichmen	nt						
	21. Reactor Power Con	trol						
	22. Nuclear Power Plan	t Economics						
	23. Safety Measures for	r Nuclear Power Plants						
	24. Site Selection and C	Commissioning Procedure						
	25. Major Nuclear Pow	25. Major Nuclear Power Disasters						
	26. Chernobyl Nuclear	Power Plant						
	27. Safety Problems in	Chernobyl Reactor Design						
	28. Other. Earlier. Sovi	et Nuclear Accidents						
Pre-requisite	Thermodynamics-I & II							
مخکینی ارین مضامین	Heat Transfer							
Related Courses	Physics-II Engineering Mecha	nics: Statics						
ار و نده مضامین								
Teaching and	Lectures tutorials and assignm	ents						
Learning methods								
د تدریس میته د								
Computer	Moderate Computer Knowledge	ge such as using MS Word MS Excel						
Knowledge	MS PowerPoint and CAD	ge such as, using wis word, wis Exect,						
د کمیده تر زده کرم، ته	WIST OWEN ONLY and CAD,							
- <u>موتر ر- محري -</u> اد تدا								
<u>چ</u> ے	Taxt Books:							
	<u>Text BOOKS</u> .							
	• Raja. A.K. Srivastava A.P. and Dwivedi M. (2006). <i>Power</i>							
Course Materials	Plant Engineering. Ne	w Age International (P) Ltd., Publishers						
and References	<u>Reterence</u> :							
د مضمون درسي مواد او	الحظيكونه							
اختليكونه	• DIPAK K. SARKAR,	(2015). THERMAL POWER PLANT						
	(Design and Operation),	Elsevier Inc. All rights reserved.						
	• Nag, P. K. (2008). Pow	er Plant Engineering (3rd Edition). Tata						
	McGraw Hill							
	Evaluation activities a	and Grads						
	ني فعاليتونه او نمري	د ارژو						
Activity	Scope	Marks						
فعاليت	هدف	نمري						
7. Attendance and	Attending the class,							
class contribution	contribution to the	5						
حاضري او په درس	knowledge and relationship	3						
كي برخه اخستل	with the group.							
0 Assistants	Solving the indicated							
8. Assignments	problems from the problem	5						
خورىي دىدە	list and submitting on time.							
9. Laboratory and	Weekly laboratory/field trip							
field trip reports	reports that include abstract,							
د لابر أتو ار/ ساحي	introduction, method, result.	15						
ر ايورونه	conclusion and implication							
10. Ouizzes	The quiz includes teaching							
صنف ارزهنی	materials and assignments	5						
<u> </u>	materials and assignments							

		ous classe	es.						
11.	Midterm	The midterm ex	am includes						
	exam	CS		20					
4	منحنئ أزمويد	The even include	dag tha						
12.	Final exam	covered topics a	ifter the				50		
نه	وروستي ازموي	midterm exam	atter the				20		
		Total Course M	arks				100		
		س مجموعي نمري	د کور				100		
	Rel	lationship of this (	Course to	o Progr	am Lea	rning Ou	utcome		
		ونيرو موجو سره	کليدي ښو	فانحي له	ړيده د ۲ Pro	. مصمون ا ram Ou	itcomes		
			1	2	2		5	(	7
			1	2	3	4	3	0	/
No.	Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Use of t	thermodynamics							
	knowledge t	o analyze and	2	2	2	2	2	2	2
	solve proble	em related to							
	power plants.								
2	Understand th	ne various types							
	of power p	blants and the	2	2	2	2	2	2	2
	appropriate e	nergy resources	5	5	5	5	5	5	5
	for them.								
	Analyze and	design of the							
	mentioned powerplant		3	3	3	3	3	3	3
3	Learn energy	planning for the							
	mentioned po	wer plants.	3	3	3	3	3	3	3
	Total	l	2.75	2.75	2.75	2.75	2.75	2.75	2.75
	Averag	ge				2.75		-	-
	1= Some r	elation 2= M	oderate	relatio	n	3= Exte	ensive re	lation	
L									

Item موضوع	Description		توضيحات					
Title عنوان یا مضمون	En. Ene 0727 E	En. Ene 0727 Electrical Systems of Buildings						
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical					
د کرپدتونو او درسي ساعتونو شمير	3	2	1					
Offering year and semester د تدریس کال او سمستر	Fourth year - F	Fourth year - First semester						
Aim موخي	Upon completing this course, students will be able to (i) understand lighting and daylighting in buildings (ii) understand electrical circuits and its components (iii) Analyze and design of electrical protection systems in buildings (iv) Analyze and design of electrical systems in residential buildings (v) analyze and design of electrical systems in commercial buildings (vi) Draw electrical maps of buildings using electrical Auto CAD and create final biding documents for the electrical systems of buildings. This course will also help students develop important problem-solving and critical thinking skills that will be broadly applicable throughout their lives and careers.							
Key Learning Outcomes کلیدي ښوونیز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Explain basics of electrical systems of buildings and understand its importance.</li> <li>Understand lighting and daylighting in buildings</li> <li>Understand electrical circuits and its components</li> <li>Analyze and design of electrical protection systems in buildings</li> <li>Analyze and design of electrical systems in residential buildings</li> <li>Analyze and design of electrical systems in commercial buildings</li> <li>Draw electrical maps of buildings using electrical Auto CAD and</li> </ul>							
Academic Staff Responsible د تدریس مسئول								
Syllabus مفردات	I. <u>INT</u> 1. Intro 2. Ove 3. Gen II. <u>LIGH</u> 1 A C	RODUCTION oduction rview of Building Electrical Dis eral Design Approach <u>TING AND DAYLIGHTING O</u> hronicle of Artificial Lighting	tribution Systems <u>F BUILDINGS</u>					
	2. Elements of Seeing							

### En. Ene 0727 Electrical Systems of Buildings

3. Light	
4. The Color of Light	
5. Characteristics of Artificial Lighting	
6. Types of Artificial Light Sources	
7. Forms of Architectural Lighting	
8. Lighting Installations	
9. Light Distribution and Glare	
10. Illuminance and Luminance	
11. Principles of Lighting Design	
12. Lighting Design Practices and Considerations	
13. Lighting System Controls	
14. Daylighting Principles	
III. OVERVIEW OF ELECTRICAL CIRCUITS AND	
COMPONENTS	
1. Introduction	
2. Review of DC and AC Circuits	
3. Multiphase AC Systems	
4 Power Factor Correction	
5 Building Electrical Service Equipment	
6 Overcurrent Protection: Fuses and Circuit Breakers	
7 Utilization Equipment and Devices	
8 Conductors	
0 Enclosures and Baceways	
10 Electric Motors	
TO. Electric Motors	
IV DROTECTION SYSTEMS	
1 Introduction	
2 Impact of Electricity on Humans	
<ol> <li>Basic Operation of Protection Devices</li> </ol>	
4 Types of Protection Devices	
<ol> <li>Types of Trotection Devices</li> <li>Grounding and Bonding</li> </ol>	
5. Grounding and Bonding	
1 Introduction	
<ol> <li>Infoduction</li> <li>Size and Bating of Conductors</li> </ol>	
2. Size and Rating of Conductors	
5. Design of Conductors	
<ol> <li>Selection of Conduits</li> <li>Branch Circuits and Feeders for Non-motor Loads</li> </ol>	
5. Branch Circuits and Feeders for Non-motor Loads	
6. Branch Circuits and Feeders for Motors	
VI ELECTRICAL SYSTEMS FOR DESIDENTIAL DUILDING	7
VI. <u>ELECTRICAL STSTEMS FOR RESIDENTIAL BUILDING</u>	2
1. Infoduction 2. Consul Design Amproach	
2. General Design Approach 3. Main Service Entrance Design	
5. Iviani Service Entrance Design	
4. Dranch Uncurs for Residential Buildings	
5. General Design Procedure	
o. Electrical Systems for Apartment Buildings	

	VII	ELECTRICAL SYSTEMS FOR COM	MEDCIAL DUILDINGS					
	V 11.	<u>ELECTRICAL STSTEMS FOR COM</u>	MERCIAL BUILDINGS					
		1. Introduction						
		2. Short-Circuit Currents						
		3. Lighting and Power Panels						
		4. Motor Control Centers Design						
		5. Switchboards and Unit Substations						
		6. Emergency Systems						
	VIII.	VIII. DRAWING OF ELECTRICAL MAPS USING AUTOCAD						
		1. Drawing of Electrical Maps for Resi	dential Buildings					
		2. Drawing of Electrical Maps for Commercial Buildings						
			6					
Pre-requisite	Engine	ering Circuits Analysis						
مخكيني اړين								
مضامين								
Related	Engine	ering Physics III, Engineering Circuits A	nalysis					
Courses								
اړونده مضامين								
Teaching and	Lecture	es, tutorials, and assignments						
Learning		C .						
methods								
د تدريس ميتود								
Computer	Moder	ate computer knowledge such as M	S Word, MS Excel, MS					
Knowledge	Powerl	Point and CAD						
د کمیتو تر زده	10000							
کری ته ارتبا								
ھې مد <u>م</u>	Text B	poks:						
	<u>بر عامی المار</u> بیر کتاب							
	• Mo	<u>y</u> ncef Krarti, Energy Efficient Electrical S	Systems for Buildings CRC					
Course	Pre	ass 2017 ISBN 13. 978-1-4822-5833-2	systems for Dundings. Cive					
Materials and	Defere	2017. ISBN 15. 770-1-4022-5055-2						
References	At of the	<u>100</u> .						
د مضمون درسي	<u>عىيىرى-</u>	I and D. Waish French D. Desertion	Mashanian I That is a					
مواد او	•	Joseph B. Wujek, Frank R. Dagosuno	b, Mechanical and Electrical					
اخطيكونه		Systems in Architecture, Engineerin	ig, and Construction, 5th					
		Edition, Prentice Hall, 2010, ISBN 13:	9/8-0-13-500004-5.					
	•	Rechard R. Janis, William K.Y. Tao, M	echanical and Electrical					
		Systems in Buildings, 4 <sup>th</sup> Edition, Prent	ice Hall, 2008.					
		Evaluation activities and Grades						
Activity		د ارزوني فعاليتونه او نمري	Mortza					
مرالیت فوالیت		دفعه						
Attendance and	d class							
contributio	on	Attending class, contributions to	_					
حاضر م، او به در س کې		knowledge and relationships with the 5						
خه أخستل	بر	group.						
Assignment	nte	Solving the indicated problems from						
Assignmen	ns .<	the problem list and submitting on	5					
ر ئي دنده	<del></del>	time.						

