

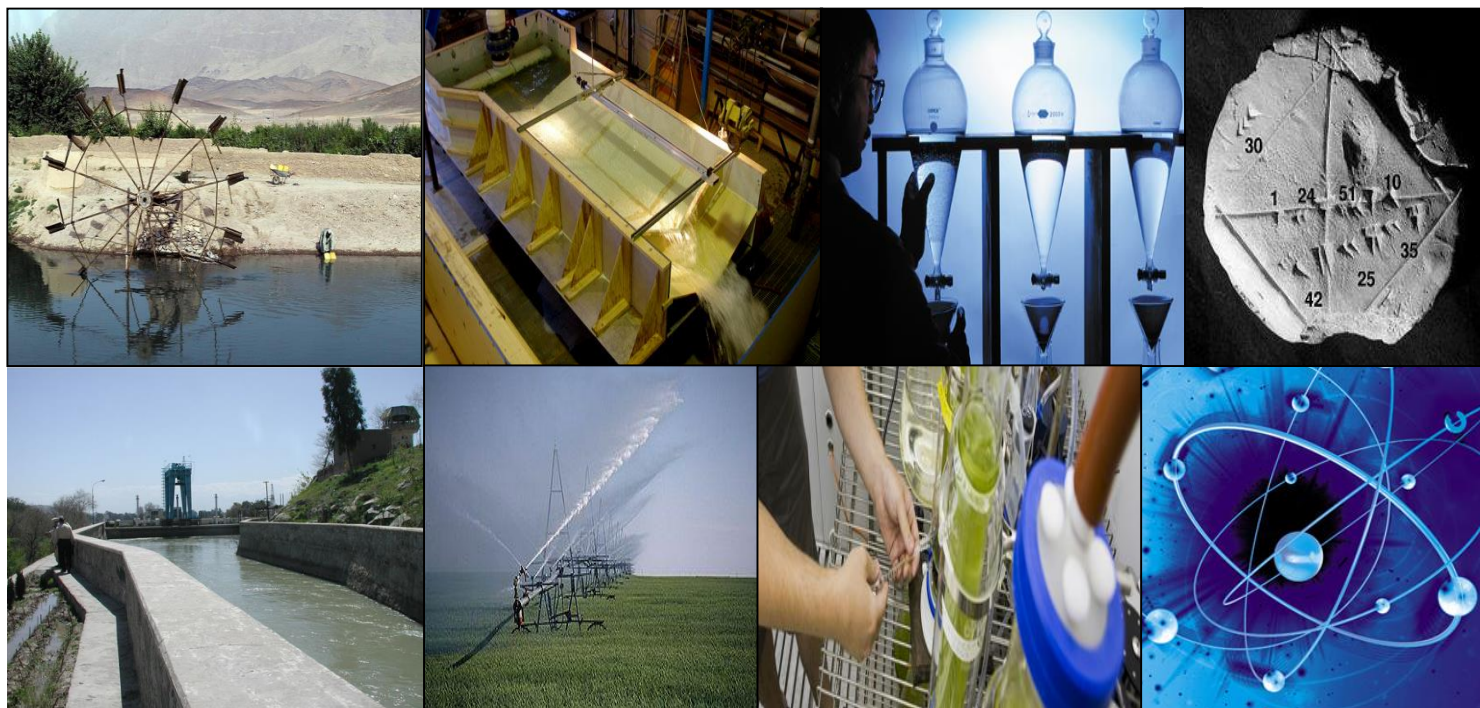
د اوبو او چاپېريالي انجنيرۍ څانگې تحصيلي نصاب

نصاب تحصيلي رشته انجنيرۍ آب و محيط

Water & Environmental Engineering Department Curriculum

ليسانس دوره دوره ليسانس

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



لوړوزده کړو وزارت
علمي معینیت
اکاډمیکو چارو د انسجام لوی ریاست
علمي برنامه د پراختیا ریاست

د هیواد د پوهنتونونو د تحصیلي نصاب د پراختیا د بیاکتنې ملي برنامه

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مېزان 1398 هـ - کابل

پیام مقام وزارت تحصیلات عالی

انکشاف پایدار کشور و جامعه مستلزم ایجاد نهاد های با کیفیت آموزشی از سطح پایین تا بالا میباشد، تا بتوانند افراد جامعه را مجهز با دانش و مهارت های مورد نیاز جامعه تربیه کنند. وزارت تحصیلات عالی به منظور نایل شدن به این امر مهم برنامه های بنیادی را روی دست گرفته است که یکی از آنها تدوین نصاب پویا که پاسخگوی نیاز دانش آموزان و در نهایت پاسخگوی نیاز جامعه بوده و با تطبیق آن اهداف نظام سیاسی- اجتماعی کشور برآورده شده بتواند، میباشد. نصابی که در نتیجه تطبیق آن کسانی به جامعه تقدیم شوند که با شایستگی های مسلکی، علمی و فنی خود در بازار کار به سطح کشور و منطقه موقعیت خود را تثبیت کرده بتوانند و از لحاظ جنبه فرهنگی و اخلاقی، هموطن خوب برای هموطنان، همشهری خوب برای همشهریان خود و بالاخره پدر و مادر خوب برای فرزندان خود بار آیند.

در پلان استراتژیک ملی وزارت تحصیلات عالی، تدوین نصاب تحصیلی معیاری به عنوان یکی از اهداف اصلی مطمح نظر قرار گرفت و به کمسیون ملی نصاب وظیفه سپرده شد تا رهنمود انکشاف و بازنگری نصاب تحصیلی را ترتیب نموده، به منظور آغاز روند بازنگری اساسی و توحید نصاب ملی در اختیار تمامی پوهنتون ها و مؤسسات تحصیلات عالی دولتی و خصوصی قرار دهد. پروسه بازنگری نصاب در اوایل سال 1397 در تمام رشته ها از مرحله نیاز سنجی از سطح دیپارتمنت ها، پوهنخی 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.

مسرت داریم که پروسه بازنگری نصاب های درسی در رشته های حقوق، علوم سیاسی، فقه و قانون، تعلیمات اسلامی و ثقافت اسلامی؛ مبتنی بر رهنمود بازنگری نصاب، همت و همکاری همه جانبه ی مسئولین و اعضای کادر علمی پوهنخی های حقوق و علوم سیاسی و شرعیات و علوم اسلامی پوهنتون های دولتی و خصوصی کشور و به همکاری مالی و تخنکی بنیاد محترم آسیا (The Asia Foundation) اینک به ثمر رسید. ما شاهد تلاش های مستمر، صادقانه و تخصصی همکاران خویش در نهادهای فوق الذکر در تمامی مراحل از جمله مرحله نیاز سنجی، بررسی های مسلکی کمیته های تخصصی و برگزاری سه کلستر ملی بودیم و کار های را که به همت تیم همکار درین زمینه صورت گرفته است قابل تحسین میدانیم.

اکنون با افتخار نصاب های بازنگری شده ی رشته های حقوق، فقه و قانون، تعلیمات اسلامی و علوم سیاسی و ثقافت اسلامی را من حیث اولین نصاب های نهایی شده در وزارت تحصیلات عالی افغانستان، جهت تطبیق در تمام پوهنتون ها و مؤسسات تحصیلات عالی دولتی و خصوصی تقدیم جامعه علمی خویش می نماییم. امید داریم با تطبیق نصاب های جدید بسا از خلاها و کاستی های قبلی رفع گردیده، خدمات با کیفیت بهتر و بازدهی مؤثر تر در عرصه تحصیلات عالی صورت گیرد.

در پایان از همه تهیه کنندگان نصاب های تحصیلی تمامی رشته ها، به خصوص رشته های حقوق، فقه و قانون، تعلیمات اسلامی، ثقافت اسلامی و علوم سیاسی، به خصوص از همکاران گرامی در وزارت تحصیلات عالی، بنیاد محترم آسیا، استادان پر تلاش شامل در این پروسه، رؤسای پوهنخی ها و آمرین دیپارتمنت های مربوطه که در تدوین نصاب های تحصیلی هر کدام به سهم خویش توان و استعداد خود را به خرچ داده اند، کمال قدردانی و سپاس گزاری می نمایم.

پوهنمل دیپلوم انجنیر عبدالنواب بالاکری
معین علمی و سرپرست وزارت تحصیلات عالی

پس منظر 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 34 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 تحت شعار **ملت واحد-نصاب تحصیلی واحد** هستیم. همچنان درنظر است تا نصاب های تحصیلی جدید به اساس لایحه سیستم کريدت وزارت تحصیلات عالی تدوین گردد زیرا دراین سیستم، واحدهای درسی برای تکمیل هر یک از دوره های تحصیلی معین می باشد. مضامین به کتگوری های اساسی، حتمی-تخصصی، پوهنتون شمول و اختیاری و کار عملی و منوگراف دسته بندی گردیده، حد اقل و حد اکثر کريدت و یا واحد درسی در مطابقت به لایحه سیستم کريدت، برای هر سمستر مشخص شده است. برای تعیین و تسلسل مضامین در دوره تحصیلی، پیش نیاز بودن یک مضمون برای مضمون دیگر مورد توجه قرار گرفته است. در کل وزارت تحصیلات عالی برنامه بازنگری و انکشاف نصاب های تحصیلی را به منظور برآورده ساختن اهداف ذیل انجام می دهد:

- عیار سازی نصاب های 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 کريدت 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 کريدت ها و کود گذاری مضامین؛
- مشخص نمودن نتایج متوقعه از نصاب 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 نصاب درسی با کشورهای منطقه و جهان و نیاز بازار کار.

پیشگفتار

ارائه آموزش های معیاری در حوزه حقوق و علوم سیاسی و تربیه نیروهای متخصص در بخش های مختلف رسالت مهمی است که پوهنچ های حقوق و علوم سیاسی به عنوان نهاد های تحصیلات عالی حقوقی عهده دار هستند. باورمند هستیم زمانی نهادهای علمی میتوانند در اجرای رسالت خویش موفق باشند که علاوه بر ارائه آموزش های نظری به ارتقاء مهارت های عملی محصلان و اصلاح نصاب درسی به منظور فراهم آوری فرصت های شغلی بیشتر برای فارغ التحصیلان بیش از پیش عطف توجه نمایند. نصاب تحصیلی (Curriculum) یک رکن اساسی در تحصیلات عالی هر کشور است. زیرا نصاب تحصیلی در واقع بیوگرافی (شناسنامه) مشخصات و خصوصیات هر مضمون (کورس) بوده که به منزله رهنمود فشرده و جامع برای موضوعاتی که قرار است تغییر در فهم، سلوک و مهارت مسلکی محصلان به شکل مطلوب مطابق به اهداف مطروحه فراهم سازد می باشد.

در سطح هر یک از پوهنتون ها، پوهنچ ها و دیپارتمنت ها، کمیته های نصاب تحصیلی وظیفه دارند تا نصاب تحصیلی را که در سال های گذشته تدریس می گردید مورد ارزیابی، بازنگری و انکشاف قرار داده، مطابق نیاز جامعه، بازار کار، پیشرفت تکنالوجی، آخرین دستاوردهای علمی و بلاخره مطابق به استندرد ها و معیار های محلی، ملی و جهانی عیار سازند. تاکید اجماع ملی که در ماه حوت سال 1396 در کابل در خصوص معیاری سازی نصاب های تحصیلی افغانستان برگذار گردیده بود؛ نیز بر همین موارد بود.

کمیته های بازنگری نصاب در سطح پوهنچ ها و پوهنتون ها با تدوین و توزیع پرسشنامه از اعضای کادر علمی، فارغ التحصیلان، محصلین بر حال و استخدام کننده های دولتی و خصوصی در زمینه نقاط ضعف، قوت، فرصت ها و چالش های موجود در نصاب های درسی رشته های مختلف خواهان معلومات گردیدند. نتیجه تجزیه و تحلیل این پرسشنامه ها و مصاحبه ها در هرشته نقاط ضف و قوت را مشخص و فرصت ها و چالش های موجود را انعکاس داد. بر همین مبنی برای اصلاح و بازنگری نصاب تحصیلی پلان های عملیاتی طرح و اولویت ها مشخص گردید.

در فاکولته های حقوق و علوم سیاسی کار بازنگری، توحید و معیاری سازی نصاب درسی بالای هر دو رشته حقوق و رشته علوم سیاسی و روابط بین الملل آغاز گردید. در این روند نصاب های تحصیلی حدود هشتاد فاکولته حقوق دولتی و خصوصی در سطح وزارت تحصیلات عالی مورد بازنگری و انکشاف قرار گرفت. بعد از بیش از یک سال کار تخصصی و تدویر چندین مرحله کلاستر در سطح ملی، مطالعه نیاز های بازار کار و بررسی الگوهای مختلف از سایر کشور ها؛ تدوین نصاب واحد معیاری در سطح ملی به انجام رسید.

انتظار میرود با تطبیق نصاب های جدید، دانش آموخته های رشته های مورد نظر با دانش عمیق تر، مهارت های بیشتر، نگرش مسئولیت پذیری و تعهد مسلط شوندف طوریکه بتوانند با سهولت های بهتری وارد عرصه کار گردیده، خدمات با کیفیت و تخصصی را به جامعه انجام دهند. یقین داریم این دانش آموخته ها دارای مهارت مسلکی بالا، آشنا با کمپیوتر و انترنت مسلط به زبان های بین المللی، اعتماد به نفس، صداقت، توانمند به انجام تحلیل و تجزیه علمی مسایل اجتماعی می باشند.

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Curriculum outline of Bachelor of Engineering in Water and Environmental Engineering in Afghanistan

Background

Water and Environmental Engineering program in Afghanistan is designed to prepare students with ability to identify and address the prevailing need and societal problems related in the field of water resources and environmental management. It covers a balanced curriculum of both water resource and environmental engineering. Upon successful completion of the course, students will be equipped with necessary knowledge and skills for assessment and recognizing alternatives in designing related to social, economic, environmental and public safety projects.

This curriculum structure consists of collegiate courses, basic courses, professional courses and elective including a project work. Students are required to take general courses such as mathematics, science, English and some general engineering course in first, second and third year. In the fourth year students are expected to specialize in Water Resources Engineering and Environmental Engineering.

The curriculum is prepared based on the criteria for engineering program recognized by Ministry of Higher Education, Afghanistan. The following courses and corresponding credits are included in the curriculum:

- Collegiate courses: 18 credits
- Basic course: 48 credits
- Professional courses (including technical elective): 78 credits
- Capstone project (including research methodology): 11 credits

This curriculum is also prepared with due consideration to following program educational outcomes for engineering program set by ABET (Accreditation Board for Engineering and Technology) (<http://www.abet.org/Linked%20Documents-UPDATE/Criteria%20and%20PP/E001%2010-11%20EAC%20Criteria%201-27-10.pdf>):

- (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 order to set the standard, the course syllabus of 4 other universities offering the water resources and environmental engineering or similar program has been referred/compared while preparing this curriculum. These universities are Bangladesh University of Engineering and Technology, Bangladesh; National University of Singapore, Singapore; Massachusetts Institute of Technology, USA, and Cornell University, USA.

In this curriculum, the course structure has been divided into 4 parts:

1. Collegiate Courses:

The collegiate course is a general course of study that introduces students to a subject and prepares them for a general education and ethics. The collegiate course includes: Islamic studies and contemporary history of Afghanistan.

2. Basic courses:

The basic course is a general course of study that introduces students to a subject and prepares them for a higher level course. The basic course includes: Science, Mathematics, English and other important courses related to their study.

3. Professional (including elective) courses:

The professional courses are leading students to be professional in water and environmental engineering. Also, students are expected to take an optional course by choosing electives in their fourth year of study: Water Resources as well as Environmental Engineering.

4. Projects:

Students will have an opportunity to conduct the project focused on a particular topic based on their selected area of specialization. Research Methodology course which is essential for project is considered as credits for projects. Project is divided into proposal and its defense in three semesters.

Vision

WEE department aims to become a leading higher education institution in the country and as well as in the region to educate capable human resources, conduct researches and perform services in the field of water and environment.

Mission

The mission of WEE department is to create such an educational environment for its faculty members, students and staffs. Academic facilities namely laboratories, research facilities, access to update reference and textbooks, collaboration with national and international relevant organizations and improvement of teaching system are the main parts of the mission.

د نصاب د بیا کتنې اړتیا (Need of Curriculum Review)

د لوړو زده کړو محترم وزارت د نصاب د بیا کتنې په موخه د علمي نهادونو له پاره د ملي نصاب د جوړښت په موخه د خپل پلان مطابق د هرې څانګې له پاره د پوهنځي رئیس او د هم هغې څانګې اړوند آمرین او د علمي کادر غړي، د شریکو ګټو لرونکي ماهرین ، متخصصین او د اړوندو چارو مسئولین یې په ځانګړو بېلابېلو وختونو کې د برنامې له پاره بللی دی .

په دې برخه کې د اوبو زیرمو او چاپیریالي انجنیرۍ څانګې د کلسټر له پاره د هیواد د بیا کتنې، پراختیا او د ورځنۍ نصاب د پروسې د واحد ملت - واحد تحصیلي نصاب د جوړولو شاهدان یو چې یو د بل پسې د جوړیدو په حال کې دی. په همدې توګه په پام کې ده چې د نوي تحصیلي نصاب چارې د لوړو زده کړو محترم وزارت د کړیډیتونو د لایحې سره برابر ترتیب شې، ځکه په دې سیستم کې د یوې تحصیلي دورې له پاره واحد درسي نصاب جوړیږي. مضامین په بېلابېلو برخو لکه اساسي، پوهنتون شموله، حتمي تخصصي، اختیاري تخصصي، عملي کار او په مونوګراف باندې ویشل شوي دي ، د کړیډیتونو ټیټه او لوړه کچه د واحد کړیډیټي سیستم د لایحې په چوکاټ کې، د هر سمسټر له پاره ځانګړې شوې ده. د تحصیل په دوره کې د مضامینو تسلسل ، چې په هغه کې د اولویت پر بنسټ دیومضمون له پاره د بل مضمون اړتیا په پام کې نیول شوې ده. په ټوله کې د څانګې درسي نصاب چې د لوړو زده کړو وزارت د درسي نصاب د بیا کتنې او پراختیا تر نامه لاندې په دې ځانګړي کلسټر کې پرې کار کېږي، له بشپړتیا وروسته باید لاندینی موخې ترسره کړي :

- په ملي او نړیوالو معیارونو سره برابر د تحصیلي نصاب تیارول ؛

● د ساینس او ټکنالوژۍ د تحولاتو په پام کې نیولو سره د بازار د ورځنیو اړتیاوو سره برابر نصاب عیارول. د تحصیلي نصاب د بیا کتنې په برخه کې چې څانګه یې پلې کوي ، لاندینی موخې په پام کې نیول شويدي :

1. د مضمون د محتوا او کړیدتونو د شمېر له مخې د مضمونونو بیا کتنه ؛
2. د اړتیا او لومړیتوبونو په پام کې نیولو سره په اړونده څانګه کې د مضامینو کمو او زیاتول ؛
3. د پیش شرط مضمونونو (اساسی ، پوهنتون شموله ، تخصصی او اختیاری) ارزونه ؛
4. د شاګرد محوری پایلو پربنسټ په اړونده څانګه کې په نوی او عصری شکل سره د ماډلونو (OBE, SCL) پلی کول؛
5. د څانګې د متوقعه پایلو سره برابر د درسي نصاب د متوقعه پایلو مشخص کول ؛
6. د کلسټر د هر غړي د وړاندیزونو پر بنسټ د نړۍ او سیمې هیوادونو د مآخذونو په پام کې نیولو سره، د مضامینو د نومونو بدلول او یا تعدیلول ؛
7. د محصلینو د اړتیاوو مطابق د مضامینو زیاتول، له منځه وړل او یوځای کېدل او د نړۍ او سیمې هیوادونو سره برابر درسي نصاب معیاری کول .

د څانګې ښوونیزې موخې

په ټولګی او لابراتوار کې د یوه ټاکلي وخت له پاره په انفرادي او گروهی ډول د برنامې اړوند ښوونه، کورنی کارونه او سمینارونه ترسره کېږي، د اوبو او چاپیریالي انجنیرۍ څانګې د لیسانس دورې درسي نصاب چې د کړیدت سیستم سره برابر دی او دلته ورڅخه یادونه شوې ده ، په جدولونو کې ضمیمه او په جزئیاتو سره په پام کې نیول شوی دی.

د توقع وړ پایلې

څرنګه چې د اوبو او چاپیریالي انجنیرۍ څانګه او د هغې اړوند موخې په ټول هیواد کې د اوبو تنظیم او اداره او همدا رنگه د چاپیریالي ککړتیا مخنیوی او ساتنه د شاوړو او لامزرع مخکو خړوبول او په بېلابیلو ډګرونو کې د اړتیا سره برابر د اوبو استعمال، د حکومت داساسی پالیسی او دندو له جملې څخه ګڼل کېږي او هغه دا چې د ملی اقتصاد د پیاوړتیا په موخه د مخکوالو، دهقانانو او په ټوله کې د هیواد والو له پاره د خدمت مصدر ګرځي، د څانګې فارغان یې د کارموندنې اساسی منبع تشکیلوي ، په دې برخه کې اړینه ده چې څانګه د بازار د اړتیاوو سره برابر په اغېز مننه توګه د تحصیل په موده کې خپل نصاب معیاری کړي . د څانګې فارغان باید د راتلونکي له پاره د توقع وړ پایلو په پام کې نیولو سره د دې وړتیا ترلاسه کړي چې د اوبو هر ډول پروژې اداره او پلی کړي.