Labo	oratory and field	Weekly laboratory/field trip reports								
trip reports		that include a	abstract	, introd		15				
Ĺ	د لابراتوار/ ساح	method, resu	lusion a							
	راپورونه	implication.								
	Ouizzoa	Quizzes inclu	Quizzes include teaching materials							
	Quizzes	and assignme	ents from	n two p	oreviou	s	5			
	لصنعي ارزوني	classes.								
М	lidterm exam	The midterm	exam i	ncludes	the		21	n		
	منځنئ ازموينه	covered topic	es.				20	5		
	Final exam	The final exa	m inclu	ides the	covere	ed	5(	)		
4	وروستي ازموينه	topics after th	ne midte	erm exa	ım.		5	5		
		Total Course	Marks				10	0		
		مجموعي نمري	د کورس				10	0		
	Relation	onship of this <b>(</b>	Course	to Prog	ram Le	arning Outco	ome			
	ſ	ونيزو موخو سره	کليدي ښو	انګې له ا	يکه د خ	د مضمون اړ				
					Pro	gram Outco	omes			
			1	2	3	4	5	6	7	
						er			-	
			and		Jue	oth			an	
			ce :		hnic	y /ith	nud		dno	
			cien	ata	tec	.ppl ce w	ial a	ely	a gr eam	
No.	Course Ou	s, sc	se d	pun	nd a enc	sion ty	ctiv	in a y te		
		atics	alyz	ols a	g ar cum	fess bili	ffee	ion		
			emi	luct/an	toc	king	pro onsi	te e	inct	
			ath ing	conc	lern	hin ge ( es	bnd	nica	o fu disc	
			y m ieer	gn/c rime	noc	cal 1 /led plin	erste al re	Inui	ty t ilti-	
			hppl ngir	esig xpe	l se 1	rritid now iscij	Ind€ thic	om	ilid. Im n	
	<b>TT 1 1 1</b>	1.1 1	e P	бЦ		C k d	e. C	C	A ii	
1	Understand lig	ghting and	1	1	1	2	3	2	2	
	Understand li	outing and								
2	davlighting in	buildings	2	2	2	2	3	2	2	
	Understand elect	trical circuits								
3	and its com	ponents	2	2	2	2	3	2	2	
	Analyze and	design of								
4	electrical protec	tion systems	3	3	3	2	3	2	3	
	in build	ings								
	Analyze and	design of								
5	electrical sy	stems in	3	3	3	2	3	2	3	
	residential buildings									
	Analyze and	design of								
6	electrical sy	stems in	3	3	3	2	3	2	3	
	commercial	buildings								
	Draw electric	al maps of								
7	buildings usin	g electrical	3	3	3	3	3	2	3	
/	Auto CAD and	create final	5	5	5	5	5	4	5	
	biding docume	ents for the								

	electrical systems of								
	buildings.								
Total		2.4	2.4	2.4	2.1	3.0	2.0	2.6	
Average			2.4						
	1= Some relation 2= Moderate relation 3= Extensive relation								

## En. Ene 0728 Energy Efficiency

Item موضوع	Description		توضيحات			
Title عنوان یا مضمون	En. Ene 0728 Energy Efficiency					
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical			
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	2	1			
Offering year and semester د تدریس کال او سمستر	Fourth year - First se	emester				
Aim موخي	This course presents simplified analysis methods to evaluate energy conservation opportunities in buildings, industries and transport.					
Key Learning Outcomes کلیدي ښوونیز نتایج	<ul> <li>By the successful completion of this course, students will be able to:</li> <li>Understand the procedure of building energy audits.</li> <li>Understand and applying different energy conservation measures.</li> <li>Evaluate energy conservation measure from the economic point of view.</li> <li>Learn the usage of energy analysis tools.</li> <li>Understand energy efficient electrical systems.</li> <li>Understand and apply methods for estimating energy savings.</li> <li>Evaluate different energy conservation measures by retrofitting building envelope, secondary HVAC system, lighting and other electrical equipment.</li> <li>Manage energy and understand control systems</li> <li>Understand cogeneration benefits</li> <li>Analyze energy conservation by water management in buildings.</li> <li>Understand the integration of energy efficiency with renewable generation</li> <li>Conduct energy audit of industries</li> <li>Conduct energy audit of urban transportation</li> </ul>					
Academic Staff Responsible د تدریس مسئول استاد						

	I. <u>INTRODUCTION TO ENERGY AUDIT</u>
	1. Introduction
	2. Types of Energy Audits
	3. General Procedure for a Detailed Energy Audit
	4. Common Energy Conservation Measures
	5. Case Study
	6. Verification Methods of Energy Savings
	II ENERGY SOURCES AND LITH ITY RATE STRUCTURES
	1 Introduction
	2 Energy Resources
	3 Electricity Rates
	4 Natural Gas Rates
	5 Utility Rates for Other Energy Sources
	5. Other March Store Chergy Sources
	III. <u>ECONOMIC ANALYSIS</u>
	1. Introduction
	2. Basic Concepts
	3. Inflation Rate
	4. Compounding Factors
	5. Economic Evaluation Methods among Alternatives
	6. Life-Cycle Cost Analysis Method
	7. General Procedure for an Economic Evaluation
Syllabus	8. Financing Options
مفردات	W ENERGY ANALYSIS TOOLS
	IV. <u>ENERGY ANALISIS TOOLS</u>
	1. Introduction 2. Batic Based Methods
	2. Ratio-Dased Methods
	Inverse Modeling Methods     Earward Modeling Methods
	4. Forward Modering Methods
	V. <u>ELECTRICAL SYSTEMS</u>
	1. Introduction
	2. Electrical Motors
	3. Lighting Systems
	4. Electrical Appliances
	5. Energy Efficient Electrical Equipment
	6. Electrical Distribution Systems
	7. Power Quality
	VI. BUILDING ENVELOPE RETROFIT
	1. Introduction
	2. Basic Heat Transfer Concepts
	3. Simplified Calculation Tools for Building Envelope Audit
	<ol> <li>Selected Retrofits for Building Envelope</li> </ol>
	VII. <u>SECUNDAKY HVAC SYSTEMS RETROFT</u>
	1. Introduction
	2. Types of Secondary HVAC Systems

3. Ventilation Systems
4. Ventilation of Parking Garages
5. Indoor Temperature Controls
6. Upgrade of Fan Systems
7. Common HVAC Retro-t Measures
VIII. ENERGY CONSERVATION MEASURE IN HEATING
<u>EQUIPMENT</u>
1. Introduction
2. Basic Combustion Principles
3. Boiler Efficiency Improvements
IX. ENERGY CONSERVATION MEASURE IN COOLING
EQUIPMENT
1. Introduction
2. Chiller Replacement
3. Chiller Control Improvement
4. Alternative Cooling Systems
X. ENERGY MANAGEMENT CONTROL SYSTEMS
1. Introduction
2. Basic Control Principles
3. Energy Management Systems
4 Control Applications
XI COMPRESSED AIR SYSTEMS
1 Introduction
2 Review of Basic Concepts
3 Common Energy Conservation Measures for Compressed Air
Systems
Systems
XII THERMAL ENERGY STORAGE SYSTEMS
1 Introduction
2 Types of TES Systems
2. Principles of TES Systems
4 Charging/Discharging of TES systems
4. Charging/Discharging of TES systems
5. TES Control Strategies
6. Measures for Reducing Operating Costs
XIII POWER GENERATION AND COGENERATION SYSTEMS
1 Introduction
2. Papafits of Cogeneration
2. Benefits of Cogeneration
4. Types of Eval Deced Constantion Systems
4. Types of Fuel-Based Generation Systems
5. Evaluation of Cogeneration Systems
o. Case Study
VIV HEAT DECOVEDV SVSTEMS
AIV. <u>EAI KEUVEKI SISIEMS</u>
1. Introduction
2. Types of Heat Recovery Systems
------------------------------------------------------------
3. Performance of Heat Recovery Systems
4. Simplified Analysis Methods
XV. WATER MANAGEMENT
1. Introduction
2. Indoor Water Management
3. Outdoor Water Management
4. Swimming Pools
XVI. METHODS FOR ESTIMATING ENERGY SAVINGS
1. Introduction
2. General Procedure
3 Energy Savings Estimation Models
A Applications
5. Uncertainty Analysis
5. Oncertainty Analysis
VVII ODTIMAL INTEGRATION OF ENERGY EFCIENCY WITH
DENEWADIE CENERATION
<u>RENEWABLE GENERATION</u>
1. Introduction
2. Optimization Approaches
3. Near-Optimal Analysis Methodology
4. Case Study 1: Optimal Retrofit and Design of Homes
5. Case Study 2: Design of Optimal Hybrid Systems
XVIII. <u>CASE STUDIES</u>
1. Reporting Guidelines
2. Case Study 1: Walk-rough Audit of a Residence
3. Case Study 2: Standard Audit of a Residence
4. Case Study 3: Audit of a Museum
XIX. <u>MANAGING ENERGY EFFICIENCY IN INDUSTRY</u>
1. Introduction
2. Energy Management in Industry
3. Considering the Complexity of a System
4. Transition in Organizations
5. Transactional Analysis in Relation to Energy Management
6. Establishing Energy Management Within an Organization
7. Energy Management: The Need to Lead While Delegating
Leadership
8. Delegating Authority and Taking Risk
9. The Adoption of an Energy Strategy
10. To Concretize: Success Factors for In-House Energy
Management
<u> </u>
XX. ENERGY EFFICIENT URBAN TRANSPORT
1. Introduction
2. Barriers to Urban Transport System Efficiency
3 Government Policy Role to Remove Barriers
5. Government i oney Role to Remove Damers