د متوقعه پایلو پر اساس د څانګې موخې په لاندې ډول دي :

د زده کړې د محتوا پېژندنه

د نصاب د اوسنۍ برنامې د پراختیایي محتوا له مخې چې د څانګې اساسی موخه د علمی کادرونو روزل او ټولنې ته وړاندې کول دي، د زده کړې د بشپړېدو په اړه لاندینی ټکی په پام کې نیول کېږي :

- په څانګه کې د زده کړې دوره څلورکلنه ده.
- په څانګه کې د تحصیل درجه لیسانس ده ؛
- د لوړو زده کړو وزارت د کړیدت سیستم سره برابري زده کړې پرمخ وړل کېږي؛
- په څانګه کې د تدریس ډول باید شاګرد محوره وي ؛
- د مضامینو ډلبندي : په مسلسل توګه په جدولونو کې په پوهنتون ، اساسی ، اختصاصی او د انتخابی مخکي شرط مضامینو په توګه وېشل شوی دی ؛
- په پروګرام کې د زده کړی سیستم د صنفی کارونو، سمینارونو، ګرافیکي کارونو، ساحوی او تطبیقي کارونو په ډول په پام کې نیول شويدي ؛
- د عملي او نظري درسو تناسب د علمی شورا د پریکړو او د نصاب جوړونې کمېټې د نظریو او د اړتیا پر بنسټ په پام کې نیول شوی دی؛
- د محصلانو ارزونه د لوړو زده کړو وزارت د کړیدت د لایحې سره برابر ترسره کېږي ؛

- د استادانو د تدریس چارې د ځان ارزونې او پوهنځی د نافذه مقرراتو له مخې ترسره کېږي؛
- د درسي موادو نوې کېدنه د نويو او معتبرو درسي مآخذونو څخه وخت پر وخت ترسره کېږي.

ښوونیزه محتوا

1. د زده کړې موده: په څانګه کې د زده کړې موده څلورکاله يا اته سمستره ټاکل شوې ده.
 2. د مضمون کود نمبرونه: د کود دوه لومړني توري دپوهنځي نوم (EN)، دويم درې توري، دڅانګې نوم (WEE)، د کين څخه ښي لور ته لومړني دوه عددونه د سمستر شمېره او دوه ورپسې عددونه د مضمون کود دي. د بيلګې په توګه: (En.WEE0207) يعنې En - د انجنيرۍ پوهنځي، WEE - د اوبو او چاپيريالي انجنيرۍ څانګه، 02- دويم سمستر او 07 - د مضمون نوم راښيي.
- د کريدتونو په پام کې نيولو سره د څانګې د مضامينو شمېر دا رنگه ښودل کېږي:
- د اوبو او چاپيريالي انجنيرۍ څانګې د ليسانس تحصيلي دورې له پاره دټولو کريدتونو شمېر (155) ته رسيږي؛
 - د پوهنتون شموله مضامينو د کريدتونو شمېر (18) دی چې د ټولو کريدتونو (11.61) سلنه جوړوي؛
 - د اساسي مضامينو د کريدتونو شمېر (48) دی چې د ټولو کريدتونو (30.97) سلنه جوړيږي؛
 - د اختصاصي مضامينو د کريدتونو شمېر (78) چې د ټولو کريدتونو (50.32) سلنه تشکيلوي؛
 - د څېړنيزې پروژې (وروستۍ) او عملي کارونو د کريدتونو شمېر (11) دی چې د ټولو کريدتونو (7.10) سلنه جوړيږي.
3. د دوو سمسترونو په منځنۍ رخصتۍ کې د څلورم ټولګي له پاره د څېړنې کار د زده کړې په موخه په څېړنيزو ادارو کې لږ تر لږه دوه اونۍ مشاهداتي او عملي کار په پام کې نيول شويدي، ښايې چې هغه په نصاب کې شامل نه وي؛
 4. د نظري او عملي کارونو د تناسب کچه: څانګې خپل نصاب په دوو لويو برخو ويشلی دی: عملي او نظري. عملي کار کورني کارونه، عملي سوالونه، ساحوي کارونه، سمینارونه او څېړنيز موضوعات په بر کې نيسي؛
 5. د تدریس طريقه: د څانګې نصاب او د هغې اړوند مفردات داسې ترتيب شويدي چې د سمستر په پيل کې محصلانو ته درسي مفردات په اختيار کې ورکول کېږي. د شاګرد محوري په برخه کې د محصل له خوا د سمینارونو د اړايې په شکل او هم د صنفی او کورنيو کارونو په ډول، په همدې توګه ساحې ته د مشاهداتي او عملي کارونو د اجراء له پاره شاګردان په انفرادي او گروپي ډولونو سره تنظيميږي. په ټولګي کې د تدریس آېزار، د استاد خونه يا څانګه، تخته، مارکر، کمپيوټر، پروجکتور يا (LCD)، جوړشوي ماډلونه، چارټونه او د عملي کارونو اېزار تشکيلوي. درسي مواد د استادانو له خوا د نويو او معتبرو مآخذونو څخه ترتيب او د شاګردانو په واک کې د معياري لکچر نوټ يا د کتاب او د پاور پايټ سلايډونو په شکل ورکول کېږي.
 6. د محصلانو د ارزونې طريقه: د محصلانو ارزونه د لوړو زده کړو وزارت د ازموينې لايحې او طرزالعملونو سره برابر د سمینارونو، کورنيو کارونو، صنفی پروژو، ساحوي او لابراتواري کارونو، د سمستر منځنۍ او وروستۍ ازموينو په ډول ارزول کېږي. د سمستر په اوږدو کې دمحصل ارزونه (40) سلنه، چې په هغو کې (10) سلنه د ټولګي فعاليت، (10) سلنه کورني کارونه، (20) سلنه منځنۍ ازموينه او نور پاتې (60) سلنه يې وروستۍ ازموينه تشکيلوي چې ټولې يې (100) نمرې دي.
- د کريدت د لايحې له مخې په ازموېنه کې دکيون لپاره (75) سلنه حاضري حتمي ده، پرته له دې محصل محروم کيل کېږي.

The following sections are the details of Water Resources and Environmental Engineering curriculum structure:

Category-wise Curriculum Structure

Course Category	Credits	Remarks
A. Colligative Course	18	
B. Basic Courses	48	
C. Professional courses + Technical elective courses	74 + 4 = 78	
D. Projects	11	
Total Credits	155	
Minimum required credits	136	
Maximum credits allowed	168	

A. Colligative Courses (Required): 18 credits

S/N	Subject Name	Code No	Number of Credits
1	Islamic Studies (1)	En.WEE0101	1
2	Computer	En.WEE 0104	3
2	Contemporary History of Afghanistan	En.WEE 0102	1
3	Foreign Language (1)	En.WEE 0103	2
4	Islamic Studies (2)	En.WEE 0201	1
5	Foreign Language (2)	En.WEE0203	2
6	Islamic Studies (3)	En.WEE 0301	1
7	Foreign Language (3)	En.WEE0303	2
8	Islamic Studies (4)	En.WEE0401	1
9	Islamic Studies (5)	En.WEE 0501	1
10	Islamic Studies (6)	En.WEE 0601	1
11	Islamic Studies (7)	En.WEE 0701	1
12	Islamic Studies (8)	En.WEE 0801	1
Total Credits			18

B. Basic Courses (Required): 48 credits

S/N	Subject Name	Code No	Number of Credits
1	Calculus (1)	En.WEE 0105	3
2	Introduction to engineering	En.WEE 0106	2
3	Engineering graphics (1)	En.WEE 0107	4
4	Introduction to Computer Programing	En.WEE 0204	3
5	Engineering chemistry	En.WEE 0108	2
6	Calculus (2)	En.WEE 0205	3
7	Engineering graphics (2)	En.WEE 0207	4
8	Physics (1)	En.WEE 0209	3
9	Calculus (3)	En.WEE 0305	3
10	Physics (2)	En.WEE 0309	3
11	Engineering Mechanic (Statics & Dynamics)	En.WEE 0310	3
12	Engineering Survey (1)	En.WEE 0311	2
13	Environmental Studies	En.WEE 0313	3
14	Calculus (4)	En.WEE 0405	3
15	Structure Analyses	En.WEE 0414	2
16	Fluid Mechanics	En.WEE 0418	3
17	Survey Engineering (2)	En.WEE 0411	2
Total Credits			48

C. Professional Courses (Required): 78 credits

S/N	Subject Name	Code No	Number of Credits
1	Environmental Chemistry and Biology	En. WEE 0208	3
2	Construction Material and Methods	En.WE 0312	2
3	Soil Mechanics	En.WEE 0415	3
4	Strength of Material	En.WEE 0416	3
5	Engineering Geology & Geomorphology	En.WEE 0417	3
6	Engineering Hydraulics	En.WEE 0524	3
7	Hydrology	En.WEE 0519	3
8	Concrete analysis and design	En.WEE 0520	4
9	Numerical Method	En.WEE 0521	3
10	Environmental Impact Assessment (EIA)	En.WEE 0522	3
11	Waste Water Engineering and Sanitation	En.WEE 0625	3
12	Water supply Engineering	En.WEE 0523	3
13	Ground water engineering	En.WEE 0626	3
14	GIS application in Water Resources Planning and Management	En.WEE 0627	3
15	Solid and Hazardous Waste Management	En.WEE 0628	3
16	Engineering Economics	En.WEE 0629	2
17	River Engineering	En.WEE 0630	3
18	Water Resources Planning and Management	En.WEE 0838	3
19	Irrigation Engineering	En.WEE 0745	3
20	Urban Drainage Engineering and Management	En.WEE 0732	3
21	Water Resources Engineering	En.WEE 0733	4
22	Air Quality Management	En.WEE 0734	3
23	Environmental Health & Sanitation	En.WEE 0844	3

24	Hydraulic Structures	En.WEE 0839	3
25	Construction Project Management	En.WEE 0840	2
26	Professional Elective	En.WEE 0842/43	2
27	Professional Elective	En.WEE 0736/37	2
Total Credits			78

Professional Elective Courses

S/N	Subject Name	Code No	Number of Credits
1	Waste Reduction and Recycling	En.WEE 0736	2
2	Trans boundary Water	En.WEE 0842	
3	Flood and Draughts	En.WEE 0842	2
4	Soil and water conservation	En.WEE 0843	

D. Projects : 11 Credits

S/N	Subject Name	Code No	Number of Credits
1	Research Methodology	En.WEE 0631	2
2	Seminar 1 (Research Proposal)	En.WEE 0735	3
3	Seminar 2 (Research Project)	En.WEE 0841	6

Summary of credits

No	Subject Category	Total Credits	Overall Percentage
1	Collegiate	18	11.61%
2	Professional	78	50.32%
3	Basics	48	30.97%
4	Capstone Project	11	7.10%
Total		155	100.00%

Semester-wise Curriculum Structure

(Semester - 1) (First year / First Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (1)	En.WEE 0101	Collegiate	1	0	1	1	Faculty of Sharia	Nil	
2	Contemporary History of Afghanistan	En.WEE 0102	Collegiate	1	0	1	1	Faculty of Education	Nil	
3	Foreign Language (1)	En.WEE 0103	Collegiate	2	0	2	2	Faculty of Literature	Nil	
4	Computer	En.WEE 0104	Basics	2	2	4	3	Computer Science	Nil	Computer lab
5	Calculus (1)	En.WEE 0105	Basics	2	2	4	3	EngWEE	Nil	
6	Introduction to Engineering	En.WEE 0106	Basics	2	0	2	2	Eng/WEE	Nil	
7	Engineering Graphics (1)	En.WEE 0107	Basics	2	4	6	4	Eng/WEE	Nil	Class work
8	Engineering chemistry	En.WEE 0108	Basics	1	2	3	2	Eng/WEE	Nil	
Total				13	10	23	18			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	4	4.516
2	Professional	0	0.000
3	Basics	14	7.097
4	Elective	0	0.000
	Total	18	11.613

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

	(Semester - 2) (First year / Second Semester)									
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (2)	En.WEE 0201	Collegiate	1	0	1	1	IC,CO	Nil	
2	Introduction to Computer Programing	En.WEE 0204	Basics	2	2	4	3	CS	Nil	Computer lab
3	Calculus (2)	En.WEE 0205	Basics	2	2	4	3	Eng/WEE	Calculus (1)	
4	Environmental chemistry & Biology	En.WEE 0208	Professional	2	2	4	3	Eng/WEE	Nil	
5	Engineering graphics (2)	En.WEE 0207	Basics	2	4	6	4	Eng/WEE	Graphics (1)	Class work
6	Foreign Language (2)	En.WEE 0203	Collegiate	2	0	2	2	FL	Nil	
7	Physics (1)	En.WEE 0209	Basics	2	2	4	3	Eng/WEE	Nil	
	Total			13	12	25	19			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	3	1.935
2	Professional	3	1.935
3	Basics	13	8.387
4	Elective	0	0.000
	Total	19	12.258

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

(Semester - 3) Second year / First Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theor	Practical	Total				
1	Islamic Studies (3)	En.WEE 0301	Collegiate	1	0	1	1	IC,CO	Nil	
2	Calculus (3)	En.WEE 0305	Basics	2	2	4	3	Eng/WEE	Calculus (2)	
3	Physics (2)	En.WEE 0309	Basics	2	2	4	3	Eng/WEE	Physics (1)	
4	Engineering Mechanic (Statics & Dynamics)	En.WEE .310	Basics	2	2	4	3	Eng/WEE	Nil	
5	Engineering Survey (1)	En.WEE 0311	Basics	1	2	3	2	Eng/WEE	Nil	
6	Foreign Language (3)	En.WEE 0303	Collegiate	2	0	2	2	FL	Nil	
7	Construction Material and Methods	En.WEE 0312	Professional	1	2	3	2	Eng/WEE	Nil	
8	Environmental studies	En.WEE 0313	Basics	3	0	3	3	Eng/WEE	Nil	
Total				14	10	24	19			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	3	1.935
2	Professional	2	1.290
3	Basics	14	9.032
4	Elective	0	0.000
Total		19	12.258

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

(Semester - 4) (Second year / Second Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (4)	En.WEE 0401	Collegiate	1		1	1	IC,CO	Nil	
2	Calculus (4)	En.WEE 0405	Basics	2	2	4	3	Eng/WEE	Calculus (3)	
3	Fluid Mechanics	En.WEE 0418	Basics	2	2	4	3	Eng/WEE	Nil	
4	Structure analysis	En.WEE 0414	Basics	2	0	2	2	Eng/WEE	Engineering Mechanics	
5	Survey Engineering (2)	En.WEE 0411	Basics	1	2	3	2	Eng/WEE	Surveying (1)	
6	Soil Mechanics	En.WEE 0415	Professional	2	2	4	3	Eng/WEE	Nil	
7	Strength of Material	En.WEE 0416	Professional	2	2	4	3	Eng/WEE	Statics	
8	Engineering Geology & Geomorphology	En.WEE 0417	Professional	2	2	4	3	Eng/WEE	Nil	
Total				14	12	26	20			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.645
2	Professional	9	5.806
3	Basics	10	6.452
4	Elective	0	0.000
Total		20	12.903

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

(Semester - 5) (Third year / First Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (5)	En.WEE 0501	Collegiate	1	0	1	1	IC,CO	Nil	
2	Engineering Hydraulics	En.WEE 0524	Professional	2	2	4	3	Eng/WEE	Fluid mechanics	
3	Hydrology	En.WEE 0519	Professional	3	0	3	3	Eng/WEE	Hydraulics	
4	Concrete analysis and design	En.WEE 0520	Professional	3	2	5	4	Eng/WEE	Strength of mat	
4	Numerical Method	En.WEE 0521	Professional	2	2	4	3	Eng/WEE	Calculus	
6	Environmental Impact Assessment (EIA)	En.WEE 0522	Professional	2	2	4	3	Eng/WEE	Chemistry	
7	Water supply Engineering	En.WEE 0523	Professional	2	2	4	3	Eng/WEE	Hydraulics	
Total				15	10	25	20			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.645
2	Professional	19	12.258
3	Basics	0	0.000
4	Elective	0	0.000
Total		20	12.903

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

(Semester - 6) (Third year / Second Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (6)	En.WEE 0601	Collegiate	1	0	1	1	IC,CO	Nil	
2	Research Methodology	En.WEE 0631	Capstone Project	2	0	2	2	Eng/WEE	Nil	
3	Waste Water Engineering and Sanitation	En.WEE 0625	Professional	2	2	4	3	Eng/WEE	Chemistry	
4	Ground water engineering	En.WEE 0626	Professional	3	0	3	3	Eng/WEE	Eng. Geology	
5	GIS application in Water Resources Planning & Management	En.WEE 0627	Professional	1	4	5	3	Eng/WEE	Surveying	
6	Solid and Hazardous Waste Management	En.WEE 0628	Professional	3	0	3	3	Eng/WEE	Nil	
7	Engineering Economics	En.WEE 0629	Professional	2	0	2	2	Eng/WEE	Nil	
8	River Engineering	En.WEE 0630	Professional	3	0	3	3	Eng/WEE	Hydraulics	
Total				17	6	23	20			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.645
2	Professional	17	10.968
3	Basics	0	0.000
4	Capstone Project	2	1.290
5	Elective	0	0.000
Total		20	12.903

No	Elective Subjects	Codes	Credits
1			
2			
3			
Signature			

(Semester - 7) (Fourth year / First Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (7)	En.WEE 0701	Collegiate	1	0	1	1	IC,CO	Nil	
2	Irrigation Engineering	En.WEE 0745	Professional	3	0	3	3	Eng/WEE	Nil	
3	Urban Drainage Engineering and Management	En.WEE 0732	Professional	3	0	3	3	Eng/WEE	Hydrology	
4	Water Resources Engineering	En.WEE 0733	Professional	4	0	4	4	Eng/WEE	Hydrology	
5	Air Quality Management	En.WEE 0734	Professional	3	0	3	3	Eng/WEE	Nil	
6	Seminar 1 (Research Proposal)	En.WEE 0735	Capstone Project	1	4	5	3	Eng/WEE	Research Method	
7	Professional Elective-I	En.WEE 0736/37	Professional	2	0	3	2	Eng/WEE	Nil	
Total				17	4	22	19			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.645
2	Professional	12	7.742
3	Basics	0	0.000
4	Capstone Project	3	1.935
5	Elective	3	1.935
Total		19	12.258

No	Elective Subjects	Codes	Credits
1	Waste Reduction and Recycling	En.WEE 0736	2
2	Transboundary Water	En.WEE 0842	
3			
Signature			

(Semester - 8) (Fourth year / Second Semester)										
No	Subjects	Codes	Subject Category	Classes			Number of Credits	In charge Department and Faculty	Prerequisite Subjects	Remarks
				Theory	Practical	Total				
1	Islamic Studies (8)	En.WEE 0801	Collegiate	1	0	1	1	IC,CO	Nil	
2	Environmental health & sanitation	En.WEE 0844	Professional	3	0	3	3	Eng/WEE	Environment	
3	Hydraulic Structures	En.WEE 0839	Professional	2	2	4	3	Eng/WEE	Hydraulics	
4	Construction Project Management	En.WEE 0840	Professional	2	0	2	2	Eng/Civil	Nil	
5	Water Resources Planning & Management	En. WEE 0838	Professional	3	0	3	3	Eng/WEE	W.R Engineering	
6	Seminar 2 (Research Project)	En.WEE 0841	Capstone Project	1	10	11	6	Eng/WEE	Seminar 1	Remarks
7	Professional Elective-II	En.WEE 0842/ 843	Professional	2	0	2	2	Eng/WEE	Nil	
Total				14	12	26	20			

No	Subject Category	Credits	Percentage due All Credits
1	Collegiate	1	0.645
2	Professional	11	7.097
3	Basics	0	0.000
4	Capstone Project	6	3.871
5	Elective-II	2	1.290
Total		20	12.903

No	Elective Subjects	Codes	Credits
1	Flood and Draughts	En.WEE 0842	2
2	Soil and water conservation	En.WEE 0843	
Signature			

Semester-wise Course Syllabus

First Semester

En. WEE 0102 History of Afghanistan

Note: This subject is a colligative course; its detailed Syllabus will be provided by History Department.