Pre-requisite	None				
محكيني ارين مصامين					
Related Courses اړونده مضامين	Solar Energy, Heat Transfer and HVAC				
Teaching and Learning methods د تدریس میتود	Lectures, tutorials, and assignments				
Computer Knowledge	Moderate computer knowledge such as MS V PowerPoint, CAD and eQUEST	Word, MS Excel, MS			
د کمپيوتر زده کړې ته اړتيا					
	<u>Text Books</u> : <u>درسی کتاب</u> • Krarti.Moncef (2011). Energy Audit of B Engineering Approach (2nd Edition). CR	uilding Systems, an C Press.			
Course Materials and References	<u>Reference:</u> <u>اخځلیکونه</u> Moncef Krarti, Energy Efficient Electrical Systems for Buildings. CRC Press, 2017, ISBN 13: 978-1-4822-5833-2				
ا مصفول درمی مراد او اخطَلیکونه	<ul> <li>Patrik Thollander, Jenny Palm, Improving Energy Efficiency in Industrial Energy Systems, (2013), Springer ISBN 978-1-4471- 4161-7</li> </ul>				
	<ul> <li>Ming Fang, Am Fu, Energy Efficiency, 978-1-4471-6665-8</li> <li>Penni McLean-Conner, Energy Efficience, (2009), PennWell.</li> </ul>	ency: Principles and			
Evaluation activitio ونی فعالیتونه او نمر ی	es and Grades د ارز				
Activity	Scope	Marks			
فعاليت	هدف	نمرى			
Attendance and class contribution حاضري او په درس کي برخه اخستل	Attending class, contributions to knowledge and relationships with the group.	5			
Assignments کورني دنده	Solving the indicated problems from the problem list and submitting on time.	5			
Laboratory and field trip reports د لابراتوار/ ساحي راپورونه	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.	15			
Quizzes صنفي ارزوني	Quizzes includes teaching materials and assignments from two previous classes.	5			
Midterm exam منځنۍ ازموينه	The midterm exam includes the covered topics.	20			
Final exam وروستی ازموینه	The final exam includes the covered topics after the midterm exam.	50			
	Total Course Marks د کورس مجموعی نمری	100			

	Relationship of this Course to Program Learning Outcome							
	.ي ښوونيزو موخو سره 	فې له کليد	که د څانځ	ون اړين	د مضم			
				Prog	ram Outc	omes		
		1	2	3	4	5	6	7
No.	Course Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
1	Understand the procedure of building energy audits.	1	1	1	2	3	2	2
2	Understand and applying different energy conservation measures.	3	2	2	2	3	2	2
3	Evaluate energy conservation measure from the economic point of view.	3	3	3	3	3	2	2
4	Learn the usage of energy analysis tools.	2	3	3	3	3	2	3
5	Understand energy efficient electrical systems.	3	3	3	2	3	2	3
6	Understand and apply methods for estimating energy savings.	3	3	3	3	3	2	3
7	Evaluate different energy conservation measures by retrofitting building envelope, secondary HVAC system, lighting and other electrical equipment.	3	3	3	3	3	2	3
8	Manage energy and understand control systems	3	3	3	3	3	3	3
9	Understand cogeneration benefits	3	2	2	2	2	2	3
10	Analyze energy conservations by heat recovery	3	3	3	3	3	2	3
11	Analyze energy conservation by water management in buildings.	3	3	3	3	3	2	3
12	Understand the integration of energy efficiency with renewable generation	3	3	3	3	3	2	3
13	Conduct energy audit of industries	3	3	3	3	3	3	3
14	Conduct energy audit of urban transportation	3	3	3	3	3	3	3
	Total	2.8	2.7	2.7	2.7	2.9	2.2	2.8
	Average				2.7			
	1= Some relation 2= Modera	ate rela	tion	3=	Extensive	e relati	on	

# En. Ene 0729 Wind Energy Engineering

Item موضوع	توضيحات Description						
Title عنوان یا مضمون	En. Ene 0	cn. Ene 0729 Wind Energy Engineering Theoretic تولیزه Practical عملی Practical					
Credits and no. of hour	ليزه Total	ټو	نظري Theoretic	عملي Practical			
د کرېدتونو او درسي ساعتونو شمير	3		2	1			
Offering year and semester د تدریس کال او سمستر	Fourth ye	ar-First semester					
Aim موخي	The obje understan design an grid opera	ctives of the prop ding of the wind d manufacturing, e ations.	oosed course is to l energy industry electric generation,	provide a broad from component transmission, and			
Key Learning Outcomes کليدي ښوونيز نتايج	Key learn Able to un Able to un Able to un Able to as Able to de	ing outcomes of the nderstand various w nderstand variuous nderstand connection ssess the wind power esign wind power s	is course should be a vinds such as local a types of wind turbin og the wind power to er resources. tation	as follows: nd global winds. ne aerodynamics o the grid			
Academic Staff Responsible د تدریس مسئول استاد							
Syllabus مفردات	I. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. II. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. II. 5. 6. 7. 8. 9. 10. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 8. 9. 10. 7. 7. 7. 8. 9. 10. 7. 7. 7. 7. 7. 7. 8. 9. 10. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7	THE WIND RES	OURCE ffect nd t ctor <u>ER PLANT</u> sses				
	III. 1.	WIND ENERGY	<u>CONVERSION</u>				

2.	Rotation Principle
3.	Forces on A Rotor Blade
4.	Factors Affecting Performance of Rotor
5.	Thrust and Torque on the Rotor
6.	Power Curve
7.	Lift Base VAWT
IV.	WIND TURBINE AERODYNAMICS
1.	Aerodynamic Power Regulation
2.	Stall Controlled WPP
3.	Pitch Controlled WPP
4.	Active-stall Controlled WPP
5.	Halting of WPP
6.	Other Method of Aerodynamic Control
V.	WIND POWER CONTROL STRATRGIES
1.	Introduction
2.	Power Control Classification
3.	Integrated Aerodynamic and Electric Control Strategies
4.	Power Electronic Converters
5.	Constant Speed and Variable Speed WPPs
6.	Back to Back PEC in WPP
VI.	QUALITY ISSUES OF WIND POWER
1.	Introduction
2.	Wind Power Impacts
3.	Local Impacts of Wind Power
4.	System Wide Impacts of Wind Power
5.	Wind Power Variability
6.	Islanding
7.	WPP Electrical Safety and Grid
8.	WPP Inertia
9.	Plant Load Factors
10.	Capacity Credit
VII.	GRID INTERGRTION OF WIND POWER
1.	The Electrical Grid
2.	Embedded Generation
3.	WPP in the Electric Grid
4.	Interface Issues
5.	Operational Issues
6.	Per Unit Calculation
7.	Simulation of Grid Connected WPP
VIII.	WIND RESOURCE ASSESSMENTS
	TECHNOLOGIES
1.	Wind Resource Assessment
2.	Wind Resource Assessment Sensors
3.	Meteorological Mast
I I	0

4.	Data Logger
5.	Wind Vane
6.	Anemometer
7.	Temperature Sensor
8.	Barometric Pressure Sensor
9.	Pyranometer
10	). Relative Humidity Sensor
1	1. Modem
12	2. Area Required by WPP
13	3. Software Analytical Tools
IX.	DESIGNE CONSIDERATION OF WIND POWER
	<u>PLANT</u>
1	. WPP Design Process
2	2. Generalized Rotor Design
	3. Aerodynamic Regulation Choice
2	A. Blade Number
	5. Blade Design
	5. Blade Manufacture
	7. Nacelle Design
8	3. Gearbox Choice
c c c c c c c c c c c c c c c c c c c	<ol> <li>Disc Brake Selection</li> </ol>
	0. Electric Generator Choice
1	1. Electronic Controller Choice
1	2. Hydraulic and Lubrication System
	3 Tower Design
	4 Substation Design
1	5 Foundation Design
	6 Key Equation for WPP Design Analysis
1	7 Specific Ratings of WPP
x	SMALL WIND TURBINES
Δ.	Need of SWT
	SWT Classification
	X VAWT and HAWT
-	Drag and Lift Based VAWTs
	HAWT Eastures
-	. HAWI realules
	5. Opwind and Downwind Sw 18
	Components
5	S. Geared and Direct Drive HAW IS
	2. Speed Regulation of SW1s
	U. UII Grid and on Grid SW1s
	1. Hybrid Wind Energy System
	2. Hybrid Wind Diesel System
	3. Consumer Labelling
	4. Choice of SWT
	5. SWT Siting
	6. Maintenance Iissues
	7. Health Objection to SWT
]	8. SWT Industry Challenges

Pre-requisite مخکینی ارین مضامین	No	one					
ي ي مدن Related Courses اړونده مضامين	El	ectrical Machin	es & Drives				
Teaching and Learning methods د تدریس میتود	Le	ectures, tutorials	s, and assignme	ents			
Computer Knowledge د کمپیوتر زده کړې ته اړتیا	M Po	oderate comput owerPoint, and (	er knowledge s CAD.	such as MS Wo	ord, MS Exc	el, MS	
	<u>Te</u> ناب	<u>ext Books</u> : <u>درسی کة</u> Earnest J PHI Lear	. (2015). <i>Wind</i> ning Private Li	Power Techno mited.	<i>logy</i> (2nd E	dition).	
Course Materials and References د مضمون درسي مواد او اخځليکونه	<u>Re</u> نه	<ul> <li><u>Keterence</u>:</li> <li>James F. Manwell, Jon G. McGowan, Anthony L. Rogers (2009). Wind Energy Explained: Theory, Design and Application (2nd Edition) Wiley.</li> <li>Hemami A. (2012). Wind Turbine Technology. Cengage Learning.</li> <li>Nelson V. (2009). WIND ENERGY, Renewable Energy and the Environment CPC Press</li> </ul>					
	1	Evaluation a ۱۰ او نمری	ctivities and G د ار زونی فعالیتونه	rades			
Activity فعاليت	Sc ف	ope				Marks نمري	
Attendance and class contribution حاضري او په درس کي برخه اخستل	At rel	tending class, c ationships with	contributions to the group.	knowledge an	d	5	
Assignments کورن <i>ي</i> دنده	So su	lving the indication bound the second s	ated problems f ie.	from the proble	m list and	5	
Laboratory and field trip reports د لابراتوار/ ساحي راپورونه	W int	eekly laborator troduction, met	y/field trip repo hod, result, con	orts that include clusion and im	e abstract, plication.	15	
Quizzes صنفي ارزوني	Qı tw	uizzes include to o previous clas	eaching materia	als and assignn	nents from	5	
Midterm exam منځنی ازموینه	Th	ne midterm exai	m includes the	covered topics.		20	
Final exam وروستی ازموینه	Th mi	ne final exam in dterm exam.	cludes the cove	ered topics afte	r the	50	
Total Course Marks د کورس مجموعی نمری					100		
Relatio د	nshi سر	ip of this Cours دی ښوونيزو موخو	e to Program L که د څانګی له کلیا	earning Outcor د مضمون اړي	me		
Skills / knowledge مهارتونه / زده کړه		۔ میڅ	Some یو څه	Moderate متوسط	Extensive زیات		

Ap	pply mathematics,					X			
science and engineering									
experiments/analyze data						Х			
Use	modern tools and					v			
	techniques					Λ			
Cri	tical thinking and								
a	pply knowledge					Х			
conc	currence with other								
Unde	disciplines								
and e	thical responsibility					Х			
Com	municate effectively					X			
Abi	lity to function in a								
gr	oup and in multi-					Х			
d	isciplinary team								
	Remarks				•				
	كتثي								
			1		Pro	gram Outc	omes	6	-
			1	2	3	4	5	0	7
No.	<b>Course Outco</b>	mes winds	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
	such as local and glowinds.	obal	1	1	1	2	3	2	2
2	Understand variuous of wind turbine aerodynamics	s types	2	2	2	2	3	2	2
3	Understand connecti wind power to the g	ing the	2	2	2	2	3	2	2
4	Assess the wind power resources.		3	3	3	2	3	2	3
5	Design wind power	station	3	3	3	2	3	2	3
	Total		2.4	2.4	2.4	2.1	3.0	2.0	2.6
	Average					2.4			
1= Some relation 2= Moderate relation 3= Extensive relation									

## En. Ene 0730 Solar Photovoltaic

Item موضوع	Description		توضيحات
Title عنوان یا مضمون	En. Ene 0730 Solar Ph	notovoltaic	
Credits and	ټوليزه Total	نظري Theoretic	عملي Practical
د کرېدتونو او درسي ساعتونو شمير	2	1	1
Offering year and semester د تدریس کال او سمستر	Fourth year - First sen	nester	
Aim موخي	This course will ex characteristics of PV techniques to mitig requirements for inter system-level electror interconnection.	plore and develop an under energy sources, the variability ate the variability of the connection to a smart-grid A nic circuits and controls r	erstanding the electrical ity of the solar resource, e electrical generation, C utility system, and the needed to perform the
Key Learning Outcomes کلیدي ښوونیز نتايج	At the end of the cours Understand F Understand s Understand s Understand s Understand F Design PV s Design PV s Understand p Maintain and Describe the systems.	se students should be able to: PV markets and applications safety basics electricity basics solar energy fundamentals PV module fundamentals systems system mechanical parts performance analysis I troubleshoot PV systems grid-interconnection requiren	nents for PV energy
Academic Staff Responsible د تدریس مسئول			
Syllabus مفردات	I. <u>BACKGR</u> 1. Intr 2. Vol 3. Cur 4. Elec 5. Elec 6. DC 7. Mea II. <u>INTRODI</u> 1. How Sou	ROUND oduction to Electricity tage rrent ctric Power ctrical Energy Power and AC Power asurement of Electrical Quant <u>UCTION TO PV SYSTEM</u> w Solar Cells are Batter than a irces of Electricity	ities any Conventional

	2. What is a Solar Cell?
	3. How Solar Cell Generates Electricity?
	4. Parameters of Solar Cells
	5. Solar Cell Technologies
	6. Factor Affecting Electricity Generated by a Solar Cell
III.	SOLAR PV MODULE
	1. What is a Solar PV Module?
	2. Ratings of PV Module
	3. Standard PV Module Parameters
	4. Factors Affecting Electricity Generated by a Solar PV
	Module
	5. Measuring Module Parameters
IV.	SOLAR PV MODULE ARRAY
	1. Connection of Modules in Series
	2. Connection of Modules Parallel Combination
	3. Connection of Modules in Series and Parallel (Mixed
	Combination)
V	BATTERIES
•••	1 Some Basics about Batteries
	<ol> <li>Some Dasies about Dateries</li> <li>How Does a Battery Work?</li> </ol>
	3 Types of Battery
	4 Parameters of Battery
	5. Comparison of Various Rechargeable Batteries
	6 How to Select a Battery?
	<ol> <li>Batteries for Photovoltaic (PV) Systems</li> </ol>
VI.	APPLICATION OF BATTERIES IN SOLAR PV SYSTEM
	1. Why to Connect Batteries Together?
	2. Estimating Number of Batteries Required in Series
	3. Estimating Total Energy Stored in Series Connected
	Battery Array
	4. Estimating Maximum Power form Series Connected
	Battery
	5. Parallel Connection
	6. Battery Bank Installation and Commissioning
	7. Battery Capacity
	8. Physical Maintenance
VII.	CHARGE CONTROLLER, MPPT AND INVERTERS
	1. Need for BOS
	2. Power Converters and Their Efficiency
	3. Ac to DC Converters
	4. DC to AC Converters (Inverters)
	5. DC to DC Power Converters
	6. Charge Controllers
	7. Maximum Power Point Tracking (MPPT)

	VIII. <u>SOLAR PV SYSTEM DESIGN</u>
	1. Types of Solar PV Systems
	2. Design Methodology for SPV System
	IX. <u>GRID-CONNECTED SOLAR PV POWER SYSTEMS</u>
	1. Introduction to Grid-connected PV Systems
	2. Configuration of Grid-connected Solar PV Systems
	3. Components of Grid-connected Solar PV Systems
	4. Grid-connected Solar PV Systems Design for small
	Power Application
	5. Grid-connected Solar PV Systems Design for Power Plant
	X. MECHANICAL CONSIDERATIONS
	1. Important Properties of Materials
	2. Establishing Mechanical System Requirements
	3. Design and Installation Guidelines
	4. Forces Acting on PV Arrays
	5. Array Mounting System Design
	6. Computing Mechanical Loads and Stresses
	7. Standoff, Roof Mount Examples
Pre-requisite	None
مخكيني اړين	
مضامين	
Related	Solar Energy Engineering and Engineering Circuit Analysis I
Courses	
اړونده مضامين	
Teaching and	Lectures, tutorials and assignments
Learning	
methods	
د تدریس میتود	
Computer	Moderate Computer Knowledge such as, using MS Word, MS Excel, MS
Knowledge	PowerPoint and CAD.
د کمپیوتر زده	
کړې ته اړتيا	
	• Konrad Mertens. (2018) PFundamentals, Technology and Practice.
Course	<ul> <li>Chetan Singh Solanki (2013) Solar Photovoltaic Technology and</li> </ul>
Materials and	system.
References	Reference:
د مضمون در سی	اخخليكونه
مواد او	• Mike Holt's Illustrated Guide to Understanding NEC Requirements
اخطيكونه	for Solar Photovoltaic Systems. (2014)
	• State Renewable Energy (2014). The Complete Guide to
	Understanding Solar Electricity. Kindle Edition. State Renewable
	<ul> <li>Michael Boxwell (2018) Solar Electricity Handbook: A simple</li> </ul>
	practical guide to solar energy: designing and installing solar