En. WEE 0103 English I (English for Academic Purposes)

Item	Description
Title	English I (English for Academic Purposes)
Credits and no. of hours	3 (3-0)
Offering year and semester	First Year-First Semester
Aim	The objective of the course is to help these people learn some of the linguistic and cultural – mainly institutional and disciplinary - practices involved in studying or working through the medium of English.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the basic approach for learning English language• Able to understand the phonetics and its application to English language• Develop the vocabulary skills• Able to understand the common diction in English language• Understanding the common grammatical errors in English language• Develop the understanding of English literature
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction</u><ul style="list-style-type: none">1. Current approaches to learning English2. Communication todayII. <u>Phonetics</u><ul style="list-style-type: none">1. Phonetics and correct English pronunciationIII. <u>Syntax</u><ul style="list-style-type: none">1. Vocabulary2. Diction and English sentence3. Sentence variety and style4. Grammatical problemsIV. <u>Reading Skill</u><ul style="list-style-type: none">1. Readability2. Reading strategies3. Generating ideas through purposive reading4. Reading of selected stories5. ComprehensionV. <u>Writing Skill</u><ul style="list-style-type: none">1. Principles of effective writing2. Generating ideas3. Planning4. Organization and development of writing5. Composition6. PrécisVI. <u>Written Communication</u><ul style="list-style-type: none">1. Business communication2. Tenders and quotations3. Journal articles4. ReportVII. <u>Oral Communication</u>

	1. Dialogue 2. Technical and scientific presentation			
Pre-requisite	None			
Related Courses	Critical Thinking and Writing, English Communication Skills in Engineering			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• Ingre. <i>Engineering Communication</i> (1st Edition) <u>References:</u> <ul style="list-style-type: none">• Alexander, O., Argent, S. & Spencer, J. (2008), <i>EAP essentials: A teacher's guide to principles and practice</i>. Reading: Garnet• Badger, R. & White, G. (2000). <i>A process genre approach to teaching writing</i>. ELT Journal, 54, 153-160.• Biber, D. (2006). <i>University language: A corpus-based study of spoken and written registers</i>. Amsterdam: John Benjamins.• Sorenson, <i>Webster's New World Student Writing Handbook</i>, 4th Edition• Nation, P. (2007). <i>The four strands. Innovation in Language Learning and Teaching</i>1, 2-13.• Quality Assurance Agency for Higher Education (2002). <i>Subject benchmark statements: Languages and related studies.</i>” Available from: http://www.qaa.ac.uk/			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering	X			
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively		X		
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course outcomes	Program 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	Understanding the basic approach for learning English language	1	1	1	2	2	1	1
2	Able to understand the phonetics and its application to English language	1	1	1	2	2	1	1
3	Develop the vocabulary skills	1	1	1	2	2	1	1
4	Able to understand the common diction in English language	1	2	1	1	1	1	1
5	Understanding the common grammatical errors in English language	2	1	1	1	1	1	1
6	Develop the understanding 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= Moderate relation 3=Extensive relation								

En. WEE 0104 Computer

Note: This course is colligative subject; its syllabus will be provided by computer department.

En. WEE 0105 Calculus I (Differential & Integral Calculus)

Item	Description
Title	Calculus I (Differential & Integral Calculus)
Credits and no. of hours	3 (2-2)
Offering year and semester	First Year-First Semester
Aim	The objective of this course is to provide a firm foundation in the concepts and techniques of the calculus, including standard functions, limits, continuity, differentiation, integration, differential equations, Sequences and Series.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the firm concepts of limits and functions• Able to understand the concepts of differentiation and integration and its application• Develop the idea of different technique of integration• Able to understand the firm concepts of differential equation, parametric equation and polar coordinates, Infinite Sequences and Series
Academic Staff Responsible	
Syllabus	<p>I. <u>Functions and their representations</u></p> <ol style="list-style-type: none">1. Representation of functions2. Essential functions3. New functions from old functions4. Exponential Functions5. Inverse functions and Logarithms <p>II. <u>Limits and their properties</u></p> <ol style="list-style-type: none">1. Limits of functions2. Theorems on limits3. Infinity4. Special limits5. Continuity, Right- and left-hand continuity, Continuity in an interval, Theorems on continuity, Piecewise continuity, Uniform continuity <p>III. <u>Differentiation</u></p> <ol style="list-style-type: none">1. Interpretation of the Derivative2. Differentiation rules3. Derivatives of special Functions4. Hyperbolic Functions5. Higher order Derivatives6. Linear Approximations and Differentials <p>IV. <u>Applications of differentiation</u></p> <ol style="list-style-type: none">1. Maximum and Minimum Values2. Mean Value Theorem3. Indeterminate Forms and L'Hospital's Rule4. Curve Sketching5. Optimization Problems

	6. Ant derivatives V. <u>Integration and Applications of integration</u> 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. <u>Integration techniques</u> 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. <u>Differential equations</u> 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. <u>Parametric equation and polar coordinates</u> 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 IX. <u>Infinite Sequences and Series</u> 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
Pre-requisite	None
Related Courses	Multivariable Calculus for Engineers, Differential Equations, Linear Algebra, Probability & Statistics
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and	<u>Textbooks:</u>

References	• Stewart, James, <i>Calculus</i> (6 th Edition)			
	<u>References:</u> • Larson, Hostetler and Edwards. <i>Calculus</i> (8 th Edition) • Wrede, Robert C. and Murray Spiegel. <i>Advanced Calculus</i> (2 nd Edition)			
Evaluation Method(s)	Assignment (20%) Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Differential & Integral Calculus first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			

N0	Course outcomes	Program 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	Understanding the firm concepts of limits and functions	1	1	1	2	2	1	1
2	Able to understand the concepts of differentiation and integration and its	1	1	1	2	2	1	1
3	Develop the idea of different technique of	1	1	1	2	2	1	1
4	Able to understand the firm concepts of differential	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. WEE 0106 Introduction to Engineering

Item	Description			
Title	Introduction to Engineering			
Credits and no. of hours	2 (2-0)			
Offering year and semester	First Year-First Semester			
Aim	The objective of this course is to provide an introduction to engineering disciplines and its importance and various fields.			
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding engineering disciplines• Understanding engineering various fields• Able to know the role of engineering fields in development			
Academic Staff Responsible				
Syllabus	I. <u>Introduction to engineering and its fields</u> II. <u>Introduction to engineering skills and ethics</u> III. <u>Design procedures</u> IV. <u>Measurement and problem solution</u> V. <u>Engineering units and units conversion</u> VI. <u>Triangular functions and problem solution</u> VII. <u>Area, volumes and problem solutions</u> VIII. <u>Introduction to estimation and problem solution</u>			
Pre-requisite	None			
Related Courses	Physics, Calculus I			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Mathematics and Physics			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• Engineering fundamental and problem solving (6th Edition)			
	<u>References:</u> <ul style="list-style-type: none">• Paul H. Wright. (2002), “Introduction to engineering”, 3rd Edition, John Wiley & Sons.			
Evaluation Method(s)	Assignment (20%) Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Differential & Integral Calculus first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			

Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

N0	Course outcomes	Program 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	Understanding engineering disciplines	1	1	1	2	2	1	1
2	Understanding engineering various fields	1	1	1	2	2	1	1
3	Able to know the role of engineering fields in development	1	1	1	2	2	1	1
Total		1	1	1	3	3	1	1
Average		1.57						
1= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0107 Engineering Graphics I (Computer-Aided Design)

Item	Description
Title	Computer-Aided Design and Computer-Aided Manufacturing
Credits and no. of hours	4 (2-4)
Offering year and semester	First Year-First Semester
Aim	This course is designed to provide a general understanding of Engineering drawing & CAD as it is the common tool of communication in Engineering field.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • The student will learn about the basic principle of engineering drawing including lettering, applied geometry, orthographic drawing and sketching, sectional views and conventions, detail drawing, assembly drawing, dimensioning; • The student will also learn about the basic descriptive geometry dealing with points, lines & planes and their relationship in space and basic developed views • Demonstrate knowledge and skills needed to design and draft projects ranging for two dimensional designs for commercial and residential buildings. • Demonstrate basic skills needed to view, print, edit, and create variations of two dimensional electronic designs.
Academic Staff Responsible	
Syllabus	<p>I. <u>Hand Aided Design & Drafting</u></p> <ul style="list-style-type: none"> • Preface of technical drawing machine parts. • <u>& Sketching</u> • Free hand sketching General information • Multiview projection, Drawing of machine parts and drawing by instruments • Axonometric projection • Isometric, Diametric and trimetric projection • Sectioning, Frontal section, Horizontal section and Oblique section • Drawing a building floor plan • Different steps of floor plan and detail of building projection <p>Contour line, drainage, flood plain road transportation, and earth work</p> <p>II. <u>Introduction, Drawing Equipment and Lettering</u></p> <ol style="list-style-type: none"> 1. Drawing Instruments & their use 2. Types of lines & letters 3. Scales 4. Dimensions & their Types 5. Planning of a Sheet 6. Types of Engineering Drawing <p>III. <u>Projection</u></p> <ol style="list-style-type: none"> 1. Orthographic projections 2. First angle and third angle projection 3. Projection of points 4. Projection of lines and simple positions and inclined to both

	<p>the planes</p> <ol style="list-style-type: none"> 5. Projection of solids in simple positions and inclined to both the planes 6. Sections of solids and auxiliary views 7. Development of surfaces 8. Pictorial projections such as isometric and oblique view <p>IV. <u>Conic section, Curves and Miscellaneous Items</u></p> <ol style="list-style-type: none"> 1. Cycloidal curves 2. Spirals and insulates 3. Planning and drawing 4. Lettering and dimensioning 5. Rivets, riveted joints 6. Screws and screwed fastenings 7. Keys, cotters 8. Pulleys <p>V. <u>Preparation and Assembly of Machine Drawing and Subjects Selected from the Following Bearings</u></p> <ol style="list-style-type: none"> 1. Wall-brackets 2. Shaft coupling 3. Engine pistons 4. Engine rods 5. Connecting rods 	
Pre-requisite	None	
Related Courses	Introduction to Computer & Programming	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<p><u>Textbooks:</u></p> <ul style="list-style-type: none"> • Ostrowsky, O. (1995), <i>Engineering Drawing with CAD Applications</i>. Edward Arnold. <p><u>References:</u></p> <ul style="list-style-type: none"> • Boundy, A.W. (2006). <i>Engineering Drawing: Workbook</i> (6th Edition). McGraw-Hill Australia Pvt. Ltd. • French, T.E., Vierck, C.J. and Foster R.J. (1993). <i>Engineering Drawing and Graphic Technology</i> (4th Edition). McGraw-Hill. • Bethune, James D., <i>Essentials of Drafting</i>. Prentice Hall • Trymbaka Murty, S., <i>Computer Aided Engineering Drawing</i>. T.K. International Publishing House Pvt. Ltd. New Delhi. • میا خیل ، میا پاچا. (۱۳۹۷)، پہ سیول انجینیری کی د اٹوکہد استعمال، ننگرہار پوهنتون. 	
Evaluation Method(s)	Quizzes (5%), Lab Assignments (25%), Mid-term (20%) and Final Exam (50%)	
Time Distribution:	<ul style="list-style-type: none"> • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork 	<p>30%</p> <p>70%</p> <p>As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in engineering drawing first and then learn the solution by laboratory works.</p>

• Home study									
Relationship of this Course to Program Learning Outcome									
					None	Some	Moderate	Extensive	
Apply mathematics, science and engineering					X				
Design/conduct experiments/analyze data					X				
Use modern tools and techniques							X		
Critical thinking and apply knowledge concurrence with other disciplines							X		
Understand professional and ethical responsibility						X			
Communicate effectively						X			
Ability to function in a group and in multi-disciplinary team							X		
Remarks									
N0	Course outcomes	Program 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	The student will learn about the basic principle of engineering drawing including lettering, applied geometry, orthographic drawing and sketching, sectional views and conventions, detail drawing, assembly drawing, dimensioning.	1	1	1	1	1	1	1	
2	The student will also learn about the basic descriptive geometry dealing with points, lines & planes and their relationship in space and basic developed views	1	1	1	2	2	1	1	
3	Demonstrate knowledge and skills needed to design and draft projects ranging for two dimensional designs for commercial and residential buildings.	1	1	1	1	1	1	1	

4	Demonstrate basic skills needed to view, print, edit, and create variations of two dimensional electronic designs.	1	1	1	2	2	1	1
Total		1	1	1	3	3	1	1
Average		1.57						
1= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0108 Engineering Chemistry

Item	Description
Title	Engineering Chemistry
Credits and no. of hours	2 (1-2)
Offering year and semester	First Year-First Semester
Aim	The objective of this course is to develop the fundamental knowledge of physical, inorganic and organic chemistry pertinent with engineering.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understanding the relationship between atomic/molecular structure and properties • Able to understand the Lewis Structures for chemical species and determine the ionic/covalent character of chemical bonds • Develop the concepts of Valance-Bond Theory and Molecular Orbital Theory to predict electron arrangement and molecular shape • Recognize, rationalize and quantify the acid/base behavior and also calculate and interpret the solubility • Understanding the development of theories resulting in Arrhenius temperature dependence of reaction rates • Able to understand how energy is stored by molecules and analyze closed system and open systems, steady and unsteady process • Understand the basic idea of electrochemistry, nuclear chemistry and organic chemistry • Develop an understanding of the application of the theoretical knowledge with practice application through laboratory works
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction and Review</u></p> <ol style="list-style-type: none"> 1. Units of measure and conversion 2. Scientific notation 3. Significant figures 4. Stoichiometry review <p>II. <u>The Periodic Table and Atomic Structure</u></p> <ol style="list-style-type: none"> 1. The periodic table of the elements

	<ol style="list-style-type: none"> Atomic models Excitation and ionization energies Ionization energy Electron affinity
	<p>III. <u>Introduction to Quantum Theory</u></p> <ol style="list-style-type: none"> The Bohr's theory of the hydrogen atom The wave-mechanical description of atoms Quantum numbers Atomic orbitals Electron configuration
	<p>IV. <u>Chemical Bonding</u></p> <ol style="list-style-type: none"> Ionic bond The nature of covalence Electronegativity The concept of resonance Bond enthalpy Valence bond theory
	<p>V. <u>Gas</u></p> <ol style="list-style-type: none"> Pressure of a gas The gas laws The ideal gas equation Gas stoichiometry Imperfect gases
	<p>VI. <u>Chemical Kinetics</u></p> <ol style="list-style-type: none"> The rate of a Reaction The rate law Temperature dependence of rate constants Reaction mechanism Catalysis
	<p>VII. <u>Chemical Equilibrium</u></p> <ol style="list-style-type: none"> The concept of equilibrium and the equilibrium constant The relationship between chemical kinetics and chemical equilibrium Predicting the direction of a reaction Calculation of equilibrium concentration Factors affecting chemical equilibrium
	<p>VIII. <u>Acids, Bases and Salts</u></p> <ol style="list-style-type: none"> Lewis concept acids and bases Bronsted-Lowry concept of acids and bases Acid-base titration Acid-bases indicators Hydrolysis of salts pH and Buffer solutions
	<p>IX. <u>Thermochemistry and Introduction to Thermodynamics</u></p> <ol style="list-style-type: none"> The nature and types of energy Energy changes in chemical reactions Introduction to thermodynamics Enthalpy of chemical reactions Calorimetry
	<p>X. <u>Chemical Thermodynamics</u></p>

	<ol style="list-style-type: none">1. The three laws of thermodynamics2. Spontaneous process3. Entropy4. Gibbs free energy5. Thermodynamics in living systems <p>XI. <u>Electrochemistry</u></p> <ol style="list-style-type: none">1. Redox reactions2. Conductivity3. Galvanic cells4. Standard reduction potentials5. Thermodynamics of redox reactions <p>XII. <u>Nuclear Chemistry</u></p> <ol style="list-style-type: none">1. The nature of nuclear reactions2. Natural radioactivity3. Uses of isotopes4. Effects of radiation5. Application of nuclear energy <p>XIII. <u>Organic Chemistry</u></p> <ol style="list-style-type: none">1. Classes of organic compounds2. Aliphatic hydrocarbons3. Aromatic hydrocarbons4. Chemistry of the functional groups <p>XIV. <u>Laboratory Sessions:</u></p> <ol style="list-style-type: none">1. Laboratory information and safety2. Periodic relationships among the elements3. Paper chromatography4. Acid-base titration and volumetric analysis5. Chemical equilibrium – Vinegar analysis6. Gravimetric analysis and filtration technique7. Saponification	
Pre-requisite	None	
Related Courses	Environmental Chemistry & Biology	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Basic Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• Chang, R. (2010). <i>Chemistry</i> (10th Edition). McGraw-Hill Science.	
	<u>References:</u> <ul style="list-style-type: none">• Brown, L. S. and Holmes, T. A. (2011). <i>Chemistry for Engineering Students</i> (2nd Edition). Cengage Learning• Yen, T. F. (2008). <i>Chemistry for Engineers</i>. Imperial College Press, London	
Evaluation Method(s)	Laboratory Exercises (15%), Assignment (10%), Mid-Term Exam (25%) and Final Exam (50%)	
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises	60% 10%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be

<ul style="list-style-type: none">• Laboratory• Case study• Fieldwork• Home study	30%	exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques		X		
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No	Course outcomes	Program 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	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		1.07						
1= some relation 2= Moderate relation 3=Extensive relation								

Second Semester

En. WEE 0204 Introduction to Computer & Programming

Item	Description
Title	Introduction to Computer & Programming
Credits and no. of hours	3 (2-2)
Offering year and semester	First Year-Second Semester
Aim	It aims to provide students with an understanding of the role computation can play in solving problems. It also aims to help students, regardless of their major, to feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Apply knowledge of computing, mathematics, science, and/or engineering appropriate to the discipline• Use the techniques, skills, and modern engineering tools necessary for engineering practice• Apply knowledge and skills to solve problems effectively and efficiently that contributes to the technical advancement of computer engineering.
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction</u><ul style="list-style-type: none">1. What computer does?2. Computational thinking3. Basic machines architecture and programming languagesII. <u>Core elements of programs</u><ul style="list-style-type: none">1. Kinds of languages2. Objects, expressions, operators3. Abstraction by naming4. Strings5. Scripts6. Straight-line programs7. Branching programsIII. <u>Algorithms</u><ul style="list-style-type: none">1. Iteration2. Exhaustive enumeration3. Guess and check4. For and while loops5. Approximate solutions6. Bisection search7. Newton-RaphsonIV. <u>Functions</u><ul style="list-style-type: none">1. Function syntax2. Abstraction by specification3. Functions and scoping4. Specifications

	<ul style="list-style-type: none"> 5. Modules V. <u>Recursion</u> <ul style="list-style-type: none"> 1. Recursion 2. Inductive reasoning 3. Divide and conquer VI. <u>Objects</u> <ul style="list-style-type: none"> 1. Structures types and mutability 2. Tuples 3. Lists and mutability 4. Functions as objects 5. Dictionaries VII. <u>Classes</u> <ul style="list-style-type: none"> 1. Definition of classes 2. Classes vs. instances 3. Methods 4. Bindings of values 5. Exceptions VIII. <u>Object-oriented programming basics</u> <ul style="list-style-type: none"> 1. Objects 2. Classes 3. Introduction to inheritance 4. Encapsulation IX. <u>Debugging</u> <ul style="list-style-type: none"> 1. Testing and debugging 2. Black box testing 3. Glass box testing 4. Integration testing and unit testing 5. Debugging approaches X. <u>Object Interaction and behavior</u> <ul style="list-style-type: none"> 1. Calling methods 2. Writing methods (including the use of return types and parameter) 3. Constructors (using and writing) 4. Interactive I/O 5. If-statements (and if-else) 6. Instance variables (fields) 7. Assignment statement 8. Variables and references 9. Loops 10. Arrays: one-dimensional arrays, using arrays with functions 11. Strings: using C++ string class, string manipulation, using functions of the string class & programmer-defined
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	<p>functions</p> <p>12. Lists</p> <p>13. Method overloading</p> <p>14. Introduction to Class libraries (java standard libraries)</p> <p>XI. <u>Java Programming Language</u></p> <p>1. Java syntax</p> <p>2. Java programming environment</p> <p>3. Dealing with compilation errors</p> <p>XII. <u>Laboratory Sessions</u></p> <p>1. Programming concepts and algorithms</p> <p>2. Internal representation of data</p> <p>3. Elements of structured programming language: data types operators, expressions, control structures, functions, pointers and arrays, input and output</p> <p>4. Concept of Object Oriented Programming (OOP): encapsulation, inheritance, polymorphism and abstraction.</p>	
Pre-requisite	None	
Related Courses	Computer-Aided Design and Computer-Aided Manufacturing	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<p><u>Text Books:</u></p> <ul style="list-style-type: none"> • Zelle, John. Python (2003), <i>Programming: An Introduction to Computer Science</i>. Wilsonville, OR: Franklin, Beedle & Associates. ISBN: 9781887902991 	
	<p><u>References:</u></p> <ul style="list-style-type: none"> • Kölling, Michael (2010). <i>Introduction to Programming with Green foot: Object-oriented programming in Java with Games and Simulations</i>. Pearson Education. (ISBN 10: 0-13-603753-4) • Vine, M. (2008). <i>C Programming for the Absolute Beginner</i>, (2nd Edition). Cengage (CS 1233) • Gaddis, T. (2004). <i>Starting Out with Java Alternate</i>. Scott Jones. (CS 1273) • Horstmann, Cay S. (2007), <i>Big Java</i> (3rd Edition). Wiley • Jones, J. and K. Harrow. <i>Problem Solving With C++</i> • http://www.mathworks.com/academia/student_center/tutorials/launchpad.html • http://www.math.siu.edu/matlab/tutorials.html 	
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution:	30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in computer first and then
<ul style="list-style-type: none"> • Lectures • Tutorials/exercises • Laboratory 		