	<ul> <li>photovoltaic systems. Greenstream Publishing</li> <li>Heinrich Häberlin. (2012). Photovoltaics: System Design and Practice 1st Edition Wiley.</li> </ul>									
		<ul> <li>James P. Dunl</li> </ul>	op. (20	whey 12). Pho	otovol	taic Syste	ems	s, 3rd Ed	lition	
		Amer Technic	al Pub	ritica ar	d Cre	dag				
		Evaluati مری	on activ تونه او ند	و نے فعالی	u Gra د ارز	ues				
А	ctivity	Scope	<b>~ ~</b>	<b>y v</b> .			M	arks		
	فعاليت	هدف	نمري أهدف							
Att	endance									
an	d class	Attending the class contribution to the knowledge								
راھ	حاضر مي اه	and relationship with t	Attending the class, contribution to the knowledge						5	
<del>پ</del> خه	درس کے بر		ne grou	h.						
	و في بي بر اخستل									
Assi	ignments	Solving the indicated p	problem	s from	he pr	oblem			5	
0. 	کورني دند	list and submitting on	time.						-	
Lat	boratory	Waakhy laboratory/fial	d trip r	onorta ti	ot inc	luda				
r	eports	abstract introduction	method	result	concl	usion			15	
/	د لابراتوار	and implication.	methou	, 105410,	conci	usion			10	
ونه	ساحي راپور	•								
Q	uizzes	The quiz includes teac	hing ma	aterials a	and				5	
ب <i>ني</i>	صنفي ارزو	assignments from two	previou	is classe	s.		5			
Midt	erm exam	The midterm exam inc	ludes th	ne cover	ed top	bics	20			
Fin	al exam									
1 11	وروستى	The exam includes the	covere	d topics	after	the	50			
	ازموينه	midterm exam								
		Total Course Marks							100	
		د کورس مجموعي نمري		<u> </u>	<b>.</b>				100	
		Relationship of this C	ourse to	) Progra	m Lea	arning Ou	itec	ome		
		لووليرو مولكو شره	- سيدي جه	ڪاڻي ٿ	Pro	gram O	- utc	omes		
			1	2	3	4		5	6	7
						r				
			nd		nes	othe				and
			ce a		miq	/ ith e		pu		dnc
			cien	ata	tecł	pply e w		al a	ely	a gro eam
No.	Co	urse Outcomes	s, sc	ze d	and	nd a renc		sion ity	ctiv	in a ry te
		atic	:t naly:	ols	ng ai ncur		ofes	effe	tion lina	
			hem g	nduc ts/ar	n to	nkir cor		l pro pons	ate	îunc scip
			mat	/cor nen	oder	l thi edge	ines	stanc rest	unic	tof i-di
			ply ;inee	sign	e mc	tica wle	cipli	ders ical	mm	ility nult
			Ap eng	De exp	Ust	Cri kn(	dis	Un eth	Co	Ab in 1
1	To unders	stand PV Markets and	1	2	2	3		3	3	3
	Application	ons								

2	To understand Electricity Basics	1	2	2	2	3	2	3
3	3 To understand Solar Energy Fundamentals		2	3	2	3	3	3
4	4 To understand PV Module Fundamentals		2	3	2	3	3	3
5	To design the PV System	3	3	3	2	2	2	2
6	To understand Maintenance and Troubleshooting of PV system		3	3	3	2	2	3
7	To understand and describe the grid-connected solar PV systems.	3	3	3	3	3	3	3
8	To understand the Mechanical parts of PV System	2	2	2	2	2	3	2
9	To understand Safety Basics	2	2	2	2	3	3	3
	Total	2.1	2.3	2.6	2.3	2.7	2.7	2.8
	Average				2.5			
	1= Some relation 2= Moderate relation 3=Extensive relation							

## En. Ene 0833 Energy Policies And Politics

Item موضوع	Description		توضيحات			
Title عنوان یا مضمون	En. Ene 0833 Energy Policies and Politics					
Credits and no. of hour	عملي Theoretic نظري Practical توليزه Total					
د کرېدتونو او درس <i>ي</i> ساعتونو شمېر	3 3 0					
Offering year and semester د تدریس کال او سمستر	Fourth Year-Second Semester					
Aim موخي	Energy and politics are intrinsically interlinked. A country's ability to access energy supplies and the ways in which it uses energy crucially determine the state of its economy, its national security, and the quality and sustainability of its environment. The prevailing lifestyle and structure of global society today is that of "hydrocarbon man"-and the way hydrocarbon man produces goods, wages war, and even finds entertainment is dependent on regular access to fossil fuels. Moreover, for energy exporters and important energy transit states, energy supply policy is as much a part of the policy arsenal as other economic tools, military power, and diplomatic tactics. States are no more likely to refrain from using energy to promote their policy goals than to ignore economic or military means of doing so.					
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>using energy to promote their policy goals than to ignore economic or military means of doing so.</li> <li>Energy Politics discusses the relationship between energy and international politics. It focuses on the politics of oil and natural gas since more than any other energy sources, their production, transport and supply are entwined in international politics. It reaches a number of major findings.</li> <li>Energy and politics are inseparable. Energy trends and international politics are innately interconnected and energy security is an integral part of the foreign and national security policies of states.</li> <li>Energy use affects the structure of the international system itself: oil use creates an element of interdependency in the international system. Since oil is a global commodity, each country's demand affects the price and supply availability of oil for all consumers.</li> <li>Tight oil market conditions lead to increased internationalization of domestic political developments in oil producers and key transit states. Under tight conditions in the world oil markets, local political instability in an oil exporter or major transit state can have international reverberations.</li> <li>Energy creates an additional link between the domestic and foreign policies of states. The impact of hydrocarbon use on</li> </ul>					

	habits and policies a matter of international political interest and
	concern.
Academic Staff Responsible	Teaching Asst. Wais
د تدریس مسئول استاد	
	I. ENERGY AND REGIME TYPE
	II. FOREIGN POLICY
	III. PIPELINE TRENDS AND INTERNATIONAL POLITICS
	IV. CONFLICT
	V. SECURITY
a 11 i	CLIMATE CHANGE
Syllabus مفردات	VI. RUSSIA
_,	VII. EUROPE
	VIII. THE UNITED STATES
	IX. CHINA
	X. IRAN
	XI. SAUDI ARABIA
	XII. CONCLUSION
Pre-requisite مخکینی اړین مضامین	None
Related Courses اړونده مضامين	Climate Change, Management, Foreign Policy
Teaching and	
methods	Lectures, tutorials and assignments
د تدريس ميتود	
Computer	Moderate Computer Knowledge such as, using MS Word, MS Excel, MS PowerPoint and CAD,
Knowledge	
د کمپيوتر زده کړې	
ته ارتيا	
	Taut Dasher
Course	<u>Text DOOKS</u> : در سی کتاب
Materials and	<ul> <li>S. Brenda, Energy Politics, 2009. University of Pennsylvania Press</li> </ul>
References	Reference:
د مصموں درس <i>ي</i> مواد او <b>اختليکونه</b>	اخطيكونه
موري رو ، <u>مسي</u> س	• H. Llewelyn, Y. L. Phillip, 2013. The Politics of Energy.

Evaluation activities and Grads										
	Activity	ي Scope	به او نمز	ي تعالينو	د ارزود		Ma	rks		
	فعاليت	هدف					مري	۰.		
13. دlass <b>ں کي</b>	Attendance and contribution حاضري او په درس برخه اخستل	Attending the class, contribution to the knowledge and relationship with the group.					5			
14. <i>A</i>	Assignments <b>کورن<i>ي</i> دنده</b>	Solving the the problem time.	Solving the indicated problems from the problem list and submitting on time.				10			
15. field إپورونه	Laboratory and trip reports د لابر اتوار / ساحي ر	Weekly laboratory/field trip reports that include abstract, introduction, method, result, conclusion and implication.					0			
16. پ	Quizzes صنفي ارزونو	The quiz in and assign classes.	The quiz includes teaching materials and assignments from two previous classes.							
17.	Midterm exam منځنۍ ازموين	The midterm exam includes the first and the second part.20								
18.	Final exam	The exam includes from Part 3 to				55				
ينه ۱۰۰۰ Taylor	وروستی ازموی	Part 5.								
Total Course Marks							100	)		
ي حري	- بررس مبدر م Relationsł	nin of this (	ourse	to Prod	ram L	earnin	σΩι	itcome		
	رە	ونيزو موخو س	ليدي ښو	ين المي انگې له ک	<u>ی</u> که د څ	ضمون اړ	נ אנ נ אנ			
					Pro	ogram	Out	comes		
			1	2	3	4		5	6	7
No. Course Outcomes		Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other	disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team	
1	Understanding the trends and internation politics are innation interconnected a security is an inter- of the foreign and security policies	ne Energy aational ely nd energy egral part d national of states	1	1	1	2		1	2	1

2	Able to use Energy effects on the structure of the international system itself	1	2	1	2	2	2	1
3	Develop Linkage between energy, economy, environment and climate change	2	1	3	1	2	2	2
4	Understanding Major energy producers and consumers	1	2	1	2	1	2	2
5	Developing how energy has become a source of conflict	1	1	2	1	3	1	2
Total		1.2	1.4	1.6	1.6	1.8	1.8	1.6
Average					1.6			
	1= Some relation 2= Moderate relation 3=Extensive relation							

Item موضوع	Description		توضيحات		
Title عنوان یا مضمون	En. Ene 0835 Engine	eering Management			
Credits and no. of hour	توليزه Total	نظري Theoretic	عملي Practical		
د کرېدتونو او درس <i>ي</i> ساعتونو شمير	3	3	0		
Offering year and semester د تدریس کال او سمستر	Fourth year - Second semester				
Aim موخي	Provide comprehensive information about construction industry, construction business, construction management, and professional affiliations.				
Key Learning Outcomes کليدي ښوونيز نتايج	<ul> <li>Key learning outcomes of this course follow:</li> <li>Know the history of the construction industry</li> <li>Review the basics, including industry sectors, project players, and professional affiliations.</li> <li>Construction management importance in the industries.</li> <li>Well-known societies of construction management.</li> <li>Find out what it takes to be an effective and efficient project manager.</li> <li>Understand the complete process of project life cycle.</li> <li>Learn how to estimate project costs, administer contracts and job site management.</li> <li>Ability to measure performance, monitor safety, and control quality.</li> <li>Planning and control.</li> <li>TQM (total quality management QA/QC)</li> <li>Identify, evaluate, and manage project risks.</li> </ul>				
Academic Staff Responsible					
Syllabus مفردات	<ul> <li>I. <u>THE CONSTRUCTION INDUSTRY</u></li> <li>1. The Construction Industry</li> <li>2. "It's Just Construction"</li> <li>3. Industry Sectors</li> <li>4. The Project Players</li> <li>5. The Industry Image</li> <li>6. Career Opportunities</li> </ul> II. <u>WHAT IS CONSTRUCTION MANAGEMENT?</u> <ul> <li>1. Construction Management Defined</li> <li>2. The Construction Project</li> <li>3. The Owner Sets the Stage</li> </ul>				

4.	Project Delivery Methods
5.	Project Delivery Selection
6.	What Does a Construction Manager Do?
7.	What It Takes to Be a Construction Manager
	č
III.	HOW WE GET THE WORK
1	Finding the Work
2	The Competition
2.	How We Play the Game
3. 4	Making the Bid/No Bid Decision
4.	A Final Nata
5.	A Filial Note
IV	THE CONSTRUCTION CONTRACT
1 1	The Contract Deguments
1.	The Construction Specification Institute
2.	
3.	Contract Types
<b>X</b> 7	
V.	PROJECT STAGES
1.	The Design and Construction Process
2.	The Successful Project
VI	ESTRATING DROIECT COSTS
V I. 1	ESTIMATING PROJECT COSTS
1.	The Chamateriation of a Coord Fatimater
2.	The Characteristics of a Good Estimator
3.	Factors Impacting Project Cost
4.	Types of Estimates
5.	Understanding Project Costs
6.	The Estimating Process
7.	Putting it All Together
8.	Completing the Estimate
VП	CONTRACT ADMINISTRATION
v II. 1	Starting Off Right
1.	Who's on First?
2.	Coordinating Construction Datails
5.	Cooldinating Construction Details
4.	
5.	Schedule Issues
6.	Making Changes
7.	When Things Go Wrong
VIII	CONSTRUCTION OPERATIONS AND IOR SITE
1	Management
1. 2	Construction Impacts
2. 2	The Superintendent
) J.	Decumenting Construction Activity
4. -	Documenting Construction Activity
5.	ruone Kelanons
6.	Company image and Publicity
IX	PROJECT PLANNING AND SCHEDULING

	1	It's All about Time!
	1.	Types of Schedules
	2. 2	Puilding the Schedule
	5. 4	Communicating and Undating the Schedule
	4.	Communicating and Opdating the Schedule
	X.	MONITORING PROJECT PERFORMANCE
	1.	The Project Control Cycle
	2.	Factors Impacting Project Performance
	3.	Tracking Quality, Cost and Time
	4.	Assessing Overall Project Status
	5.	Documenting Project Performance
	XI.	MANAGING QUALITY AND SAFETY
	1.	Attitude Is Everything
	2.	Developing the Quality Management Plan
	3.	The QA/QC Functions
	4.	Safety as a Component of Quality
	5.	A Dangerous Business
	6.	Developing the Safety Management Plan
	7.	The Economics of Quality and Safety
	XII.	MANAGING PROJECT RISKS
	1.	A Systematic Process
	2.	The Risk Mitigation Plan
	3.	The Risk Management Team
	XIII.	<b>BUILDING INFORMATION MODELING</b>
	1.	What Is a Building Information Model?
	2.	Designing in BIM
	3.	Using BIM to Manage Construction
	4.	Implementing BIM
	5.	Implications for the Future
Pre-requisite	None	
مخكيني اړين مضامين		
Related Courses	None	
اړونده مضامين		
Teaching and	Lecture	es, tutorials, and assignments
Learning methods		
د تدريس ميتود		
Computer	Moder	ate computer knowledge such as MS Word, MS Excel, MS
Knowledge	Powerl	Point, and CAD.
د کمپيوتر زده کړې ته		
اړتيا		
	<u>Text B</u>	<u>ooks</u> :
Course Materials	سي كتاب	
and References	•	Barber J. Jackson, PhD, DBIA, Construction Management 2nd
د مضمون درسي مواد		Edition 2014
او اخځليکونه	Referen	nce:
	<u>ځليکونه</u>	
		Evaluation activities and Grades
		د ارزوني فعاليتونه او نمري

А	ctivity فعاليت	Scope هدف				I	Marks نمر ہ		
Atten class c درس ستل	ndance and contribution حاضري او په	Attending class, cont relationships with the	ributior e group.	ıs to kn	owled	lge and	2.5-	5	
Ass	<del>ي . د</del> ignments کورني دند	Solving the indicated problem list and subr	l problem nitting of	ms fror on time	n the		5		
Labo field t با <b>حي</b>	ratory and trip reports د لابراتوار/ س راپورونه	Weekly laboratory/fi abstract, introduction conclusion and impli	eld trip , metho cation.	reports od, resu	that i lt,	nclude	15		
Q	uizzes	Quizzes include teach	hing ma	terials	and			5	
يى Midt	erm exam	The midterm exam in	o previo	the cov	vered t	opics		20	
ینہ Fin	منځنۍ ازمور exam	The final examinely	des the		d tonia	opies.		20	
وينه	وروستۍ ازمو	the midterm exam.		covered	u topic			50	
		Total Course Marks						100	
د کورس مجموعي نمري Relationship of this Course to Program Learning Out						ing Outco	me		
		ي ښوونيزو موخو سره	ی له کلیدو	ه د څانگ	ن اړيک	د مضّمو			
					Prog	gram Outo	comes		
			1	2	3	4	5	6	7
No. Course Outcomes			_	_	-	-	Ũ	,	
No.	Cou	rse Outcomes	Apply mathematics, science and engineering	Design/conduct experiments/analyze data	Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Cou Know the hi construction	rse Outcomes	Apply mathematics, science and engineering	<ul> <li>Design/conduct</li> <li>experiments/analyze data</li> </ul>	2 Use modern tools and techniques	Critical thinking and apply knowledge concurrence with other disciplines	C Understand professional and ethical responsibility	Communicate effectively	Ability to function in a group and in multi-disciplinary team
No.	Cour Know the hi construction Review the industry sec and professi	rse Outcomes istory of the a industry basics, including tors, project players, onal affiliations.	<ul> <li>Apply mathematics, science and engineering</li> </ul>	د Design/conduct experiments/analyze data	2 Use modern tools and techniques	Critical thinking and apply       C     Nowledge concurrence with other disciplines	د Understand professional and ethical responsibility	c Communicate effectively	<ul> <li>Ability to function in a group and in multi-disciplinary team</li> </ul>
No.	Course Know the his construction Review the industry sec and professi Understand management industries.	rse Outcomes	c Apply mathematics, science and engineering	c Design/conduct experiments/analyze data	2 Use modern tools and techniques	Critical thinking and apply       0     Critical thinking and apply       0     c       0     knowledge concurrence with other disciplines	c C C C C C C C C C C C C C C C C C C C	c communicate effectively	C     C     Ability to function in a group and in multi-disciplinary team

Total		2.9	2.9	2.9	2.9	2.9	2.9	2.9
8	quality. Plan and control the projects.	3	3	3	3	3	3	3
7	Be able to measure performance, monitor safety, and control	3	3	3	3	3	3	3
6	Learn how to estimate project costs, administer contracts and job site management.	3	3	3	3	3	3	3
5	Understand the complete process of project life cycle.	3	3	3	3	3	3	3
	effective and efficient project manager.							