<ul style="list-style-type: none">• Case study• Fieldwork• Home study	70%	learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility		X		
Communicate effectively			X	
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

N0	Course outcomes	Program 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	Generality of Worship	1	1	1	1	1	1	1
2	Criteria for Worship	1	1	1	2	2	1	1
3	Objectives of Worship	1	1	1	1	1	1	1
4	Importance of Worship	1	1	1	2	2	1	1
5	Needs for Worship	1	1	1	1	1	1	1
6	Benefits of Worship	1	1	1	1	1	1	1
Total		1	1	1	1.33	1.33	1	1
Average		1.1						
1= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0205 Calculus II (Multivariable Calculus for Engineers)

Item	Description
Title	Calculus II (Multivariable Calculus for Engineers)
Credits and no. of hours	3(2-2)
Offering year and semester	First Year-Second Semester
Aim	This course is designed to acquire an active knowledge and understanding of the main concepts and techniques of multivariable calculus including vectors, partial differentiation, multiple integration and higher order differential equations.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• 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 of several variables, partial differentiation, multiple integration and higher order differential equations
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Vectors and the Geometry of Space</u><ul style="list-style-type: none">1. Three-Dimensional Coordinate Systems2. Vectors3. Vector products4. Equations of Lines and Planes5. Cylinders and Quadric Surfaces6. Cylindrical and Spherical CoordinatesII. <u>Vector Functions</u><ul style="list-style-type: none">1. Vector Functions and Space Curves2. Derivatives and Integrals of Vector FunctionsIII. <u>Partial Differentiation</u><ul style="list-style-type: none">1. Functions of Several Variables2. Limits and Continuity3. Partial Derivatives4. Tangent Planes5. Chain Rule6. Directional Derivatives and the Gradient Vector7. Maximum and Minimum Values8. Lagrange Multipliers9. Higher order partial derivativesIV. <u>Multiple Integrals</u><ul style="list-style-type: none">1. Double Integrals over Rectangles2. Iterated Integrals3. Double Integrals over General Regions4. Surface Area5. Triple Integrals6. Triple Integrals in Cylindrical and Spherical Coordinates7. Change of Variables in Multiple Integrals

	V. <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 VI. <u>Second-Order Differential Equations</u> 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)			
Related Courses	Differential & Integral Calculus, Differential Equations, Linear Algebra, Probability & Statistics			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Stewart, James. <i>Calculus</i> (6 th Edition)			
	<u>References:</u> • Larson, Hostetler and Edwards. <i>Calculus</i> (8 th Edition) • Wrede, Robert C. and Murray Spiegel. <i>Advanced Calculus</i> (2 nd Edition)			
Evaluation Method(s)	Assignment (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Multivariable Calculus for Engineers first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with			X	

other disciplines				
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course outcomes	Program 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	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= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0208 Environmental Chemistry & Biology

Item	Description
Title	Environmental Chemistry & Biology
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Sixth Semester
Aim	The purpose of the course is to prepare the engineers and scientists to help those engaged in basic research, to carry out apply research, in basic environmental engineering
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Physical and chemical properties of water• Basic Biochemistry of wastewater, air and solid wastes• Physiology of microbial degradation of pollutants• Methods of detection of microbes and viruses in the environment
Academic Staff Responsible	
Syllabus	<p>I. <u>Characteristics and Analysis for Water & Wastewater</u></p> <ol style="list-style-type: none">1. Introduction2. Review of Basic Chemistry3. Standard Solutions, pH, Acidity, Alkalinity, CO₂4. Color, Turbidity and Solids5. Hardness, Water Softening; Calcium, Magnesium, Chloride and Conductivity6. Dissolved Oxygen BOD, COD and TOC7. Nitrogen's Photometric Measurements; Nitrogen (NO₂, NO₃, NH₃)8. Iron, Manganese, Phosphorus9. Sulphate and Sulphides10. Sampling and Sampler; Analysis of Industrial Wastes and Biogas Analysis <p>II. <u>Characteristics and Analysis for Air & Solid Wastes</u></p> <ol style="list-style-type: none">1. Definition of Air Pollutants; Nature of Air Pollution: Gaseous Pollutants (HC, SO₂, CO, CO₂ and Particulate)2. Air Sampling and Equipment for Sampling: CO, CO₂, SO_x, NO_x, HC and Particulate3. Definition of Solid Wastes, Physical Characteristics; Chemical Characteristics, Sampling and Analysis <p>III. <u>Basic Microbial Biochemistry, Genetics and Physiology</u></p> <ol style="list-style-type: none">1. Microbial Growth, I. E. Kinetics and Growth Parameter2. Microbial Biochemistry, Metabolism and Pathways3. Principles of Microbial Genetics4. Principles of Genetic Engineering <p>IV. <u>Biochemical Pathways Involved in Biodegradation</u></p> <ol style="list-style-type: none">1. Selection of Microbial Strains for Xenobiotic Degradation2. Xenobiotic Degradation by Bacteria3. Xenobiotic Degradation by Eukaryotic Microbes4. Genetics of Pathways in Xenobiotic Biodegradation5. Genetic Engineering of Biochemical Pathways

	<p>V. <u>Application and Detection of Microbes.</u></p> <ol style="list-style-type: none"> 1. Bacteria and Water Quality 2. Indicators and Indices 3. Role of Microbes in Waste Treatment, Activated Sludge, Trickling Filter, Oxidation Pond 4. Bioassay Method for Microbes and Phases 5. Novel Methods for Microbial Detection in the Environment, E.G. Polymerase Chain Reaction (PCR), Antibody, Biosensors, Principles and Applications <p>VI. <u>Chemistry Laboratory Sessions</u></p> <ol style="list-style-type: none"> 1. Determination of pH, Acidity, Alkalinity & CO₂ 2. Determination of Color and Turbidity 3. Determination of Hardness 4. Determination of Suspended Solids Weight 5. Determination of Chloride & Conductivity 6. Determination of COD 7. Determination of DO & BOD 8. Determination of Iron & Manganese 9. Determination of Phosphate, Sulfate 10. Gas Analysis for CO₂, CO & O₂ 11. Suspended Particulate Matter in the Atmosphere 12. Determination of SO_x 13. Determination NO_x 14. Solid Wastes (Physical Analysis) <p>VII. <u>Biology Laboratory sessions:</u></p> <ol style="list-style-type: none"> 1. Biological examination of water: Algae, bacteria, Protozoa 2. Bacterial water quality: Measuring quality of water by using coli form organisms (MPN method and membrane filter). 3. Indicator and Indices: Faecal streptococci, anaerobic bacteria 4. Bacteria in waste water.
Pre-requisite	None
Related Courses	Engineering Chemistry, Environmental Impact Assessment
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> • Sawyer, C.N., G.F. Parkin and P.L. McCarty (1994). <i>Chemistry for Environmental Engineering</i>. McGraw-Hill, New York.
	<u>References:</u> <ul style="list-style-type: none"> • Sawyer, C.N. et al (2002). <i>Chemistry for Environmental Engineering and Science</i>. McGraw-Hill, ISBN: 0072480661 • C. J. Haist (Editor) (1997). <i>Manual of Environmental Microbiology</i>. ASM Press.

Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Environmental Chemistry & Biology first and then learn the solution by laboratory works.		
	30%			
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course outcomes	Program 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	Physical and chemical properties of water	1	1	1	1	1	1	1
2	Basic Biochemistry of wastewater, air and solid wastes	1	1	2	1	2	1	1
3	Physiology of microbial degradation of pollutants	1	1	1	1	1	1	1
4	Methods of detection of microbes and viruses in the environment	1	1	1	2	1	2	1
Total		1	1	1.25	1.25	1.25	1.25	1
Average		1.14						
1= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0207 Engineering Graphics II

Item	Description
Title	Computer-Aided Design and Computer-Aided Manufacturing
Credits and no. of hours	4 (2-4)
Offering year and semester	First Year-First Semester
Aim	This course is designed to provide a general understanding of Engineering drawing & CAD as it is the common tool of communication in Engineering field.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • The student will learn about the basic principle of engineering drawing including lettering, applied geometry, orthographic drawing and sketching, sectional views and conventions, detail drawing, assembly drawing, dimensioning; • The student will also learn about the basic descriptive geometry dealing with points, lines & planes and their relationship in space and basic developed views • Demonstrate knowledge and skills needed to design and draft projects ranging for two dimensional designs for commercial and residential buildings. • Demonstrate basic skills needed to view, print, edit, and create variations of two dimensional electronic designs.
Academic Staff Responsible	
Syllabus	<p><u>Computer Aided Design & Drafting</u></p> <p>I. <u>Hand Aided Design & Drafting (First Four Weeks)</u> Preface of technical drawing machine parts, & Sketching Free hand sketching General information, Multiview projection, Drawing of machine parts and drawing by instruments Axonometric projection, Isometric, Diametric and trimetric projection, Sectioning, Frontal section, Horizontal section and Oblique section, Drawing a building floor plan Different steps of floor plan and detail of building projection Contour line, drainage, flood plain road transportation, and earth work</p> <p>II. <u>Introduction to computer usage</u> Introduction to Auto CAD / Felix CAD, advantages over manual drawing, understanding basic concepts such as, Absolute, relative, polar & world co-ordinates, drawing units, Drawing limits, extents, layers, line types, line thickness, object snapping, filters.</p> <p>III. <u>Introduction to CAD packages and computer aided drafting</u> Drawing Editing and Dimensioning of simple objects; Drawing entities in Auto CAD, various drawing commands, use of object snaps & filters, different editing commands, Dimensioning Commands, text commands, hatching commands.</p> <p>IV. <u>Creating 3 Dimensional Object</u> Creating objects/images in three dimensions, editing in three dimensions, Using 3-D image types, creating shaded images,</p>

	Creating rendered images, display options, setting the camera position. V. <u>Drawings of building services</u> Building symbols; Types of building drawings, proposed drawing, submission drawing, working drawing and completion drawing			
Pre-requisite	None			
Related Courses	Introduction to Computer & Programming			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Ostrowsky, O. (1995), <i>Engineering Drawing with CAD Applications</i>. Edward Arnold.			
	<u>References:</u> <ul style="list-style-type: none">Boundy, A.W. (2006). <i>Engineering Drawing: Workbook</i> (6th Edition). McGraw-Hill Australia Pvt. Ltd.French,T.E., Vierck, C.J. and Foster R.J.(1993). <i>Engineering Drawing and Graphic Technology</i> (4th Edition). McGraw-Hill.Bethune, James D., <i>Essentials of Drafting</i>. Prentice HallTrymbaka Murty.S, <i>Computer Aided Engineering Drawing</i>. T.K. International Publishing House Pvt. Ltd. New Delhi.• میا خیل ، میا پاچا. (۱۳۹۷)، پہ سیول انجینیری کی د اتوکپڈ استعمال، ننگرہار پوهنتون.			
Evaluation Method(s)	Quizzes (5%), Lab Assignments (25%), Mid-term (20%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	30% 70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in engineering drawing first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering	X			
Design/conduct experiments/analyze data	X			
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility		X		
Communicate effectively		X		
Ability to function in a group			X	

and in multi-disciplinary team				
Remarks				

No.	Course outcomes	Program 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	The student will learn about the basic principle of engineering drawing including lettering, applied geometry, orthographic drawing and sketching, sectional views and conventions, detail drawing, assembly drawing, dimensioning;	1	1	1	1	1	1	1
2	The student will also learn about the basic descriptive geometry dealing with points, lines & planes and their relationship in space and basic developed views.	1	1	2	1	2	1	1
3	Demonstrate knowledge and skills needed to design and draft projects ranging for two dimensional designs for commercial and residential buildings.	1	1	1	1	1	1	1
4	Demonstrate basic skills needed to view, print, edit, and create variations of two dimensional electronic designs.	1	1	1	2	1	2	1
Total		1	1	1.25	1	1	1.25	1
Average		1.1						
1= some relation 2= Moderate relation 3=Extensive relation								

En. 0203 English II (Critical Thinking and Writing)

Item	Description
Title	English II (Critical Thinking and Writing)
Credits and no. of hours	2 (2-0)
Offering year and semester	First Year-Second Semester
Aim	Student will learn to write in a clear, concise style and to present information logically. Student will also learn to design documents in which format contribute to clarity and efficiency including use of graphics and deliver oral presentations.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the principles and procedure of technical research and report writing• Able to develop the writing skills of business letter• Develop the basic idea of graphic Aid• Understanding the Contemporary Communication as an Engineer• Develop the practical writing skills by applying the theoretical understanding
Academic Staff Responsible	
Syllabus	<ol style="list-style-type: none">I. <u>Overview of Technical Research and Report Writing</u><ol style="list-style-type: none">1. Definition and Nature of Technical Writing2. Properties of Technical Writing3. Basic Principles of Technical Writing4. Styles in Technical Writing5. The Role of Technical Writing6. The Wholistic Guide of Technical Writing7. End-products of Technical WritingII. <u>Information Structure/Techniques in Technical Writing</u><ol style="list-style-type: none">1. Distinction between Technical and Literary Writing2. Formal Definition3. Description Mechanism4. Process Description5. Classification6. Cause and Effect7. Comparison and Contrast8. AnalogyIII. <u>Types of Technical Report</u><ol style="list-style-type: none">1. Report Layout2. Formal Report Format3. Memorandum Report4. Letter Report5. Bulletins6. Abstract7. Proposal8. Research Report9. Feasibility StudyIV. <u>Business Letter</u><ol style="list-style-type: none">1. Definition and Purpose2. Elements and Characteristics

	<ol style="list-style-type: none"> 3. Format and Styles 4. Types of Business Letters 5. Resume and Cover Letters <p>V. <u>Process and Guidelines in Technical Writing</u></p> <ol style="list-style-type: none"> 1. Writing process: from audience to rough draft 2. Audience analysis 3. Task analysis 4. Power-revision techniques 5. Libraries, documentation, cross-referencing 6. Basic patterns and elements of the sentence 7. Common grammar, usage, punctuation problems 8. Common spelling problems <p>VI. <u>Graphic Aids</u></p> <ol style="list-style-type: none"> 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 <p>VII. <u>Contemporary Communication</u></p> <ol style="list-style-type: none"> 1. E-mail 2. Internet 3. Desktop Publishing 4. Hypertext <p>VIII. <u>Laboratory Session</u></p> <ol style="list-style-type: none"> 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)
Related Courses	English for Academic Purposes, English Communication Skills in Engineering
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<u>Textbooks :</u> <ul style="list-style-type: none"> • Manalo, E. & Fermin, V. (2007). <i>Technical and Report Writing, ECC Graphics</i>, Quezon City,
	<u>References:</u> <ul style="list-style-type: none"> • Vicente. et. Al. (2004), <i>Technical Writing</i>. Popular Bookstore, Quezon City, Philippines.
Evaluation Method(s)	Assignments (10%), English Lab Session (10%), Mid-term Exam

	(20%) and Final Exam (60%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	60% 10% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in critical thinking and writing first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering	X			
Design/conduct experiments/analyze data	X			
Use modern tools and techniques		X		
Critical thinking and apply knowledge concurrence with other disciplines				X
Understand professional and ethical responsibility		X		
Communicate effectively				X
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course outcomes	Program 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	Understanding the principles and procedure of technical research and report writing	1	1	1	1	1	1	1
2	Able to develop the writing skills of business letter	1	1	2	1	2	1	1
3	Develop the basic idea of graphic Aid	1	1	1	1	1	1	1
4	Understanding the Contemporary Communication as an Engineer	1	1	1	2	1	2	1
5	Develop the practical writing skills by applying the theoretical understanding	1	1	1	1	1	1	1
Total		1	1	1.2	1.2	1.2	1.2	1
Average		1.11						
1= some relation 2= Moderate relation 3=Extensive relation								

En. WEE 0209 Physics I (Mechanics)

Item	Description
Title	Physics I (Mechanics)
Credits and no. of hours	3 (2-2)
Offering year and semester	First Year-First Semester
Aim	This course is designed to provide a firm foundation in the concepts in mechanics, including the measurements, basic static and dynamics.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• The student will learn the basic of dimensions and measurements.• The student will also get the basic knowledge of one and two dimensional kinematics.• Concepts in dynamic mechanical systems displacement, velocity and acceleration, vectors will be also explored among the students.• 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• Develop an understanding of the application of the theoretical knowledge with practice application.
Academic Staff Responsible	
Syllabus	<p>I. <u>Measurements</u></p> <ol style="list-style-type: none">1. Basic dimensions2. Matter and Model Building3. Mass and Density4. Analysis of dimensions and units5. Measuring the dimensions <p>II. <u>Kinematics (One dimension)</u></p> <ol style="list-style-type: none">1. Displacement, velocity, acceleration2. Diagrams of displacement, velocity and acceleration3. Freely Falling Objects4. Derivation of kinematics equation <p>III. <u>Vectors:</u></p> <ol style="list-style-type: none">1. Definition of vectors2. properties of vectors3. Coordinate Systems4. Mathematical operation of vectors <p>IV. <u>Kinematics (Two dimensions)</u></p> <ol style="list-style-type: none">1. Displacement, Velocity, Acceleration2. Angular motion3. Relative Velocity and Relative Acceleration <p>V. <u>Basic Laws of Motion</u></p>

	<ol style="list-style-type: none"> 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. <p>VI. <u>Statics</u></p> <ol style="list-style-type: none"> 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. <p>VII. <u>Circular Motion</u></p> <ol style="list-style-type: none"> 1. Uniform circular motion 2. Non uniform Circular Motion 3. Motion with to resistive faces, and Numerical Modeling in Particle Dynamics. <p>VIII. <u>Kinetic Energy</u></p> <ol style="list-style-type: none"> 1. Definition of Energy 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. <p>IX. <u>Potential Energy</u></p> <ol style="list-style-type: none"> 1. Definition of Potential Energy 2. Conservative and Non conservative Forces 3. System equilibrium and energy diagrams. <p>X. <u>Introduction to Momentum and Collision</u></p> <ol style="list-style-type: none"> 1. Linear Momentum 2. Definition of Impulse, Collisions in One Dimension and Collision based motions in practical systems. <p>XI. <u>Laboratory Sessions</u></p> <ol style="list-style-type: none"> 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	None
Related Courses	Physics II (Electromagnetism & Optics)
Teaching and Learning	<u>Lectures, tutorials and assignments</u>

methods				
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Text Books:</u> <ul style="list-style-type: none">Serway and Jewett. <i>Physics For Scientists And Engineers</i> (7th Edition)			
	<u>Reference:</u> <ul style="list-style-type: none">Halliday, Resnick & Walker. <i>Fundamentals of Physics</i> (7th Edition)Ginacoi, Douglas C. <i>Physics Principles with Applications</i> (6th Edition)Cutnell, John D., Kenneth W. Johnson. <i>Physics</i> (7th Edition)Young and Freedman (1996). <i>University Physics</i> (9th Edition), Addison-Wesley Publishers			
Evaluation Method(s)	Laboratory Works (15%), Assignment (10%), Mid-semester exam (25%) and Final examination (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	60% 10% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in physics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques		X		
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course outcomes	Program 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	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
Total		1	1.2	1.2	1.2	1.2	1	1
Average		1.11						
1= some relation 2= Moderate relation 3=Extensive relation								

Third Semester

En. WEE 0305 Calculus III (Differential Equations)

Item	Description
Title	Calculus III (Differential Equations)
Credits and no. of hours	3(2-2)
Offering year and semester	Second Year-Third Semester
Aim	This course is designed to acquire advanced topics of particular importance in engineering applications.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Key understanding of the partial Differential equations• Able to understand the numerical method and its application• Understanding the idea of special functions, Fourier series and Fourier integrals• Develop the understanding of Laplace transformation• Able to understand the complex analysis• Develop the key of probability basic
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Partial Differential Equations</u><ul style="list-style-type: none">1. Existence and uniqueness2. Euler-Tricomi equation3. Equations of first orderII. <u>Numerical Methods</u><ul style="list-style-type: none">1. Direct and iterative methods,2. Discretization and numerical integration3. The generation and propagation of errors4. Interpolation, extrapolation, and regression5. Solving equations and systems of equationsIII. <u>Special Functions</u><ul style="list-style-type: none">1. Gamma, Beta, Bessel, LegendreIV. <u>Fourier series and Fourier integrals</u><ul style="list-style-type: none">1. Fourier Series2. Convergence of Fourier Series3. Generalizations: Fourier Cosine Series: Fourier Sine series4. Integration and Differentiation of Fourier series5. Fourier-Legendre Series6. Fourier-Bessel Series7. Fourier IntegralV. <u>Laplace Transforms</u><ul style="list-style-type: none">1. Laplace transforms of some elementary functions2. Sufficient conditions for existence of Laplace transform3. Inverse Laplace transforms4. Laplace transforms of derivatives5. The unit step function6. Periodic function7. Some special theorems on Laplace transform8. Partial fraction9. Solutions of differential equations by Laplace transforms10. Evaluation of improper integralsVI. <u>Complex Analysis</u><ul style="list-style-type: none">1. Complex Functions