En. Ene 0836 Energy and Environment

Item موضوع	توضيحات Description								
Title عنوان یا مضمون	En. Ene 0836 E	En. Ene 0836 Energy and Environment							
Credits and	ټوليزه Total	عملي Theoretic نظري Practical							
د کرېدتونو او د کرېدتونو او ساعتونو شمېر	3	3 3 0							
Offering year and semester د تدریس کال او سمستر	Fourth Year-Se	ourth Year-Second Semester							
Aim موخي	This course will focus on understanding the relationship between energy and environment and its technical, economic, and policy considerations related to achieving a profitable reduction in fossil fuel consumption through energy efficiency and renewable energy across a range of sectors and technologies, providing industry ready knowledge and skills.								
Key Learning Outcomes کلیدي ښوونیز نتايج	<ul> <li>providing industry ready knowledge and skills.</li> <li>On successful completion of this course, students will be able to: <ul> <li>Deal with the fundamental aspects of the environmental Management.</li> <li>Provide details of energy sources on our earth, including conventional fuels (coal, oil and gas) and non-conventional energy sources such as Solar, water and wind.</li> <li>Identify factors causing rising 'Peak' and 'Base' load electricity demand, and how renewable energy, energy management, and energy efficiency can reduce such demand.</li> <li>Present how various forms of renewable energy can be generated, with consideration of strengths and weaknesses of each.</li> <li>Explain specific opportunities to reduce greenhouse gas emissions of a city, with specific reference to the 'Carbon Neutral Adelaide'</li> <li>Program, and explain considerations related to their implementation.</li> <li>Debate the relative pro's and con's of various options for reducing greenhouse gas emissions in specific industries from a technical,</li> </ul> </li> </ul>								
Academic S Responsit بن مسئول استاد	Staff Teachin ble د تدریس	g Asst. Wais							
Syllabus مفردات	I.	FUNDAMENTALS OF ENVIROMANAGEMENT1. Our Planet-The Earth2. Constituents of Earth3. Ecological Systems4. Pollutant Type and Their Imp5. Air on Earth6. Airborne Pollutants and Their7. Air Quality Standards8. Water	<u>NMENTAL</u> pact Zone r Health Hazard						

9 1 1 1 1 1 1 2 3 4 5 6 7 8	<ul> <li>Land and Soil</li> <li>Noise Pollution (Environmental Noise)</li> <li>Thermal Pollution</li> <li>Electromagnetic Radiation Hazard</li> <li>Hazards from Radioactivity</li> </ul> <u>NERGY AND ITS SOURCES</u> <ul> <li>Energy and Its Forms</li> <li>Sun as a Source of Energy</li> <li>Energy Sources on the Earth</li> <li>Merits and Limitations of Various Energy Sources</li> <li>Nuclear Energy</li> <li>Global Energy Scenario</li> <li>Energy users in the World</li> <li>Energy and Environment Relationship</li> </ul>
III. <u>H</u> 1 2 3 4 5 6	<ul> <li>NVIRONMENTAL AWARENESS</li> <li>Awareness about Environmental Issues</li> <li>Stockholm-1972: First International Environmental Conference</li> <li>Other Important Conferences Related to Environment</li> <li>The United Nations Environment Program</li> <li>Indian Initiative Towards Environmental Program</li> <li>Sustained Industrial Development</li> </ul>
IV. <u>N</u> 1 2 3 4 5 6 7 8 9 1 1 1 1	<ul> <li>METALLURGICAL INDUSTRIES AND ENVIRONMENT</li> <li>Metals in the Service of Mankind</li> <li>Classification of Metallurgical Industries</li> <li>Conventional Integrated Iron and Steel Plants</li> <li>Integrated Steel Plants Having Coal-Based DRI (Sponge Iron)</li> <li>Integrated Steel Plants Having Gas-Based DRI (Sponge Iron)</li> <li>Integrated Steel Plants Having Smelting Reduction</li> <li>Integrated Steel Plants Based on EAF Scrap Remelting</li> <li>Ferroalloy Plants</li> <li>Foundry Industries</li> <li>Copper Extraction Industries</li> <li>Zinc and Lead Producing Industries</li> <li>Emission from Other Metallurgical Industries</li> </ul>
V. <u>E</u> <u>II</u> 1 2 3 4 5 6 7	<ul> <li>NERGY MANAGEMENT IN METALLURGICAL</li> <li>NDUSTRIES</li> <li>Energy Need and Its Role</li> <li>Energy Audit-What, Why and How?</li> <li>Energy Need for Steel Industries</li> <li>Energy Needs of Primary Aluminum Industry</li> <li>A review of Energy Use by Major Metallurgical Processes</li> <li>Possible Solutions to Problems Caused by Energy Use</li> <li>Hydrogen as a Renewable Reductant and Energy Source for Iron</li> </ul>
VI. B S <u>E</u> A	Siomass Carbon as a Renewable Energy Source for Iron and teel Industry INVIRONMENTAL ASPECTS OF PLANT LOCATION IND LAYOUT

	<ol> <li>Introduction</li> <li>Factors Considered for Selecting Metallurgical Plant Site</li> <li>Techno-Economic Issues Affecting Site Selection</li> <li>Environmental Issues</li> <li>Natural Disasters</li> <li>Health Issues</li> <li>Natural Disasters</li> <li>Health Issues</li> <li>Plant Security</li> <li>Metallurgical Plant Layout Considerations</li> <li>Distribution of Land Area in two Typical Steel Plants</li> <li>VII. OCCUPATIONAL HEALTH AND SAFETY</li> <li>Introduction</li> <li>Legal Provisions</li> <li>Role of Management</li> <li>Accident Record</li> <li>Accident Responsibility</li> <li>Typical Cases, Findings and Lessons</li> <li>General Safety at Work</li> <li>Occupational Health Monitoring and Record</li> <li>Disaster and Its Type</li> <li>Hazards in Steel Industry and Their Classification</li> <li>Common Hazards in Industry</li> <li>Disaster Management</li> </ol> VIII. ENVIRONMENTAL LEGISLATIONS AND RELATED ISSUES <ol> <li>Introduction</li> <li>Environmental Laws</li> <li>Forest Laws</li> <li>Other Relevant Laws</li> <li>Environment Management Systems</li> </ol>			
Due au minite	7. Oreen Kaning Project (OKP)			
Pre-requisite مذکینی اړین مضامین	Basic knowledge of geology and climate change.			
Related Courses ارونده مضامین	Economics, Management, Geology			
Teaching and				
Learning methods	Lactures tutorials and assignments			
د تدریس میبود Commenter				
Knowladaa	Moderate Computer Knowledge such as using MC Word, MC E1			
Allowledge	Moderate Computer Knowledge such as, using MS word, MS EXCEL,			
د حمپيونر رده دړې ت- ۱ ۰ ۰				
اړىيا				
Course Materials and References	<u>Text Books</u> : درسی کتاب • R. C. Gupta, Energy and Environmental Management in Metallurgiacal Industries, 2012			
د مضمون درسي مواد	Reference:			
او اخطيكونه	اخذليكونه			
-	• Wayne c. Turner, energy management handbook, oklahoma			
	state university, 2001			

		Evaluation activities and Grads										
Act	Activity Scope							N	larks			
بت Attenda دlass co	Attending the cl knowledge and	ass, cor relation	ntributic ship wit	on to the	e	5	<u> </u>	<u>ىمر و</u>				
خستل Assig	کي برخه ا	Solving the indi	cated n	rohlems	from t	he						
نده	کورني د کورني د	problem list and	submit	ting on	time.	lic	10					
Labora field tri سا <b>حي</b> نه	tory and p reports د لابراتوار/ راپورو	Weekly laborate include abstract result, conclusio	ory/field , introdu on and i	l trip rep action, r mplicati	ports th nethod ion.	at ,	0					
Qu روني	izzes صنفي ارز	The quiz include assignments from	es teach m two p	ing mat previous	erials a classe	und s.	10					
Midter موینه	rm exam منځنۍ ازه	The midterm ex the second part.	am incl	udes the	e first a	nd	20					
Final بموينه	exam وروستۍ از	The exam inclue	les fron	n Part 3	to Part	5.	55					
Total M	Course arks						100					
وعي نمري	د کورس مجم		~									
	Re	ationship of this) ونيزو موخو سره	Course لليدي ښو	to Progi نانګې له ک	ram Le يکه د څ	arnın مون اړ	Relationship of this Course to Program Learning Outcome					
		ک معمون رید کا کی کہ کلیدی بیتوولیزو موجو مترہ Program Outcomes										
					Pro	gran	n Outc	omes				
			1	2	Pro 3	gran 4	n Outc	comes 5	6	7		
No.	Cours	e Outcomes	Apply mathematics, science and <b>H</b> engineering	Design/conductcexperiments/analyze data	Order   Output     Use modern tools and techniques   0	Critical thinking and apply <b>4</b>	knowledge concurrence with other disciplines	Understand professional and <b>5</b> of ethical responsibility	<b>o</b> Communicate effectively	Ability to function in a group and <b>1</b> in multi-disciplinary team		
No.	Cours To acc knowledg enviro sustaina dir	e Outcomes uire general e of the energy, onment and ability and its nensions	Apply mathematics, science and tengineering	Design/conduct     Z       c     experiments/analyze data	Pro 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Critical thinking and apply <b>b</b>	7 knowledge concurrence with other disciplines	C Understand professional and C same ethical responsibility s	Communicate effectively 9	L Ability to function in a group and L in multi-disciplinary team		