	2. Integration 3. Cauchy's Theorem 4. Taylor and Laurent Series VII. <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 II (Multivariable Calculus for Engineers)			
Related Courses	Differential & Integral Calculus, Multivariable Calculus for Engineers, Linear Algebra, Probability & Statistics			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Kaplan, Wilfred. <i>Advanced Calculus</i> (5th Edition)			
	<u>References:</u> • Hildebrand. <i>Advanced Calculus for Applications</i> (2 nd Edition) • Wrede and Spiegel. <i>Schaum's Outline of Advanced Calculus</i> (2 nd Edition)			
Evaluation Method(s)	Assignment (20%) Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in differential equations & statistics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Outcomes				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Key understanding of the partial Differential equations	1	1	1	2	2	1	2
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		1.52						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0309 Physics II (Electromagnetism & Optics)

Item	Description
Title	Physics II (Electromagnetism & Optics)
Credits and no. of hours	3 (2-2)
Offering year and semester	First Year-Second Semester
Aim	This course is designed to develop basic background understanding of electromagnetic, mechanic and matter waves to provide basic path towards wireless and optical communication areas.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understand the elements of heat, waves, thermodynamics• Able to understand about optics, lenses and optical instruments and their applications• Understand the firm concepts of modern physics• Develop an understanding of the application of the theoretical knowledge with practice application
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Waves</u><ul style="list-style-type: none">1. Wave motion2. Sound waves3. Superposition and standing wavesII. <u>Thermodynamics</u><ul style="list-style-type: none">1. Temperature2. The first law of thermodynamics3. The kinetic theory of gases4. Heat engines5. The second law of thermodynamicsIII. <u>The Electromagnetic Spectrum</u><ul style="list-style-type: none">1. Radio Waves2. Microwaves3. IR radiation4. UV, X-rays, Gamma RaysIV. <u>Light and Optics</u><ul style="list-style-type: none">1. Focal point2. Index of Refraction3. Snell's Law4. Total Internal Reflection5. Fiber Optics6. Lensmaker's Equation7. Refraction and Diffraction8. PolarizationV. <u>Lenses and optical instruments</u><ul style="list-style-type: none">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. <u>Modern physics</u> 1. Introduction to Quantum physics 2. Quantum mechanics 3. Atomic physics 4. Molecules and solids VII. <u>Laboratory Sessions</u> 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)			
Related Courses	Physics I (Mechanics), Engineering Chemistry			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Raymond, A. Serway and John W. Jewett. <i>Physics for Scientists and Engineers</i> (7 th Edition). Thomson Brooks/Cole.			
	<u>Reference:</u> • Cutnell, John D. and Kenneh W. Johnson. <i>Physics</i> (9 th Edition). John Wiley & Sons. • Griffiths, David J. (1998). <i>Introduction to Electrodynamics</i> (3rd Edition). Upper Saddle River, NJ: Prentice Hall, ISBN: 9780138053260.			
Evaluation Method(s)	Laboratory Works (15%), Assignment (10%), Mid-semester exam (25%) and Final examination (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	60% 10% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in physics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze			X	

data				
Use modern tools and techniques		X		
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course Outcomes	Program 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	Understand the elements of heat, waves, thermodynamics	1	1	1	2	2	2	2
2	Able to understand about optics, lenses and optical instruments and their applications	1	2	2	2	2	3	2
3	Understand the firm concepts of modern physics	1	1	2	3	2	3	3
4	Develop an understanding of the application of the theoretical knowledge with practice application	1	2	1	3	2	2	3
Total		1	1.5	1.5	2.5	2	2.5	2.5
Average		1.92						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0310 Engineering Mechanics I: Statics

Item	Description
Title	Engineering Mechanics I: Statics
Credits and no. of hours	3(2-2)
Offering year and semester	Second Year-Third Semester
Aim	This course is designed to provide an introductory idea on the application of mechanics in solving engineering problems related to particles and rigid bodies in equilibrium.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• The student will learn about the concepts of center of mass, centroid, equilibrium of particles and the equilibrium of rigid bodies• The student will learn about the concepts of forces and force systems, equilibrium of rigid bodies, center of gravity
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction</u><ul style="list-style-type: none">1. Basic concepts force system and equilibrium2. Definition of force3. Moment and couple4. Principle of transmissibility5. Varignon's theoremII. <u>Vector</u><ul style="list-style-type: none">1. Vectors and components2. Dot and cross products; mixed triple products3. General Principles – Newton's LawsIII. <u>Forces and Force Systems</u><ul style="list-style-type: none">1. Characteristics and representation of a force2. Classification of forces, free-body diagrams3. Equilibrium of particleIV. <u>Plane Trusses</u><ul style="list-style-type: none">1. Degrees of freedom2. Types of supports and reactions3. Types of loads4. Analysis of Trusses-method of joints5. Method of sectionsV. <u>Friction</u><ul style="list-style-type: none">1. Introduction2. Static dry friction3. Simple contact friction problems- ladders, wedges, screws and belt frictionVI. <u>Equilibrium of Rigid Bodies</u><ul style="list-style-type: none">1. Rigid bodies and equivalent systems2. General systems of forces in a plane (2D) and static equilibrium conditions3. General systems of forces in space (3D) and static equilibrium conditionsVII. <u>Center of Gravity, Center of Mass, and Centroid</u><ul style="list-style-type: none">1. Center of forces2. 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 3. Product of Inertia of an Area 4. Parallel 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	None			
Related Courses	Engineering Mechanics II: Dynamics , Fluid Mechanics			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Hibbeler, R.C. <i>Engineering Mechanics: Statics and Dynamics</i> (12th Edition). Prentice Hall.			
	<u>References:</u> <ul style="list-style-type: none">Nelson, E., Best, Charles, McLean, W.G., and Merle Potter (2011). <i>Schaum's Outline of Engineering Mechanics Dynamics</i>. The McGraw-Hill Companies, Inc.Beer and Johnston (2008). <i>Mechanics for Engineers-Statics</i> (5th Edition). McGraw-Hill, New York.F. P. Beer & E. R. Johnston (1999). <i>Vector Mechanics for Engineers: Statics-Dynamics</i> (6th Edition). McGraw-Hill.			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Engineering Mechanics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			

Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	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. WEE 0310 Engineering Mechanics II: Dynamics

Item	Description
Title	Engineering Mechanics II: Dynamics
Credits and no. of hours	3(2-2)
Offering year and semester	Second Year- Fourth Semester
Aim	This course introduces to develop a clear understanding of the basic principles that govern the dynamics of particles and rigid bodies; as well as an ability to use that understanding in the solution of engineering problems.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• The student will learn about Kinematics of a particle, kinetics of a particles, kinematics of a rigid body, planar kinetics of a rigid body• The student will learn about energy and momentum in rigid body dynamics
Academic Staff Responsible	
Syllabus	<p>I. <u>Kinematics of a Particle</u></p> <ol style="list-style-type: none">1. Coordinate systems and position vectors2. Displacement, velocity, and acceleration3. Rectilinear motion4. Curvilinear motion <p>II. <u>Kinetics of a Particle</u></p> <ol style="list-style-type: none">1. Newton's law of motion2. Equation of motion for a system of particles <p>III. <u>Kinematics of a Rigid Body</u></p> <ol style="list-style-type: none">1. Rigid body and types of motion2. Rotation about a fixed axis3. General motions <p>IV. <u>Planar Kinetics of a Rigid Body</u></p> <ol style="list-style-type: none">1. Moment of inertia2. Planar kinetic equations of motion3. Equations of motion: Translation4. Equations of motion: Rotation about a fixed axis5. Equations of motion: General plane motion <p>V. <u>Energy and Momentum in Rigid Body Dynamics</u></p> <ol style="list-style-type: none">1. Work and energy for system of particles2. Kinetic energy of a rigid body3. Potential energy4. The general energy principle, virtual work5. Linear momentum and moment of momentum6. Conservation of momentum
Pre-requisite	Engineering Mechanics I: Statics
Related Courses	Engineering Mechanics I: Statics, Fluid Mechanics
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge

Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Hibbler, R.C., <i>Engineering Mechanics: Statics and Dynamics</i> (12th Edition). Prentice Hall.			
	<u>References:</u> <ul style="list-style-type: none">Nelson, E., Best, Charles, McLean, W.G., and Merle Potter (2011). <i>Schaum’s Outline of Engineering Mechanics Dynamics</i>. The McGraw-Hill Companies, Inc.Bedford, A. and Fowler, W. (2005). <i>Engineering Mechanics: Dynamics</i>, 4th Edition. Prentice Hall.F. P. Beer & E. R. Johnston (1999). <i>Vector Mechanics for Engineers: Statics-Dynamics</i> (6th Edition). McGraw-Hill			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Engineering Mechanics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	The student will learn about Kinematics of a particle, kinetics of a particles, kinematics of a rigid body, planar kinetics of a rigid body	1	2	2	3	2	2	3
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. WEE 0311 Survey I

Item	Description
Title	Surveying
Credits and no. of hours	2 (1-2)
Offering year and semester	Second Year-Fourth Semester
Aim	This course is designed to impart necessary knowledge and skills to carry out surveying and leveling, and do the relevant drawing and computations, for engineering applications.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the basic principle of surveying• Able to get knowledge of the basic principle of chain surveying, Leveling, Theodolite traversing, tachometry and identify the erroneous measurements and the sources of these 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• Work efficiently in a group environment
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction</u><ul style="list-style-type: none">1. Plane surveying2. Geodetic surveying3. Branches of surveying4. Basic principles of surveying5. The reliability of a survey6. Maps and plansII. <u>Linear measurements and chain surveying</u><ul style="list-style-type: none">1. Methods of direct linear measurements2. Chaining on level ground3. Slope chaining4. Horizontal chaining5. Making tape corrections6. Solving surveying problems by tape7. Identifying chaining mistakes and errorsIII. <u>Leveling</u><ul style="list-style-type: none">1. Types of leveling2. Equipment for leveling3. Orders of accuracy4. Level bench marks5. Differential leveling6. Curvature and refraction7. Adjusting the level8. Profile leveling9. Trigonometric levelingIV. <u>Theodolite traversing</u><ul style="list-style-type: none">1. Introduction to the theodolite2. Instrumental errors3. Instrument adjustment

	4. Field procedure 5. Measuring angles V. <u>Optical distance measurement (tachometry)</u> 1. Types of tachometric measurements 2. Principles of Stadia method 3. Distance and elevation formulae 4. Movable hair method 5. Tangential system of measurement 6. Tachometric calculations and reductions 7. Errors in tachometric surveying 8. Uses of tachometry VI. <u>Triangulation surveying</u> 1. Types of triangulation networks 2. Triangulation stations, signals, and instrument supports 3. Triangulation procedures 4. Adjusting 5. Checking for precision			
Pre-requisite	None			
Related Courses	Concrete Design and Analysis			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Bannister, A., Raymond, S. and Baker, R. (1992). <i>Surveying</i> (6 th Edition). Harlow: Longman Scientific & Technical			
	<u>References:</u> • Kavanagh, Barry F. (2004), <i>Surveying With Construction Applications</i> (5th Edition). Prentice Hall. • Kavanash, B., <i>Surveying principles and Application</i> . Prentice Hall • Irvine, W., <i>Surveying for Construction</i> . McGraw Hill • Davis, R.E., <i>Surveying Theory and Practice</i> . McGraw Hill			
Evaluation Method(s)	Laboratory and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 20% 10%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in surveying first and then learn the solution by exercise and fieldworks.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering			X	
Design/conduct experiments/analyze data				X
Use modern tools and			X	

techniques				
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively		X		
Ability to function in a group and in multi-disciplinary team			X	

No.	Course Outcomes	Program 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	Understanding the basic principle of surveying	1	2	2	3	2	2	3
2	Able to get knowledge of the basic principle of chain surveying, Leveling, Theodolite traversing, tachometry and identify the erroneous measurements and the sources of these errors	2	2	2	3	2	3	3
3	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
4	Work efficiently in a group environment	1	1	2	2	2	3	2
Total		1.25	1.75	2	2.75	2.25	2.5	2.5
Average		2.14						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0303 English III (English Communication Skills in Engineering)

Item	Description
Title	English Communication Skills in Engineering
Credits and no. of hours	2 (2-0)
Offering year and semester	Second Year-Third Semester
Aim	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	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Develop the communication models and ethics in professional life and communication• Understanding the visual elements in oral and written communication with group work and collaborative writing• Able to understand the common documents in engineering communication including the ethics in professional life and communication• Able to understand and write the extended essay/ research paper• Seminar participation• Understand the key elements of visual elements in oral and written communication; web content and multimedia presentations• Group work and collaborative writing
Academic Staff Responsible	
Syllabus	<p>I. <u>The characteristics of engineering communication.</u></p> <ol style="list-style-type: none">1. Analysis of communication based on the CMAP model2. Introduction to the writing process3. Usage focus on the assessment of English usage. <p>II. <u>Research and reference works</u></p> <ol style="list-style-type: none">1. Working with others2. Communication skills3. Summarizing and critique4. Style guides and field-specific discourse and literature. Seminar participation, presentation5. Peer reviewing and group dynamics6. Peer assessment and self-assessment7. Ethical behavior8. Results of unethical behavior <p>III. <u>Work group tutorials</u></p> <ol style="list-style-type: none">1. Oral Presentations. <p>IV. <u>Writing Process</u></p> <ol style="list-style-type: none">1. Basics and methods of ideas development,

	<ol style="list-style-type: none"> 2. Assessment of writing. 3. Writing tutorials 4. Drafting and revising 5. The extended essay from planning, proposal and drafting/revising through final draft proofreading. 6. Writing tutorials and self-editing <p>V. <u>Organizing</u></p> <ol style="list-style-type: none"> 1. Outlining. 2. Writing Process 3. Narrowing topics <p>VI. <u>Visual elements in written and oral communication and writing Process</u></p> <p>VII. <u>Group Projects</u></p> <ol style="list-style-type: none"> 1. Investigation of an engineering issue in relation to society 2. Brainstorming and topic narrowing. 3. Library/on-line research. <p>VIII. <u>Communication strategies:</u></p> <ol style="list-style-type: none"> 1. Mechanism and process description 2. Classification and definition 3. Process analysis 4. Comparison and causation 5. Exemplification and illustration 6. Production of short essays and extemporaneous speeches on relevant topics. 7. Review of English usage 8. Persuasion and argument (Use of analogy) <p>IX. <u>Overview of correspondence, reports, and summaries for the engineering workplace.</u> (Usage focus: Forms of address, titles and heading, captions, salutations and closings)</p> <p>X. <u>Group projects:</u></p> <ol style="list-style-type: none"> 1. Brainstorming, project planning; proposal writing (collaborative/WIKI writing) 2. Elements of web pages and web content, video presentations, animations, scripting. 3. Progress reports, consultation with experts. Tutorials. <p>XI. <u>Panel discussion/Seminar.</u></p> <ol style="list-style-type: none"> 1. Evaluation and assessment of group work 2. Final review.
Pre-requisite	English I (English for Academic Purposes), English II (Critical Thinking and Writing)
Related Courses	English for Academic Purposes, Critical Thinking and Writing
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge

Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• Ingre. <i>Engineering Communication</i> (1st Edition)			
	<u>References:</u> <ul style="list-style-type: none">• McMurrey & Buckley. <i>A Writer's Handbooks for Engineers</i> (1st Edition)• Sorenson. <i>Webster's New World Student Writing Handbook</i> (4th Edition)• Cottrell. <i>The Study Skills Handbook</i> (2nd Edition)			
Evaluation Method(s)	Homework Assignments (10%), Project Documents (20%), Mid-term Exam (20%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	40% 20% 40%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in English Communication Skills first and then learn the solution by group works/practical exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering	X			
Design/conduct experiments/analyze data	X			
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility			X	
Communicate effectively				X
Ability to function in a group and in multi-disciplinary team			X	
Remarks				

No.	Course Outcomes	Program 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	Develop the communication models and ethics in professional life and communication	1	2	2	3	2	2	3
2	Understanding the visual elements in oral and written communication with group work and collaborative writing	2	2	2	3	2	3	3
3	Able to understand the common documents in engineering communication including the ethics in professional life and communication	1	2	2	3	3	2	2
4	Able to understand and write the extended essay/ research paper	1	1	2	2	2	3	2
5	Seminar participation	2	1	2	3	3	3	3
6	Understand the key elements of visual elements in oral and written communication; web content and multimedia presentations	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. WEE 0312 Construction Material and Methods

Item	Description	
Title	Construction materials and methods	
Credits and no. of hours	2 (1-2)	
Offering year and semester	First Year-First Semester	
Aim	The objective of this course is to understand different materials used in construction and to differentiate the materials and their methods of usage	
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none"> • Understanding different construction materials • Differentiating between construction materials • Understanding the proper usage of construction materials • Understanding the various methods for construction 	
Academic Staff Responsible		
Syllabus	I. <u>Introduction to construction materials and methods</u> II. <u>Woods and its usage in construction</u> III. <u>Bricks and brick masonry</u> IV. <u>Stones and stone masonry</u> V. <u>Wall construction</u> VI. <u>Methods for Foundation construction</u> VII. <u>Concrete</u> VIII. <u>Bitumen</u> IX. <u>Roof construction</u> X. <u>Insulation</u> XI. <u>Tiling</u> XII. <u>Polymers</u> XIII. <u>Glass</u> XIV. <u>Painting</u> XV. <u>Gypsum, lime and pluster</u>	
Pre-requisite	None	
Related Courses	Concrete, Foundation, Construction project management	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Basic Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> • Fundamentals of building construction, materials and methods, 5th Edition, Edward Allen & Joseph Iano, 2008, JW, WILY 	
	<u>References:</u> <ul style="list-style-type: none"> • Building construction principles, materials and system construction methods and management 	
Evaluation Method(s)	Assignment (20%) Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution: <ul style="list-style-type: none"> • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork 	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Differential & Integral Calculus first and then learn the solution by laboratory works.

• Home study				
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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-
1	Understanding different construction materials	2	2	2	3	3	3	3
2	Differentiating between construction materials	2	2	2	3	3	3	3
3	Understanding the proper usage of construction materials	2	2	2	3	3	3	3
4	Understanding the various methods for construction	2	2	2	3	3	3	3
Total		2	2	2	3	3	3	3
Average		2.57						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0317 Environmental Studies

Note: This subject is a colligative course and its detailed syllabus will be provided by National Curriculum Commission.

Fourth Semester

En. WEE 0405 Calculus IV (Probability and Statistics)

Item	Description
Title	Calculus V (Probability and Statistic)
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Fifth Semester
Aim	The objective of this is to introduce students to concepts of probability and statistics necessary to undertake basic modeling and statistical decisions techniques in engineering.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Develop the key of probability basic• Use the theory of probability to estimate the likelihood of both discrete and continuous random variables.• Students will be able to calculate summary statistics for sample.• Students will be able to calculate probability related parameters from raw data.
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Probability Basic I</u><ul style="list-style-type: none">1. Experiments2. Outcomes3. Sample space4. Sample point5. Events6. Set algebra7. Probability & counting toolsII. <u>Probability Basic II</u><ul style="list-style-type: none">1. Independence of events2. Conditional events3. Bayes theorem4. Calculating probabilityIII. <u>Introduction of Statistics</u><ul style="list-style-type: none">1. Frequency distribution2. Mean median, mode and other measures of central tendency3. Standard deviation and other measures of dispersion4. Moments, skewness and kurtosisIV. <u>Functions of Random Variables</u><ul style="list-style-type: none">1. Distribution function technique2. Transformation technique: one variable, several variables3. Moment-generating function techniqueV. <u>Sampling Distributions</u><ul style="list-style-type: none">1. The distribution of mean and variance2. The distribution of differences of means and variances3. The Chi-Square distribution4. The t distribution5. The F distributionVI. <u>Regression and Correlation</u><ul style="list-style-type: none">1. Linear regression2. The methods of least squares3. Normal regression analysis4. Normal correlation analysis

	5. Multiple linear regression (along with matrix notation) VII. <u>Discrete Probability Distributions</u> 1. Uniform, bernoulli and binomial distribution 2. Hypergeometric and geometric distribution 3. Negative binomial and Poisson distribution VIII. <u>Continuous Probability Distributions</u> 1. Uniform and exponential distribution 2. Gamma and beta distributions 3. Normal distribution IX. <u>Application of Statistics</u> 1. Curve fitting by the method of least squares-fitting of straight lines 2. Second degree parabolas and more general curves 3. Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations X. <u>Introduction to MATLAB</u> 2. Variable, Scripts & Operations 3. Visualization & Programming 4. Solving equations & Curve fitting 5. Advanced Methods 6. Symbolic, Simulink, File I/O, Building GUIs	
Pre-requisite		
Related Courses	Differential & Integral Calculus, Multivariable Calculus for Engineers, Differential Equations, Linear Algebra	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Basic Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> • Devore, JL (2008). <i>Probability and Statistics for Engineering and the Sciences</i> (7 th Edition), Thomson Brooks/Cole, International Edition.	
	<u>References:</u> • Spiegel, Schiller and Srinivasan. <i>Schaum's Outline of Probability and Statistics</i> (4 th Edition) • B.S.Grewal (2008). <i>Higher Engineering Mathematics</i> , Khanna Publishers, Delhi. • Stroock, Daniel W. (2000). <i>Probability Theory: An Analytic View</i> . Cambridge University Press, Revised Edition, ISBN-10:0521663490	
Evaluation Method(s)	Assignment (20%), Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in differential equations & statistics first and then learn the solution by laboratory works.
Relationship of this Course to Program Outcomes		

	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Develop the key of probability basic	3	2	3	3	2	2	3
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
4	Students will be able to calculate probability related parameters from raw data	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= Moderate relation 3= Extensive relation								

En. WEE 0418 Fluid Mechanics

Item	Description
Title	Fluid Mechanics
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Fifth Semester
Aim	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	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the basic of Fluid properties and Hydrostatics;• Able to understand the fluid kinematics• Develop the idea of conservation of mass, momentum and energy• Understanding the basic of flow in open channels• Understanding the basic of pipe flow• Able to understand the turbo machinery and fluid measurements• Understanding the similitude and dimensional analysis
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Fluid Properties</u><ul style="list-style-type: none">1. Fluid mass, weight, density and volume2. Viscosity3. Vapor pressure4. Surface tensionII. <u>Hydrostatics</u><ul style="list-style-type: none">1. Pressure variation in fluid at rest and in motion2. Forces on plane and curved surfaces3. Buoyancy and flotationIII. <u>Fluid Kinematics and Dynamics</u><ul style="list-style-type: none">1. Concepts of systems and control volume2. Conservation of mass - Continuity equation3. Newton's 2nd Law – Momentum equation4. 1st Law of thermodynamics – Energy equation5. Bernoulli equationIV. <u>Similitude and Dimensional Analysis</u><ul style="list-style-type: none">1. Dimensional homogeneity2. The Pi theorem3. Correlation of experimental data4. Modeling and similitudeV. <u>Turbo machinery</u><ul style="list-style-type: none">1. Classification of pumps2. Mixed and axial flow pumps – the specific speed3. Centrifugal pumps and compressors4. Reaction and impulse turbinesVI. <u>Fluid Measurements</u><ul style="list-style-type: none">1. Pressure measurement – manometers2. Velocity measurement – current meters

	3. Discharge measurement – orifice, weirs, flumes 4. Viscosity measurement			
Pre-requisite	None			
Related Courses	Engineering Mechanics I & II			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• White, F. (2004). <i>Fluid Mechanics</i> (4th Edition). McGraw-Hill.			
	<u>References:</u> <ul style="list-style-type: none">• Munson, B., Young, D., and Okiishi, T., <i>Fundamentals of Fluid Mechanics</i>, John Wiley and Sons.• Streeter, V., Wylie E.B, and Bedford, K. (1997). <i>Fluid Mechanics</i>, McGraw-Hill• Roberson, J.A. and Crowe, C. (1990). <i>Engineering Fluid Mechanics</i> (4th Edition). Houghton Mifflin Co., Boston• Daugherty, R.L., Franzine, J.B. and Finnemore, E.J. (1985). <i>Fluid Mechanics with Engineering Applications</i> (8th Edition) McGraw Hill, New York.			
Evaluation Method(s)	Laboratory and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in surveying first and then learn the solution by exercise and fieldworks.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding the basic of Fluid properties and Hydrostatics	3	2	3	2	2	2	2
2	Able to understand the fluid kinematics	3	1	3	2	2	2	2
3	Develop the idea of conservation of mass, momentum and energy	3	2	3	2	2	1	2
4	Understanding the basic of flow in open channels	3	1	3	2	2	2	2
5	Understanding the basic of pipe flow	3	2	2	2	1	2	2
6	Able to understand the turbo machinery and fluid measurements	3	2	3	2	1	2	2
7	Understanding the similitude and dimensional analysis	3	2	3	2	1	2	2
Total		3	1.7	2.9	2	1.5	1.9	2
Average		2.2						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0414 Structural Analysis I

Item	Description
Title	Structural Analysis I
Credits and no. of hours	2 (2-0)
Offering year and semester	Second Year-Fourth Semester
Aim	This course is designed to combine the concepts from statics and mechanics of materials to determine internal forces of structural members and deflections of structural systems.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understanding the structural analysis combines the concepts from statics and mechanics of materials to determine internal forces of structural members like truss, cable, arch, beam and frame • Able to understand the deflections of structural systems and analyze different methods for different types of statically determinate and indeterminate structures • Develop the idea to check the structural stability of different structures • Combined with design, the analysis of structural elements and systems is one of the main themes of this civil engineering courses.
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction to Modeling Concept for Structural Analysis</u></p> <ol style="list-style-type: none"> 1. Definition of structure 2. Structural modeling concept: joints, members, support conditions, loading conditions, and material properties 3. Principle of superposition and its limitations 4. Forces and equilibrium; Free body diagrams and reactions 5. Stability and determinacy of structures <p>II. <u>Truss Systems</u></p> <ol style="list-style-type: none"> 1. Definition of truss system 2. Method of joint for analysis of trusses 3. Method of section for analysis of trusses <p>III. <u>Cable and Arch Structures</u></p> <ol style="list-style-type: none"> 1. Definition of cable structures 2. Cable characteristics 3. Analysis of cabled subjected to concentrated force 4. Analysis of cabled subjected to uniform distributed force 5. Definition of arch structures 6. Arch characteristics 7. Analysis of 3-hinged arch structures <p>IV. <u>Beams and Frame Structures</u></p> <ol style="list-style-type: none"> 1. Definition of beams and frame structures 2. Internal forces at specified point in a structural member 3. Shear force and bending moment diagrams for a beam 4. Axial force, shear force and bending moment diagrams for a 2D frame 5. Analysis of 3D frames <p>V. <u>Analysis of Statically Determinate Structures under Moving</u></p>

	<u>Loads</u> <ol style="list-style-type: none"> 1. Influence lines for beams 2. Mueller-Breslau principle 3. Influence lines for floor girders 4. Influence lines for trusses 5. Maximum influence at a point due to a series of concentrated forces 6. Absolute maximum shear and bending moment VI. <u>Deflections</u> <ol style="list-style-type: none"> 1. Deflection diagrams and the elastic curve 2. Elastic beam theory 3. The double integration method 4. Moment area theorems 5. Deflection due to shear VII. <u>Energy Methods for Calculation of Deflections</u> <ol style="list-style-type: none"> 1. External work and complementary work 2. Strain energy and complementary strain energy 3. Principle of minimum potential energy 4. Virtual work principle and its applications 5. Castigliano's theorem 6. Reciprocal Theorems 	
Pre-requisite	None	
Related Courses	Engineering Mechanics, Structural Analysis II	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> • Hibbeler, R.C. (2005). <i>Structural Analysis</i> (6th Edition). Prentice Hall. <u>References:</u> <ul style="list-style-type: none"> • Kenneth M. Leet and Chia-Ming Uang (2002). <i>Fundamentals of Structural Analysis</i>. McGraw-Hill International Edition • Kassimali, Aslam, <i>Structural Analysis</i> (4th Edition), Christopher M. Shortt. • Tartaglione, Louis C. (1991). <i>Structural Analysis</i>. McGraw-Hill International Edition. • West, Harry H. (2002). <i>Fundamentals of Structural Analysis</i> (2nd Edition). John Wiley and Sons. 	
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution:	<ul style="list-style-type: none"> • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study 	<div>70%</div> <div>30%</div> <p>As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.</p>

Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding the structural analysis combines the concepts from statics and mechanics of materials to determine internal forces of structural members like truss, cable, arch, beam and frame	2	2	3	2	2	1	2
2	Able to understand the deflections of structural systems and analyze different methods for different types of statically determinate and indeterminate structures	2	2	3	2	2	2	3
3	Develop the idea to check the structural stability of different structures	2	2	3	2	2	1	2
4	Combined with design, the analysis of structural elements and systems is one of the main themes of this civil engineering courses	2	2	3	2	2	2	3
Total		2	2	3	2	2	1.5	2.5
Average		2.4						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0411 Survey II

Item	Description
Title	Surveying
Credits and no. of hours	2 (1-2)
Offering year and semester	Second Year-Fourth Semester
Aim	This course is designed to impart necessary knowledge and skills to carry out surveying and leveling, and do the relevant drawing and computations, for engineering applications.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understanding the basic principle of surveying • Able to get knowledge of the basic principle of chain surveying, Leveling, Theodolite traversing, tachometry and identify the erroneous measurements and the sources of these 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 • Work efficiently in a group environment
Academic Staff Responsible	
Syllabus	<p>VII. <u>Modern techniques and instruments in surveying</u></p> <ol style="list-style-type: none"> 1. Global Positioning System (GPS): Applications and control provision 2. Total station <p>VIII. <u>Areas and volumes</u></p> <ol style="list-style-type: none"> 1. The planimeter 2. Areas enclosed by straight lines 3. Irregular figures 4. Volumes: Earthwork calculations 5. Mass-haul diagrams <p>IX. <u>Setting out of buildings</u></p> <ol style="list-style-type: none"> 1. Accuracy of measurement 2. Basic principles and point marking 3. Horizontal control 4. Vertical control 5. Vertical alignment 6. Connection of surface and underground lines <p>X. <u>Laboratory Session:</u></p> <ol style="list-style-type: none"> 1. Linear and angular measurement techniques 2. Traverse surveying 3. Leveling and contouring 4. Curve setting 5. Tacheometry 6. Project surveying 7. Modern surveying equipment and their applications
Pre-requisite	None
Related Courses	Concrete Design and Analysis
Teaching and Learning methods	Lectures, tutorials and assignments

Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">• Bannister, A., Raymond, S. and Baker, R. (1992). <i>Surveying</i> (6th Edition). Harlow: Longman Scientific & Technical			
	<u>References:</u> <ul style="list-style-type: none">• Kavanagh, Barry F. (2004), <i>Surveying With Construction Applications</i> (5th Edition). Prentice Hall.• Kavanash, B., <i>Surveying principles and Application</i>. Prentice Hall• Irvine, W., <i>Surveying for Construction</i>. McGraw Hill• Davis, R.E., <i>Surveying Theory and Practice</i>. McGraw Hill			
Evaluation Method(s)	Laboratory and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 20% 10%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in surveying first and then learn the solution by exercise and fieldworks.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering			X	
Design/conduct experiments/analyze data				X
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively		X		
Ability to function in a group and in multi-disciplinary team			X	
Remarks				

No.	Course Outcomes	Program 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	Understanding the basic principle of surveying	2	2	3	2	3	1	3
2	Able to get knowledge of the basic principle of chain surveying, Leveling, Theodolite traversing, tachometry and identify the erroneous measurements and the sources of these errors	2	2	3	2	3	2	3
3	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	2	2	3	2	3	1	3
4	Work efficiently in a group environment	2	2	3	2	3	2	3
Total		2	2	3	2	3	1.5	3
Average		2.4						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0415 Soil Mechanics

Item	Description
Title	Soil Mechanics
Credits and no. of hours	3(2-2)
Offering year and semester	Third Year-Fifth Semester
Aim	This course provides civil engineering students with basic knowledge on how to apply the soil mechanics problems as well as practical geotechnical engineering problems.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the introduction to Soil Mechanics• Able to understand the classification of soil and its origin• Understanding the physical properties of soil and its classification• Understanding the compaction of soil and soil in water• Understanding the stress in soil mass• Able to understand the consolidation and soil settlement• Understanding the shear strength of soil
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction to Soil Mechanics</u><ul style="list-style-type: none">1. General2. Soils3. Applications4. Soil testing5. Geotechnical literature6. Numerical modelingII. <u>Origin and Definition of Soils</u><ul style="list-style-type: none">1. Soil formation2. Clay particles3. Soil deposits4. Phase relationsIII. <u>Physical Properties and Soil Classification</u><ul style="list-style-type: none">1. Coarse-grained Soils: grain size distribution2. Fine-grained soils: atterberg limits3. Unified soil classification system4. Visual identification and description of soils5. Soil properties6. Soil physical relationsIV. <u>Soil Compaction</u><ul style="list-style-type: none">1. Compaction: general principles2. Standard proctor test3. Factors affecting compaction4. Modified proctor test5. Empirical relationships6. Field compaction7. Special Compaction TechniquesV. <u>Water in Soil</u><ul style="list-style-type: none">1. Subsurface water2. Flow of water through soils3. Darcy's law of saturated soils

	<ol style="list-style-type: none"> 4. Coefficient of permeability 5. General differential equation of flow 6. Potential and stream functions 7. Flow nets 8. Hydraulic gradient 9. Seepage forces 10. Alleviation of piping 11. Total and effective stress 12. Capillarity 13. Earth dams 14. Seepage problems 15. Refraction of flow lines at interfaces <p>VI. <u>Stress in Soil Mass</u></p> <ol style="list-style-type: none"> 1. Stresses in saturated soil without seepage 2. Stresses in saturated soil with seepage 3. Effective stress in partially saturated soil 4. Seepage force 5. Heaving in soil due to flow around sheet piles 6. Stress caused by a point load 7. Westergaard's solution for vertical stress due to a point load 8. Vertical stress 9. Solutions for Westergaard material <p>VII. <u>Consolidation and Soil Settlement</u></p> <ol style="list-style-type: none"> 1. Fundamentals of consolidation 2. One-dimensional laboratory consolidation test 3. Void ratio-pressure plots 4. Normally consolidated and over consolidated clays 5. Calculation of settlement from one-dimensional primary consolidation 6. Compression index and swell index 7. Settlement from secondary consolidation 8. Time rate of consolidation 9. Coefficient of consolidation 10. Calculation of primary consolidation settlement under a foundation 11. Skempton-Bjerrum modification for consolidation settlement 12. Precompression-general considerations 13. Sand drains <p>VIII. <u>Shear Strength of Soil</u></p> <ol style="list-style-type: none"> 1. Mohr-Coulomb failure criteria 2. Inclination of the plane of failure caused by shear 3. Direct shear test 4. Triaxial shear test 5. Consolidated-drained Test 6. Consolidated-undrained Test 7. Unconsolidated-undrained Test 8. Unconfined compression test on saturated clay 9. Sensitivity and thixotropy of clay
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	10. Anisotropy in undrained shear strength			
Pre-requisite	None			
Related Courses	Engineering Geology and Geomorphology			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Whitlow, R. (2001), <i>Basic Soil Mechanics</i>. Prentice Hall, U.K.			
	<u>References:</u> <ul style="list-style-type: none">Helwany S. (2007). <i>Applied Soil Mechanics with ABAQUS Applications</i>. John Wiley & Sons, Inc.Atkinson, John, <i>An Introduction to Mechanics of Soils and Foundation</i>Craig, R.F. , <i>Soil Mechanics</i>Das, Braja M. (2008). <i>Advanced Soil Mechanics</i> (3rd Edition). Taylor and Francis, New York.			
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding the introduction to Soil Mechanics	2	2	3	2	3	1	3
2	Able to understand the classification of soil and its origin	2	2	2	2	3	2	3
3	Understanding the physical properties of soil and its classification	2	2	2	2	3	1	3
4	Understanding the compaction of soil and soil in water	2	2	2	2	3	2	3
5	Understanding the stress in soil mass	2	1	1	2	3	2	2
6	Able to understand the consolidation and soil settlement	2	1	1	2	3	2	2
7	Understanding the shear strength of soil	2	1	1	2	3	2	2
Total		2	1.6	1.7	2	3	1.7	2.8
Average		1.9						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0416 Strength of Material (SOM)

Item	Description
Title	Strength of Materials
Credits and no. of hours	3(2-2)
Offering year and semester	Second Year-Fourth Semester
Aim	This is an advanced engineering mechanics course in which the studied objects are treated as deformable bodies. By including mechanical properties of material, real objects will be deformed under applied forces. This course will help students to understand the relationship between forces applied to a deformable body and the methods to determine internal stress, strain, and deformations induced in some simple bodies such as bars, beams and columns.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• The student will learn the basic of bars under axial loading;• Understanding the torsion of a Shaft;• Able to develop the bending of a beam;• Understanding the transformation of stress and strain• Understanding different methods of deflection of beams• Able to understand the buckling of a compressed member
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction</u></p> <ol style="list-style-type: none">1. Rigid and deformable solids2. Concept of stress and strain3. Normal stress in axial loading4. Shearing stress, bearing stress in connections5. Stresses on oblique planes in axial loading6. Stress under general loading conditions, components of stress <p>II. <u>Bar under Axial Loading</u></p> <ol style="list-style-type: none">1. Axial force in a bar under axial loading, axial force diagram2. Stress and strain distribution under axial loading, Saint-Venant's principle3. Stress-strain relationship – Hook's law4. Mechanical properties of materials, the tension test of steel5. Elastic versus plastic behavior of a material6. The compression test of concrete7. Ultimate and allowable stress: Factor of safety8. Repeated loadings; fatigue9. Deformations of members under axial loading10. Statically indeterminate bars11. Problems involving temperature changes <p>III. <u>Torsion of a Shaft</u></p> <ol style="list-style-type: none">1. Torsion of a circular shaft, torsion diagram2. Shear stress distribution in a circular shaft3. Deformations in a circular shaft, angle of twist4. Torsion of solid noncircular members <p>IV. <u>Bending of a Beam</u></p> <ol style="list-style-type: none">1. Transverse loading of prismatic members, shear force and bending moment diagrams

	<ol style="list-style-type: none"> 2. Deformations in a symmetric member in pure bending 3. Stresses and deformations 4. Moment of inertia of sections 5. Shear stress in a beam 6. Determination of shearing stresses in a beam <p>V. <u>Transformation of Stress and Strain</u></p> <ol style="list-style-type: none"> 1. Principal stresses and principal strains, maximum shear stresses 2. Orientation of principal planes by analytical and graphical methods (Mohr's circle) 3. Combined effects of axial force, bending moment, shear force and torsion moment 4. Theories of failure: Maximum and normal stress, maximum shear stress and maximum strain theory <p>VI. <u>Deflection of Beams</u></p> <ol style="list-style-type: none"> 1. Deformation of a beam under transverse loading, equation of the elastic curve 2. Direct determination of Elastic Curve by integration 3. Moment-area method and its application to determine beam deflection 4. Superposition principle and its application to analysis of statically indeterminate beams <p>VII. <u>Energy Methods</u></p> <ol style="list-style-type: none"> 1. Work 2. Elastic strain energy 3. Potential energy 4. Virtual work principle <p>VIII. <u>Buckling of a Compressed Member</u></p> <ol style="list-style-type: none"> 1. Introduction to the stability of structures 2. Euler's formula for pin-ended columns 3. Extension of Euler's formula to columns with other end conditions
Pre-requisite	Engineering Mechanics
Related Courses	
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> • Gere, James M. (2004). <i>Mechanics of Materials</i> (6th Edition) Brooks/Cole
	<u>References:</u> <ul style="list-style-type: none"> • Beer, Johnston & Dewolf (2004). <i>Mechanics of Materials</i>. McGraw-Hill. • Hartog, J.P. Den, <i>Strength of Materials</i>. Courier Dover Publication
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)

Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Engineering Mechanics first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			

No.	Course Outcomes	Program 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	The student will learn the basic of bars under axial loading	2	2	1	2	3	1	2
2	Understanding the torsion of a Shaft	2	2	1	2	3	2	2
3	Able to develop the bending of a beam	2	2	1	2	3	2	2
4	Understanding the transformation of stress and strain	2	2	1	2	3	2	2
5	Understanding different methods of deflection of beams	2	2	1	2	3	2	2
6	Able to understand the buckling of a compressed member	2	2	1	2	3	2	2
Total		2	2	1	2	3	2	2
Average		2						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0417 Engineering Geology and Geomorphology

Item	Description
Title	Engineering Geology and Geomorphology
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Fifth Semester
Aim	Engineering Geology is aimed at studying the engineering and environmental problems which may arise as a result of the interaction between geology and human activities. The main goal of the course is to improve the knowledge of geological and geomorphological processes, developing skills in the analysis of their effects on civil engineering design.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Classify and describe rocks for the purposes of engineering geology and also produce a simple geological map using field observations• Determine rock mass classification using field observations• Apply appropriate geophysical and subsurface techniques in a site investigation• Understanding of structural geology with different types of faults, fold, domes, basins and erosion process• Able to understand the process of Channel development
Academic Staff Responsible	
Syllabus	<p>I. <u>Minerals</u></p> <ol style="list-style-type: none">1. Identification of minerals2. Common rock forming minerals3. Physical properties of minerals4. Mineraloids rocks5. Types of rocks6. Cycle of rock change7. Earthquake and seismic map of Afghanistan <p>II. <u>Structural geology</u></p> <ol style="list-style-type: none">1. Faults2. Types of faults3. Fold and fold type4. Domes5. Basins6. Erosional process7. Quantitative analysis of erosional land forms <p>III. <u>Channel development</u></p> <ol style="list-style-type: none">1. Channel widening2. Valley shape3. Stream terraces4. Alluvial flood plains5. Deltas and alluvial fans6. Channel morphology7. Channel patterns and the river basin8. Geology and geomorphology of Afghanistan