	1 1	-						
	and solutions							
3	To gain an in-depth understanding of the types of renewable energy resources and technologies for a green and sustainable environment	2	2	3	2	2	1	2
4	To gain the renewable energy exploitation techniques for sustainable environment	1	2	2	2	3	2	2
<ul> <li>To improve the skills and knowledge for distinguish, analysis and comparison of the local renewable energy sources deployment in traditional and modern design for urban and rural planning</li> </ul>		2	2	2	3	3	2	2
	1.6	2	2	2.2	2.4	1.8	1.6	
	Average				1.9			
1= Some relation 2= Moderate relation 3=Extensive relation								

En.	Ene	732	Profe	essiona	l Elec	tive l	I and	En.	Ene	0837	Prof	fessiona	l Electi	ve II

One of the following courses can be selected as professional electives (3 credits) in the fourth year- first and second semesters:

- 1. Energy Efficient buildings
- 2. Energy Storage Technologies
- 3. Conventional energy technologies
- 4. Modelling of energy systems
- 5. Energy and sustainability
- 6. Energy and urban planning
- 7. Energy Markets
- 8. Geothermal Energy
- 9. Rural Electrification
- 10. Sustainable Power Generation
- 11. Energy Management
- 12. Fuel Cell Technology
- 13. Petroleum and Gas Engineering
- 14. Nuclear Energy

### En. Ene 0731 Seminar II (Research/Project Proposal)

A research/project is conducted by a student or a group of students in the final year of their study. Students are expected to choose their research/project topics with their respected advisors in the beginning of the seventh semester. They will be responsible for preparing their research/project proposal in the seventh semester. After a successful defense of the proposal, students will be allowed to proceed their research/projects and their proposal preparation will be counted 2 credits.

#### En. Ene 0834 Research/Project Design

Students who have passed their proposal defense will be allowed to proceed their research/project in the eight semester of their study. They will be responsible for completing their research/project based on the proposal accepted in the seventh semester. After successful defense of the research/project, it will be counted for 4 credits. Students are highly encouraged to write papers from their researches/projects and publish them in the international journals.

#### **4.7.Course Policy**

- 1. One day late assignment will be graded with -10% of total assignments grade.
- 2. Students can rework on 50% of low-graded assignments. The reworking decision must be made within one week of the returned graded assignment.
- 3. Exam is not only going to be from handouts and lecture notes, but class discussion and other sources are parts of the exam.
- 4. Instructor is not able to cover all the mentioned topics in the class; hence, students are asked to seek personal knowledge.
- 5. Exam questions must cover the taught topics but may be arranged and include a broad application.
- 6. Attendance is strictly required from each student.
- 7. Excellent performance, creative participation, and regular responses will be counted as outstanding class participation.
- 8. Talking during lecture is evaluated as program interruption, and each student is seriously required to avoid it.
- 9. Phone call is not allowed inside the class.
- 10. Plug off all electrical equipment in the end of class.

#### 4.8. Advising Protocol

Academic advisors help students to recognize and achieve their educational goals. The role of the academic advisor extends beyond course and program scheduling. Advisors can assist the student with virtually all aspects of the academic experience and provide information regarding campus resources as needed. Some of the specific responsibilities of academic advisors include but are not limited to;

- Clarifying university policies, regulations, programs, and procedures for the advisee
- Assistance with personal growth and career development
- Selection of educational program
- Monitoring academic progress
- Assistance with academic issues
- Assistance with personal concerns
- Navigation within the campus environment
- Assistance with campus resource identification & utilization
- Motivating advisees for overall academic improvements.
- Guidance in conducting the research/project.

### References

[1] Accreditation Board for Engineering and Technology (ABET).
 <u>http://www.abet.org/wp-content/uploads/2018/02/E001-18-19-EAC-Criteria-11-29-17.pdf</u>

- [2] Asian Institute of Technology (AIT), Thailand, Energy. http://serd.ait.ac.th/energy-3/
- [3] Quaid-e-Awam University oF Engineering, Science & Technology Nawabshah, Sindh, Pakistan, Department of Energy & Environment Engineering. <u>https://www.quest.edu.pk/departments/ee\_intro.php</u>
- [4] University of Engineering and Technology, Peshaware, Pakistan. U.S.- Pakistan Center for Advanced Studies in Energy (USPCAS-E). <u>https://uspcase.uetpeshawar.edu.pk/</u>
- [5] National University of Sciences & Technology, Islamabad, U.S.- Pakistan Center for Advanced Studies in Energy (USPCAS-E) <u>http://www.nust.edu.pk/INSTITUTIONS/Centers/CES/ap/pg/MSESE/Pages/default.a</u> <u>spx</u>
- [6] Sharif University of Technology, Tehran, Iran, Department of Energy Engineering. <u>http://energy.sharif.edu/~web/index.php/en/</u>
- [7] University of Tehran, Energy Systems Engineering- Environmental. https://kish.ut.ac.ir/en/-/energy-systems-engineering-environmental
- [8] Carl Von Ossietzky University of Oldenburg, Germany. <u>https://uol.de/en/students/course-of-</u> <u>study?id\_studg=611&cHash=120372d3a913610f91e848d6ecbfb7a3</u>
- [9] Teri School of Advanced Studies, Department of Energy and Environment, https://www.terisas.ac.in/department-of-energy-and-environment.php

# Appendix

### Curriculum Development Committee at Kandahar University, Afghanistan

No	Name	Position	Email
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	Sonior Topphing Aget Agha	Head of the	
1	Senior Teaching Assi. Agna	Curriculum	agha7437@gmail.com
	Monaninad Fazii	Committee	
2	Senior Teaching Asst.	Curriculum	muitahamanayi@amail.com
2	Mujtaba Manavi	Committee Member	indjtaballanavi@gilali.com
3	Teaching Asst. Abdul Ghani	Curriculum	ahani 1001 Quahaa com
5	Noori	Committee Member	gham. 1001@yanoo.com
4	Teaching Aget Weig	Curriculum	waamadi lahan @amail aam
4	Teaching Asst. wais	Committee Member	wsamaci.knan@gman.com
5	Teaching Asst. Ahmad Shah	Curriculum	amin kafa@amail.aam
5	Ameen	Committee Member	<u>amm.karg@gman.com</u>
6	Teaching Asst. Ahmad Shah	Curriculum	inched 796 Irdm @ameil.com
0	Irshad	Committee Member	Irsnad / 86.kdru@gmail.com
7	Senior Teaching Asst. Abdul	Curriculum	towah kdr@amail.com
/	Tawab Balakarzai	Committee Member	tawao.kur@gmaii.com
0	Senior Teaching Asst.	Curriculum	aclam hazia@amail.com
0	Mohammad Aslam	Committee Member	<u>asiani.naziq@gmaii.com</u>
0	Senior Teaching Asst. Abdul	Curriculum	habib kda@aamil aam
9	Habib Ghapoorzai	Committee Member	<u>habib.kur@gamii.com</u>
10	Teaching Asst. Naqibullah	Curriculum	ang nagih k@gmail aom
10	Kargar	Committee Member	eng.naqio.k@ginan.com
11	Senior Teaching Asst.	Curriculum	ilromkdr@gmoil.com
11	Mohammad Karam Ikram	Committee Member	<u>Ikranikui @ginan.com</u>
12	Teaching Asst. Fida	Curriculum	fida sabil@vaboo.com
12	Mohammad Sahil	Committee Member	<u>inda.saint@yanoo.com</u>

No	Name	Position	Email
1	Professor Mark Holtzapple	Head of the Curriculum Committee	m-holtzapple@tamu.edu
2	Professor Lee Lowery	Curriculum Committee Member	Lowery@tamu.edu
3	Professor Glen Shinn	Curriculum Committee Member	glen.shinn@gmail.com
4	Professor Reid Stevens	Curriculum Committee Member	stevens@tamu.edu
5	Professor Homa Khosravian	Curriculum Committee Member	hkhosravian@tamu.edu
6	Professor Charles Culp	Curriculum Committee Member	cculp@tamu.edu
7	Professor David Claridge	Curriculum Committee Member	dclaridge@tamu.edu
8	Professor Costas Kravaris	Curriculum Committee Member	kravaris@tamu.edu
9	Professor John Tyler	Curriculum Committee Member	jetyler@tamu.edu
10	Professor Mehrdad Ehsani	Curriculum Committee Member	m-ehsani@tamu.edu
11	Professor Michael Pate	Curriculum Committee Member	mpate@tamu.edu
12	Professor Sergio Capareda	Curriculum Committee Member	scapareda@tamu.edu
13	Professor Ying Li	Curriculum Committee Member	yingli@tamu.edu
14	Professor Ben Zoghi	Curriculum Committee Member	zoghi@tamu.edu
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# Curriculum Development Committee at Texas A&M University, USA

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