	<p>IV. <u>Geological and Geophysical Site Investigation</u></p> <ol style="list-style-type: none"> Site Geological Investigation <ul style="list-style-type: none"> Boreholes Airphoto and Remote Sensing Engineering Geophysics <p>V. <u>Applied Engineering Geology</u></p> <ol style="list-style-type: none"> Slope Failure and Landslides (Types, Effect of Groundwater, Stabilization, Hazard) Subsidence (Land Subsidence, Mining Subsidence, Subsidence in Karstic Areas) Earthquakes Rock as Construction Materials (Dimension Stone & Aggregates) <p>VI. <u>Laboratory Session:</u></p> <ol style="list-style-type: none"> Minerals and Rocks Identification Core Logging Air Photo Interpretation Topographic and Geological Map Readings Groundwater Engineering (well and dewatering design) Geophysical Investigation Geological Data Management, Analysis and Presentation Computer Software viz. Dips, Rockworks Lab report presentation by students 	
Pre-requisite	None	
Related Courses		
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<u>Text Books:</u> <ul style="list-style-type: none"> Waltham A.C. (1994), <i>Fundamental of Engineering Geology</i>. Blackie Academics and Professional, 88p. 	
	<u>References:</u> <ul style="list-style-type: none"> Bell, F.G. (2004), <i>Engineering Geology and Construction</i>, Spon Press, Taylor & Francis Group, London, 797 p Bell, F.G. editor (1992), <i>Engineering in Rock Masses</i>, Butterworth-Heinemann Ltd., Oxford, 580 p. Blyth F. G. H. and de Freitas M. H. (1974). <i>A Geology for Engineers</i> (6th Edition), Edward Arnold, London, TA705 B55 Goodman, R.E. (1993), <i>Engineering Geology: Rock in Engineering Construction</i>. John Wiley & Sons, Inc., Singapore, 412p. 	
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution:		
<ul style="list-style-type: none"> Lectures Tutorials/exercises 	70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can

<ul style="list-style-type: none">• Laboratory• Case study• Fieldwork• Home study	30%	be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Classify and describe rocks for the purposes of engineering geology and also produce a simple geological map using field observations	1	2	3	2	3	2	3
2	Determine rock mass classification using field observations	1	2	2	2	3	2	3
3	Apply appropriate geophysical and subsurface techniques in a site investigation	1	2	2	2	3	2	3
4	Understanding of structural geology with different types of faults, fold, domes, basins and erosion process	1	2	2	2	3	2	3
5	Able to understand the process of Channel development	1	2	1	2	3	2	3
Total		1	2	2	2	3	2	3
Average		2.1						
1= some relation 2= Moderate relation 3= Extensive relation								

Fifth Semester

En.WEE 0524 Engineering Hydraulics

Item	Description
Title	Hydraulics
Credits and no. of hours	3 (2-2)
Offering year and semester	Fourth Year-Sixth Semester
Aim	The hydraulic course provides an overview of the main areas of hydraulics that are used in the world of civil and environmental engineering and planning.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Understand and apply the hydraulic principle• Learn the solution of the practical problem in pipe flow, open channel flow and groundwater flow• Understanding the energy and momentum principle• Understanding the pumping hydraulics, pump selection and performance• Improve the knowledge of uniform, non-uniform, steady and unsteady flow
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction to Open Channel Flow</u></p> <ol style="list-style-type: none">1. Difference between Open Channel Flow and Pipe Flow2. Types of Channel3. Geometric parameters of a channel4. Classification of Open Channel Flow5. Continuity and Momentum equation <p>II. <u>Uniform flow</u></p> <ol style="list-style-type: none">1. Resistance flow formula2. Velocity distribution3. Equivalent roughness coefficient4. Velocity coefficients5. Uniform flow in rigid boundary channel6. Uniform flow in mobile boundary channel <p>III. <u>Non-Uniform Flow</u></p> <ol style="list-style-type: none">1. Governing equation of GVF2. Classification of Gradually Varied Flow3. Computation of GVF profile4. Rapidly Varied Flow5. Hydraulic Jump6. Flow over a Hump7. Flow in Channel Transition <p>IV. <u>Unsteady Flow</u></p> <ol style="list-style-type: none">1. Free-board in canal2. Wave and their classification3. Celerity of wave4. Surges5. Characteristic equation <p>V. <u>Energy and Momentum Principle</u></p> <ol style="list-style-type: none">1. Concept of Specific Energy2. Critical Depth

	3. Alternate depth 4. Specific Force 5. Sequent depth VI. <u>Pipe Flow</u> 1. Losses in pipes 2. Pipe in series and parallel 3. Pipe network analysis 4. Water hammer 5. Surge tank VII. <u>Canal Design</u> 1. Concept of best hydraulic section 2. Design of rigid boundary canal 3. Design of channel in alluvial formation- Kennedy's theory, Lacy's theory 4. Method of Tractive force 5. Free-board in canal	
Pre-requisite	Fluid Mechanics	
Related Courses	Hydrology, Hydraulic Structure, Hydrological Modeling	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<u>Text Books:</u> • Gupta, R.S. (2001). <i>Hydrology & Hydraulic Systems</i> (2 nd Edition). Waveland Press, Inc., Prospect Heights, Illinois.	
	<u>References:</u> • Novak, P., Moffat, A.I.B., Nalluri, C. and Narayanan, R. (2001). <i>Hydraulic Structures</i> (3 rd Edition). Spon Press, London and New York. • <i>Computer Applications in Hydraulic Engineering</i> (3 rd Edition) (incl. Academic CD), Haestad Press, 1997-1999. • Chow, V.T. (1982). <i>Open Channel Hydraulics</i> . McGraw-Hill, New York. • French, R.H. (1986). <i>Open Channel Hydraulics</i> . McGraw-Hill, New York • میا خیل ، میا پاچا. (۱۳۹۸)، سر خلاصو کانالونو هایدرالیک، ننگرهار پوهنتون.	
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study \	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.

Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understand and apply the hydraulic principle	2	1	1	1	2	1	1
2	Learn the solution of the practical problem in pipe flow, open channel flow and groundwater flow	2	1	1	2	2	1	1
3	Understanding the energy and momentum principle	2	1	1	1	2	1	1
4	Understanding the pumping hydraulics, pump selection and performance	2	1	2	2	2	1	1
5	Improve the knowledge of uniform, non-uniform, steady and unsteady flow	1	1	1	2	1	1	1
Total		1.8	1	1.2	1.6	1.8	1	1
Average		1.34						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0519 Engineering Hydrology

Item	Description
Title	Hydrology
Credits and no. of hours	3 (3-0)
Offering year and semester	Third Year-Fifth Semester
Aim	To provide an understanding of the circulation of water and its constituents through the hydrologic cycle; hydrologic data collection and analysis.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding of different components of hydrologic cycle• Able to understand the rainfall, infiltration and surface runoff;• Develop the advance knowledge about hydrologic transport;• Understanding about the statistical methods in hydrology: frequency analysis;• Able to understand the procedure of hydrologic data collection;• Understanding the forecasting and flood analysis
Academic Staff Responsible	
Syllabus	<ol style="list-style-type: none">I. <u>Introduction</u><ol style="list-style-type: none">1. Hydrology, hydrological cycle2. Water balance equationsII. <u>Meteorological Factors in Hydrology</u><ol style="list-style-type: none">1. Temperature, humidity, wind speed2. Evaporation and evapotranspirationIII. <u>Physical Hydrology</u><ol style="list-style-type: none">1. Precipitation processes, measurement and spatial averaging of precipitation2. Hyetographs3. Missing and inconsistent data, double mass curve method of adjustment4. Storm characterization, Intensity Duration Frequency (IDF) curves5. Snow fall and its measurement6. Infiltration, percolation and interflowIV. <u>Surface Runoff and Hydrograph Analysis</u><ol style="list-style-type: none">1. Rainfall-runoff correlation and rating curves2. Peak flow estimation using empirical methods3. The rational method and its limitations4. Stream gauging; different methods of streamflow measurement5. Hydrographs6. Unit hydrographs and their limitations7. Changing unit hydrograph duration, S-curve and synthetic unit hydrograph method8. Derivation of unit hydrographs from stormsV. <u>Probability and Frequency Analysis</u><ol style="list-style-type: none">1. Frequency and probability concepts2. Histograms, risk and reliability, recurrence interval

	3. Estimation of extreme events VI. <u>Ground Water</u> 1. Occurrences and distribution of ground water aquifers, aquiclavels and artesian wells 2. Water wells and their types 3. Wells and their classification 4. Well hydraulics 5. Pumps for the water well VII. <u>Flood Analysis</u> 1. Definition, causes and effects of floods 2. Flood prediction and design flood 3. Methods of mitigating floods 4. Flood routing			
Pre-requisite	None			
Related Courses	Hydraulics, Hydraulic Structures, Water Supply Engineering, Flood and Drought, Ground water Engineering, Water Resource Engineering, Hydrological Modeling, Water Resources Planning and Management			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Chow, V.T., Dr. Maidment, L.W. Mays (1988). <i>Applied Hydrology</i> . McGraw-Hill. <u>References:</u> • Linsley, Kobler and Paulhus (1977). <i>Hydrology for Engineers</i> . McGraw-Hill Publishing. • Viessman and Lewis (2003). <i>Introduction to Hydrology</i> . Prentice Hall. • Dingman, S.L. (2008). <i>Physical Hydrology</i> . Waveland Press, Long Grove. • حاذق ، محمد اسلم. (۱۳۹۸)، انجینیری هایدرولوژی، کندهار پوهنتون .			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			

Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding of different components of hydrologic cycle	1	1	1	1	1	1	1
2	Able to understand the rainfall, infiltration and surface runoff;	1	1	1	2	2	1	1
3	Develop the advance knowledge about hydrologic transport;	1	1	1	2	2	1	1
4	Understanding about the statistical methods in hydrology: frequency analysis;	2	1	1	2	2	1	1
5	Able to understand the procedure of hydrologic data collection;	3	2	2	2	2	1	1
6	Understanding the forecasting and flood analysis	2	1	2	2	2	2	1
Total		1.66	1.16	1.33	1.83	1.83	1.16	1
Average		1.42						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0520 Concrete Design and Analysis

Item	Description
Title	Concrete Design and Analysis
Credits and no. of hours	4 (3-2)
Offering year and semester	Third Year-Fifth Semester
Aim	To provide an understanding of the basic understanding of material properties of concrete, reinforcement and their interaction. This course also provides a basic understanding of standard methods of analysis and design of reinforced concrete members.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• To explain design process which takes place in idealizing a reinforced concrete structure• To simplify a standard reinforced concrete building into a number of manageable idealized substructures, structural elements and to construct their load paths• To interpret ultimate and serviceability limit state approaches in current structural design philosophy• To identify concrete material properties relevant to design• To estimate primary design loads on structural elements such as beams and columns consulting appropriate standards and handbooks• Combine primary design load cases as per design standards to find critical load combination that governs design• To model building structure and analyze structural elements for design actions such as design bending moment, design shear force and deflections• To design reinforced concrete structural elements for design actions to satisfy strength limit state criteria and serviceability criteria
Academic Staff Responsible	
Syllabus	<p>I. <u>Design Concepts of Reinforced Concrete Structures</u></p> <ol style="list-style-type: none">1. Methods of structural design2. Characteristic of reinforced concrete3. Material properties of concretes and reinforcing steels4. Building codes and specifications for reinforced concrete design <p>II. <u>Flexural Analysis of Beam</u></p> <ol style="list-style-type: none">1. Introduction2. Flexure theory3. Analysis of nominal moment strength for singly reinforced beam sections4. Definition of balanced conditions5. Tension-controlled sections and compression-controlled sections <p>III. <u>Flexural Design of Beam Sections</u></p> <ol style="list-style-type: none">1. Introduction2. Analysis of continuous one-way floor systems3. Design of singly reinforced beam sections with rectangular

	<p>compression zones</p> <p>4. Design of doubly-reinforced beam sections</p> <p>5. Design of continuous one-way slabs</p> <p>IV. <u>Shear in Beams</u></p> <p>1. Introduction</p> <p>2. Behavior of beams failing in shear</p> <p>3. Truss model of the behavior of slender beams failing in shear</p> <p>4. Shear in axially loaded members</p> <p>V. <u>Torsion</u></p> <p>1. Introduction</p> <p>2. Behavior of reinforced concrete members subjected to torsion</p> <p>3. Design for torsion and shear</p> <p>VI. <u>Serviceability Considerations for Design</u></p> <p>1. Introduction</p> <p>2. Deflections of reinforced concrete beams</p> <p>3. Consideration of deflections in design</p> <p>4. Cracking, Types of crack</p> <p>5. Control of flexural cracks</p> <p>VII. <u>Column: Combined Axial Load and Bending</u></p> <p>1. Introduction</p> <p>2. Tie and spiral columns</p> <p>3. Interaction diagrams for reinforced concrete columns</p> <p>4. Design of short columns</p> <p>5. Contributions of steel and concrete to column strength</p> <p>6. Biaxially loaded columns</p> <p>VIII. <u>Slender Columns</u></p> <p>1. Introduction</p> <p>2. Behavior of pin-ended columns</p> <p>3. Behavior of restrained columns in non-sway frames</p> <p>4. Design of columns in non-sway frames</p> <p>5. Behavior of restrained columns in sway frames</p> <p>6. Calculation of moments in sway frames using second-order analysis</p> <p>7. Design of columns in sway frames</p> <p>IX. <u>Reinforcement Detailing</u></p> <p>1. Detailing beams and slabs</p> <p>2. Detailing of columns</p> <p>3. Beam column joints</p>
Pre-requisite	None
Related Courses	Surveying , Structural Analysis
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Moderate Computer Knowledge
Course Materials and References	<p><u>Textbooks:</u></p> <ul style="list-style-type: none"> Nilson, A.H., Darwin, David and Dolan, Charles W. (2003). <i>Design of Concrete Structures</i> (13th Edition) <p><u>References:</u></p>

	<ul style="list-style-type: none">• ACI (2002). <i>Building Code Requirements for Structural Concrete (ACI 318-02) and Commentary</i>• Bandyopadhyay, J.N. (2008). <i>Design of Concrete Structures</i>. Prentice Hall.			
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	To explain design process which takes place in idealizing a reinforced concrete structure	1	1	1	2	2	1	1
2	To simplify a standard reinforced concrete building into a number of manageable idealized substructures, structural elements and to construct their load paths	2	1	1	2	2	1	2
3	To interpret ultimate and serviceability limit state approaches in current structural design philosophy	2	1	1	2	2	1	1
4	To identify concrete material properties relevant to design	2	1	1	2	2	1	1
5	To estimate primary design loads on structural elements such as beams and columns consulting appropriate standards and handbooks	3	2	1	2	2	1	1
6	Combine primary design load cases as per design standards to find critical load combination that governs design	2	1	1	2	2	1	1
7	To model building structure and analyze structural elements for design actions such as design bending moment,	2	2	1	2	2	1	1

	design shear force and deflections							
8	To design reinforced concrete structural elements for design actions to satisfy strength limit state criteria and serviceability criteria	3	2	1	2	2	1	1
Total		2.12	1.37	1	2	2	1	1.12
Average		1.51						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0521 Numerical Methods

Item	Description
Title	Numerical Methods
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Fifth Semester
Aim	To provide an understanding of Most problems in practical engineering applications are so complicate that they can only be solved numerically by using computer. This course is designed to introduce students to a variety of numerical methods and algorithms for solving mathematical models of real word problems from the fields of Civil Engineering.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the computational skills enabling to select the appropriate numerical technique to solve engineering problem• Able to understand the critical analysis to realize limitations and performance of different schemes in order to interpret the output generated from them• Understanding the reporting skills to present and discuss results of output generated by hand or from software packages• Perform statistical inference tasks using software and to specify the calculations involved in such tasks and to be aware of assumptions necessary for the validity of results
Academic Staff Responsible	
Syllabus	<p>I. <u>Mathematical Modeling of Engineering Problems and Error Analysis</u></p> <ol style="list-style-type: none">1. Concepts of approximation in mathematical modeling and numerical solution2. Truncation errors and the Taylor series3. Approximations and round - off errors in computer <p>II. <u>Roots of Equations</u></p> <ol style="list-style-type: none">1. Bisection method2. Method of false position3. Fixed-Point iteration4. Newton-Raphson's method5. Secant method <p>III. <u>Numerical Linear Algebra</u></p> <ol style="list-style-type: none">1. Gaussian Elimination2. LU Decomposition3. Determinant4. Inversion of a matrix5. Ill-Conditioned problems6. Gauss-Seidel method <p>IV. <u>Computations of Matrix Eigenvalues</u></p> <ol style="list-style-type: none">1. Householder method2. Power methods3. QR iteration

	<p>V. <u>Interpolation</u></p> <ol style="list-style-type: none"> 1. Linear interpolation 2. Newton interpolation 3. Lagrange interpolation 4. Hermite interpolation 5. Spline interpolation <p>VI. <u>Curve Fitting</u></p> <ol style="list-style-type: none"> 1. Linear regression 2. Polynomial regression 3. Nonlinear regression <p>VII. <u>Numerical Differentiation</u></p> <ol style="list-style-type: none"> 1. Using Taylor expansion 2. Finite difference approximations of partial derivatives <p>VIII. <u>Numerical Integration</u></p> <ol style="list-style-type: none"> 1. Trapezoidal rule 2. Simpson's rule 3. Newton-Cotes formulas 4. Gauss quadrature's <p>IX. <u>Numerical Solution of Ordinary Differential Equations</u></p> <ol style="list-style-type: none"> 1. Euler methods 2. Runge-Kutta methods 3. Predictor-Corrector Methods 	
Pre-requisite	Calculus I and III	
Related Courses	Differential & Integral Calculus, Differential Equations	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Moderate Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> • Chapra, S.C. and Canale, R.P. (2005). <i>Numerical Methods for Engineers</i> (5th Edition). McGraw-Hill. 	
	<u>References:</u> <ul style="list-style-type: none"> • Ames, W. F. (1977). <i>Numerical Methods for Partial Differential Equations</i>, Academic Press, New York. • Hoffman, J. (1992). <i>Numerical Methods for Engineers and Scientists</i>. McGraw-Hill, New York. • Rice, J. R. (1983). <i>Numerical Methods, Software and Analysis</i>, McGraw-Hill, New York. 	
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution: <ul style="list-style-type: none"> • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study 	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in numerical method first and then learn the solution by exercise.

Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding the computational skills enabling to select the appropriate numerical technique to solve engineering problem	2	2	2	2	2	1	1
2	Able to understand the critical analysis to realize limitations and performance of different schemes in order to interpret the output generated from them	2	1	2	2	2	1	1
3	Understanding the reporting skills to present and discuss results of output generated by hand or from software packages	1	2	2	3	1	2	1
4	Perform statistical inference tasks using software and to specify the calculations involved in such tasks and to be aware of assumptions necessary for the validity of results	2	2	2	2	2	1	1
Total		1.75	1.75	2	2	1.75	1.25	1
Average		1.64						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0522 Environmental Impact Assessment(EIA)

Item	Description
Title	Environmental Impact Assessment
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Sixth Semester
Aim	To acquire the knowledge of different methodologies used to assess the impacts of different projects on environment including soil, air, water, animals, plants, human, society etc.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• The building of student's knowledge and understanding of Environmental Impact Assessment• Understanding the management requirements of the water resources development projects• Develop the key knowledge of environmental impact assessment planning• Understanding the basic methodology of EIA• Have a broad understanding of Environmental Audit, Pollution Prevention and Control Laws & Acts• Finally got a broad guidelines of preparation of project report and its evaluation
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction to EIA & Audit</u></p> <ol style="list-style-type: none">1. Basic concept of EIA2. Outline of EIA process3. Subject oriented requirements4. Environment & industries <p>II. <u>EIA and Management Requirements of WRD Projects</u></p> <ol style="list-style-type: none">1. Dam/reservoir projects2. Irrigation projects3. Hydropower projects4. Water supply and sanitation projects5. Inter-basin WRD projects <p>III. <u>Environmental Impact Assessment planning</u></p> <ol style="list-style-type: none">1. Activities2. Methodology for environmental impact assessment3. Role of environmental engineering firm4. Role of regulatory agencies & control boards5. Role of the public <p>IV. <u>EIA Methodologies</u></p> <ol style="list-style-type: none">1. Screening and scoping2. Checklists, matrices3. Networks overlay mapping4. Benefit-cost analysis5. Modeling of water resources systems6. Selection of methodologies7. Impact identification, measurement, interpretation, evaluation and communication8. Case studies

	<p>V. <u>Air Quality Assessment</u></p> <ol style="list-style-type: none"> 1. Introduction 2. A generalized approach for assessment of Air Pollution Impact <p>VI. <u>Soil and Ground Water Assessment</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Soils and Ground water 3. Methodology for the prediction and assessment of impacts on Soil and Groundwater <p>VII. <u>Surface Water Assessment</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Project which create impact concerns for the surface-water environment 3. Systematic methods for evaluation of impacts of various developmental activities on surface water <p>VIII. <u>Assessment of Impacts of Socio-economic and Human Health Impacts</u></p> <ol style="list-style-type: none"> 1. Assessment of impacts on socio-economic environment 2. Conceptual framework for socio economic assessment 3. Assessment of impacts of project activities on human health <p>IX. <u>Environmental Risk Assessment(ERA) and Risk management in EIA</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Environmental Risk Assessment (ERA) 3. Risk assessment and treatment of uncertainty 4. Key steps in performing an Environmental Risk Assessment 5. Advantages and limitations of Environmental Risk Assessment <p>X. <u>Environmental Audit</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Environmental information purpose & advantage of studies 3. General approach of environmental Auditing 4. Environmental Audit 5. Audit programs in different countries 6. Auditing program in major polluting Industries 7. Reports of the Environmental audit studies <p>XI. <u>Guidelines of Preparation of Project report and its Evaluation</u></p> <ol style="list-style-type: none"> 1. Methods of clearance from the concern authorities at various labels
Pre-requisite	None
Related Courses	Environmental Studies, Environmental Chemistry & Biology
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<p><u>Textbooks:</u></p> <ul style="list-style-type: none"> • Anjaneyulu, Y. and Valli Manickam (2011). <i>Environmental Impact Assessment Methodologies</i> (2nd Edition).CRC press. <p><u>References:</u></p>

	<ul style="list-style-type: none">• Hanna, K.S. (2005). <i>Environmental Impact Assessment: Participation and Practice</i>, Oxford University Press, USA, ISBN: 0195419286. 2005.• Morris, P. and Theriv, R. (2001). <i>Methods of Environmental Impact Assessment</i>, Taylor & Francis, Inc., ISBN: 0415239591• Lawrence, D.P. and Lawrence, B. (2003). <i>Environmental Impact Assessment: Practical Solutions to Recurrent Problems</i>. Wiley, John & Sons, ISBN: 0471457221.• Manahan, Stanley E., <i>Environmental Chemistry</i> (6thEdition) Lewis Publishers, London• Agarwal, Anil & Sunita Narayan. <i>Dying Wisdom: Rise, Fall, and Potential of India's Traditional Rain Water Harvesting Systems</i>.CSE Publication, New Delhi• Lawrence, D.P. and Lawrence, B. (2003). <i>Environmental Impact Assessment: Practical Solutions to Recurrent Problems</i>. Wiley, John & Sons, ISBN: 0471457221.• Biswas, A.K. and Agarwal, S.B.C. (1992). <i>Environmental Impact Assessment for Developing Countries</i>. Butterworth-Heinemann Ltd., Oxford.• UN ESCAP (1990), <i>Environmental Impact Assessment Guidelines for Water Resources Development</i>. United Nation, New York.			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in this subject and then learn the solution by tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	The building of student's knowledge and understanding of Environmental Impact Assessment	1	1	1	2	2	1	2
2	Understanding the management requirements of the water resources development projects	1	1	2	2	2	1	1
3	Develop the key knowledge of environmental impact assessment planning	1	2	1	3	2	1	1
4	Understanding the basic methodology of EIA	1	1	1	2	2	1	1
5	Have a broad understanding of Environmental Audit, Pollution Prevention and Control Laws & Acts	1	1	1	3	2	1	2
6	Finally got a broad guidelines of preparation of project report and its evaluation	1	2	1	3	2	2	2
Total		1	1.33	1.16	2.5	2	1.16	1.5
Average		1.52						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0523 Water Supply Engineering

Item	Description
Title	Water Supply Engineering
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Sixth Semester
Aim	This course aims to provide a basic understanding of the main elements of water supply systems. The course will outline the approaches used in the planning of water supply systems and their economic assessment, as well as the principles of design of works for the collection and distribution of water supplies, including the impoundment and intake of surface water, storage, pumping, distribution and network analysis. Principles of operational management and interaction of water distribution system with other infrastructure systems will be addressed.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Develop the key understanding of water supply engineering• Able to understand the collection and transportation system of surface water
Academic Staff Responsible	
Syllabus	<p><u>I. Water Supply Engineering</u></p> <ol style="list-style-type: none">1. Introduction2. Water demands3. Water supply sources4. Ground water exploration5. Aquifer properties and ground water flow6. Well hydraulics7. Water well design8. Drilling9. Construction and maintenance10. Water demand for rural communities11. Shallow hand tubewells12. Deep tubewells13. Deep set pumps and alternative water supplies for problem areas. <p><u>II. Surface water collection and transportation</u></p> <ol style="list-style-type: none">1. Head works2. Pumps and pumping machineries3. Water distribution systems4. Analysis and design of distribution network5. Fire hydrants6. Water meters7. Leak detection8. Unaccounted for water <p><u>III. Pumps and Pumping Plant Installations</u></p> <ol style="list-style-type: none">1. Centrifugal pump2. Airflow and mixed flow pumps3. Reciprocating pumps4. Choice of pumps for water supply

	5. Pumping plant layouts 6. Pump suction design IV. <u>Pipeline and Distribution System Design and Analysis</u> 1. Introduction 2. Factors in pipeline design 3. Pipeline planning 4. Source and pipeline layout 5. Design of networks 6. Manual calculation of network flow V. <u>System Components:</u> 1. Valves 2. Flow measurement and 3. Leakage management VI. <u>Groundwater and Surface Water Treatment for Potable Water Supply</u> 1. Water characteristics 2. Plant layout and sequencing of unit operations and processes 3. Hydraulic considerations			
Pre-requisite	None			
Related Courses	Water Resources Engineering, River Engineering, Ground water Engineering, Hydraulics			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Twort A.C., Ratnayaka D.D. & Brandt M.J (2000). <i>Water Supply</i> (5 th Edition) Edward Arnold Ltd/IWA Publishing.			
	<u>References:</u> • Savic, D. & Banyard J.K., (Eds) (2011). <i>Water Distribution Systems</i> . ICE Publishing. • De Moel P.J., Verberk J.Q.J.C. & van Dijk, J.C. (2006). <i>Drinking water: principles and practices</i> . World Scientific Publishing Co. Pte. Ltd.			
Evaluation Method(s)	Laboratory Exercises (20%) Mid-term Exam (20%) Final Exam (60%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze	X			

data				
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Develop the key understanding of water supply engineering	1	1	1	2	2	1	1
2	Able to understand the collection and transportation system of surface water	2	1	1	2	2	1	1
Total		1.5	1	1	2	2	1	1
Average		1.35						
1= some relation 2= Moderate relation 3= Extensive relation								

Sixth Semester

En.WEE 0631 Research Methodology

Item	Description
Title	Research Methodology
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth year-7 th Semester
Aim	The objective of this course is to provide a basic overview of the research methods used in education in addition to those concepts needed to make those ideas and conclusions accessible to others.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understand research terminology• Be aware of the ethical principles of research, ethical challenges and approval processes• Describe quantitative, qualitative and mixed methods approaches to research• Identify the components of a literature review process• Critically analyze published research
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction to Research</u></p> <ol style="list-style-type: none">1. What is Research?2. Research Concepts3. Types of research4. Research questions5. Literature reviews6. Research Ethics and Integrity <p>II. <u>Quantitative Research Methods</u></p> <ol style="list-style-type: none">1. The Scientific Method2. Design of Quantitative Surveys3. Quantitative Research Methods <p>III. <u>Qualitative Research</u></p> <ol style="list-style-type: none">1. Introduction to Qualitative Research and Research Approaches2. Qualitative Research Methods3. Data Analysis and Theory in Qualitative Research Articles <p>IV. <u>Data collection and Sampling</u></p> <ol style="list-style-type: none">2. Descriptive and Inferential statistics3. Constructing a questionnaire <p>V. <u>Mixed-Methods Design</u></p> <ol style="list-style-type: none">1. Introduction to Mixed Methods Research2. Design of Mixed Methods Research3. Evaluation of Mixed Methods Research <p>VI. <u>Research Proposal</u></p> <ol style="list-style-type: none">1. Writing a research proposal2. Presentations & Proposals
Pre-requisite	None
Related Courses	
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Moderate Computer Knowledge

Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Johnson, R., B., & Christensen, L., (2010). <i>Educational Research: Quantitative, Qualitative, and Mixed Approaches</i> (4th Edition, Boston). MA: Allyn and Bacon.			
	<u>Reference:</u> <ul style="list-style-type: none">Creswell, J. W. (2009). <i>Research design: Qualitative, quantitative and mixed methods approach</i> (3rd Edition). Thousand Oaks, CA: Sage.American Psychological Association. (2009). <i>Publication manual of the American Psychological Association</i> (6th Edition.). Washington, D.C.Evans, I., Thornton, H., & Chalmers, I. (2011). <i>Testing treatments: Better research for better healthcare</i> (2nd Edition) London: Pinter & Martin.TRU Library (2011). <i>APA Citation Style - Quick Guide</i> (6th Edition)			
Evaluation Method(s)	Assignments (10%), Report of the case Study (20%) Mid-term Exam (20%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the exercise. Students can be exposed to different problems in Research methodology first and then learn the solution by exercise as well as fieldworks.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data		X		
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility		X		
Communicate effectively			X	
Ability to function in a group and in multi-disciplinary team			X	
Remarks				

No.	Course Outcomes	Program 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	Understand research terminology	1	2	1	2	1	1	1
2	Be aware of the ethical principles of research, ethical challenges and approval processes	1	1	1	2	2	1	2
3	Describe quantitative, qualitative and mixed methods approaches to research	1	2	1	2	2	1	2
4	Identify the components of a literature review process	2	1	1	2	2	2	1
5	Critically analyze published research	2	2	1	2	2	1	1
Total		1.4	1.6	1	2	1.8	1.2	1.4
Average		1.48						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0625 Wastewater Engineering and Sanitation

Item	Description
Title	Wastewater Engineering and Sanitation
Credits and no. of hours	3 (2-2)
Offering year and semester	Third Year-Sixth Semester
Aim	To provide an understanding of wastewater treatment, water supply systems, wastewater disposal systems, storm water systems, biosolids treatment and management, and water quality and contamination indicators
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understand and apply water and wastewater engineering principles to the design of treatment processes as well as water collection, storage, and distribution networks. • Sketch process flow diagrams for water and wastewater treatment works for different target treatment outcomes, and discuss the advantages and disadvantages of individual unit processes.
Academic Staff Responsible	
Syllabus	<p>I. <u>Wastewater Engineering</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Estimation of wastewater 3. Wastewater collection systems 4. Hydraulics of sewer 5. Design 6. Construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances 7. Plumbing system <p>II. <u>Wastewater Sources, Quantity and Quality</u></p> <ol style="list-style-type: none"> 1. Sources of water supply and wastewater 2. Water demand for various purposes 3. Population forecasting by various methods 4. Estimation of wastewater flows and variation in wastewater flows 5. Estimation of storm water quantity 6. Wastewater quality parameters and quality standard for various water uses 7. Wastewater treatment <p>III. <u>Wastewater/Sewage Collection and Disposal Systems</u></p> <ol style="list-style-type: none"> 1. Wastewater collection 2. Design of sewerage systems 3. Design of low cost sanitation 4. Discharge of sewage in streams/lakes 5. Wastewater recycling and reuse <p>IV. <u>Wastewater Treatment</u></p> <ol style="list-style-type: none"> 1. Wastewater characteristics 2. Physical methods of wastewater treatment 3. Chemical methods of wastewater treatment 4. Biological methods of wastewater treatment

	<ol style="list-style-type: none"> 5. Treatment and disposal 6. Treatment and disposal of industrial effluents 7. Sludge treatment and disposal <p>V. <u>Wastewater Treatment Plant Characteristics</u></p> <ol style="list-style-type: none"> 1. Sequencing of unit operations and processes 2. Plant layout 3. Hydraulic considerations <p>VI. <u>Natural Wastewater Treatment Systems</u></p> <ol style="list-style-type: none"> 1. Ponds and lagoons 2. Wetlands and root-zone systems <p>VII. <u>Sanitation</u></p> <ol style="list-style-type: none"> 1. Sanitation and health 2. Low cost sanitation technology 3. Septic tank system 4. Sustainability of water and sanitation services 5. Participatory development approach in water and sanitation sector 6. Community management and hazardous waste management <p>VIII. <u>Eco-sanitation</u></p> <ol style="list-style-type: none"> 1. Introduction to eco-sanitation 2. Transfer and treatment of human excreta and grey water 3. Advantages of eco-sanitation
Pre-requisite	None
Related Courses	Water Supply Engineering, Water Resources Engineering, Water Resources Planning and Management, Environmental Health and Sanitation
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Moderate Computer Knowledge
Course Materials and References	<p><u>Textbooks:</u></p> <ul style="list-style-type: none"> • Qasim, S.R. (1998). <i>Wastewater Treatment Plants; Planning, Design and Operation</i> (2nd Edition). CRC Press. <p><u>References:</u></p> <ul style="list-style-type: none"> • McGhee, T. J. (1990). <i>Water Supply and Sewerage</i>, McGraw-Hill. • Morgan P. (1990). <i>Rural Water Supplies and Sanitation</i>, MACMILLAN EDUCATION LTD. • Qasim S. R., Motley E. M., and Zhu G. (2000). <i>Water Works Engineering – Planning, Design and Operation</i>. Prentice-Hall PTR, Upper Saddle River. • Calvert, Paul, Morgan, Peter, Rosemarin, Arno, Sawyer, Ron and Jun Xio (2004). <i>Ecological Sanitation</i> (2nd Edition). Stockholm Environment Institute. • Kawamura, S. (2000). <i>Integrated Design and Operation of Water Treatment Facilities</i>. John Wiley & Sons, Inc., New York.
Evaluation Method(s)	Assignments (20%), Mid-term Exam (30%) and Final Exam (50%)

Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in water and wastewater engineering first and then learn the solution by exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			

No.	Course Outcomes	Program 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	Understand and apply water and wastewater engineering principles to the design of treatment processes as well as water collection, storage, and distribution networks.	2	1	1	2	2	1	1
2	Sketch process flow diagrams for water and wastewater treatment works for different target treatment outcomes, and discuss the advantages and disadvantages of individual unit processes.	2	2	1	2	2	1	1
Total		2	1.5	1	2	2	1	1
Average		1.5						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0626 Groundwater Engineering

Item	Description
Title	Groundwater Engineering
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Seventh Semester
Aim	To provide an acquire knowledge on water retention and flow in soils, hydraulics of ground water systems, ground water quality, ground water evaluation and management
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understand the basic idea of groundwater hydrology :porous media, hydrologic cycle, Darcy's law of fluid flow in porous media etc • Understand the engineering applications of groundwater hydraulics • Able to understand how groundwater is contaminated by different pollutants • Understand the evaluation and management issue of groundwater
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction</u></p> <ol style="list-style-type: none"> 1. Groundwater in the hydrologic cycle 2. Aquifers and their basic properties 3. Recharge areas, discharge areas, and groundwater divides 4. Groundwater budget <p>II. <u>Groundwater Hydrology</u></p> <ol style="list-style-type: none"> 1. Darcy's Law and hydraulic potential 2. Basic continuity equation 3. Streamlines and flow nets 4. Confined and unconfined flows 5. Initial and boundary conditions 6. Groundwater-surface water interactions 7. Groundwater flow modeling <p>III. <u>Contaminant Hydrology</u></p> <ol style="list-style-type: none"> 1. Geochemistry and groundwater pollution 2. Contaminant transport mechanisms and equations 3. Effects of concentration gradients (Fick's Law) 4. Modeling of contaminant transport 5. Geochemical tracers, stable isotopes <p>IV. <u>Coupled Flow and Transport</u></p> <ol style="list-style-type: none"> 1. Density driven flow, freshwater/saltwater interaction 2. Heat transport and groundwater flow 3. Unsaturated zone hydrology 4. Flow equations (retention curves and Richard's equation) 5. Infiltration and evapotranspiration 6. Mathematical models <p>V. <u>Well Hydraulics</u></p> <ol style="list-style-type: none"> 1. Design, construction and development of well 2. Pumping tests and slug tests

	3. Thiem and Thies equations 4. Partially penetrating wells 5. Multiple well systems 6. Capture zone analysis VI. <u>Groundwater Evaluation and Management</u> 1. Exploration of aquifers 2. Groundwater development and consequences 3. Groundwater management issues			
Pre-requisite	None			
Related Courses	Hydrology, Hydraulics, River Engineering, Water Resources Engineering			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Todd, D.K. and Mays, L.W. (2005). <i>Groundwater Hydrology</i> (3rd Edition), John Wiley & Sons, Inc., New York.			
	<u>References:</u> • Schwartz, F.W. & Zhang H. (2003). <i>Fundamentals of Ground Water</i> , Wiley. • Kashef A.I. (1986). <i>Groundwater Engineering</i> . McGraw Hill, New York. • Fetter, C.W. (2000). <i>Applied Hydrogeology</i> (4 th Edition). Prentice Hall, New York.			
Evaluation Method(s)	Assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines		X		
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understand the basic idea of groundwater hydrology :porous media, hydrologic cycle, Darcy's law of fluid flow in porous media etc	2	2	1	2	2	1	1
2	Understand the engineering applications of groundwater hydraulics	2	2	1	2	2	1	1
3	Able to understand how groundwater is contaminated by different pollutants	1	1	1	2	2	1	2
4	Understand the evaluation and management issue of groundwater	2	2	1	2	2	1	2
Total		1.75	1.75	1	2	2	1	1.5
Average		1.57						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0627 Geographic Information System Applications in WRPM

Item	Description
Title	Geographic Information System Applications in Water Resources Planning and Management
Credits and no. of hours	3 (1-4)
Offering year and semester	Fourth Year-Eighth Semester
Aim	The principles of Geographic Information System (GIS) and its application procedures for decisions in water resources planning and management
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Demonstrate the basic concepts and operation of GIS for water resources: Data models, data sources, map projections, arc hydro modeling concepts • Demonstrate ability to create digital data models of water resources in GIS from existing data sources, such as NHD, River Reaches, time series, etc.: From DEMS to create watersheds, streams and drainage points, Apply Arc-Hydro data model, Build a geometric network for streams and rivers • Demonstrate ability to conduct spatial analyses of water resources: Conduct hydrologic calculations using map algebra on raster grids, Analyze a digital elevation model of land surface terrain to derive watersheds and stream networks
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction to GIS</u></p> <ol style="list-style-type: none"> 1. Fundamental concepts 2. GIS scope and application in water resources 3. Overview of GIS hardware and software <p>II. <u>Mapping Concepts</u></p> <ol style="list-style-type: none"> 1. Map characteristics 2. Map scale 3. Geo-references and coordinate system 4. Map projection system <p>III. <u>Data Manipulation and Basic Spatial Analysis</u></p> <ol style="list-style-type: none"> 1. Data manipulation techniques 2. Spatial analysis techniques 3. Display of GIS analysis results 4. Digital terrain models 5. Hydrologic modeling <p>IV <u>Application of GIS in WRPM</u></p> <ol style="list-style-type: none"> 1. Spatial analysis of hydrologic components 2. Spatial analysis of water resources 3. Analysis of trends through overlay 4. Flood forecasting 5. Water supply system 7. Assessment of water quality status
Pre-requisite	None
Related Courses	Flood and Drought, Hydrological Modeling
Teaching and Learning methods	Lectures, tutorials and assignments

Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Bernhardsen, T. (1999). <i>Geographic Information System: An Introduction</i>. John Wiley & Sons, Inc			
	<u>References:</u> <ul style="list-style-type: none">Burrough, P.A. and R. A. McDonnell (1998). <i>Principles of Geographical Information Systems</i>. Oxford University PressMitchell, Andy (2001). <i>ESRI guide to GIS Analysis</i>, ESRI Press, Red Lands.Guo, Leijang (2010). <i>Application of GIS and remote sensing techniques for water resources management</i>. Conference Publication			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-semester exam (30%) and Final examination (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	30% 70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in Water resources and the probable solution by exercises.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively			X	
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course Outcomes	Program 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	Demonstrate the basic concepts and operation of GIS for water resources: Data models, data sources, map projections, arc hydro modeling concepts	2	2	3	2	2	1	1
2	Demonstrate ability to create digital data models of water resources in GIS from existing data sources, such as NHD, River Reaches, time series, etc.: From DEMS to create watersheds, streams and drainage points, Apply ArcHydro data model , Build a geometric network for streams and rivers	2	2	3	2	2	1	1
3	Demonstrate ability to conduct spatial analyses of water resources: Conduct hydrologic calculations using map algebra on raster grids, Analyze a digital elevation model of land surface terrain to derive watersheds and stream networks	2	2	3	2	2	1	1
Total		2	2	3	2	2	1	1
Average		1.85						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0628 Solid and Hazardous Waste Management

Item	Description
Title	Solid and Hazardous Waste Management
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Seventh Semester
Aim	To provide an understanding of solid and hazardous waste management and cleanup processes. In addition, students will understand the basic principles of waste collection, movement, transfer, landfilling of municipal solid wastes, fate and transport of hazardous wastes, toxicology and risk assessment, physical/chemical treatment of wastes etc.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Increase understanding of solid and hazardous waste issues in disaster events • Increase knowledge of roles of environmental health practitioners in addressing solid and hazardous waste issues • Increase understanding of the basic elements of solid and hazardous waste planning, collection, and disposal
Academic Staff Responsible	
Syllabus	<p>I. <u>Solid Waste Management</u></p> <ol style="list-style-type: none"> 1. Sources and Types of solid wastes 2. Physical and Chemical properties of solid wastes 3. Solid Waste Generation 4. Onsite handling, Storage and Processing 5. Collection of Solid Wastes 6. Transfer stations and Transport 7. Ultimate Disposal Methods 8. Resources and Energy Recovery and Recycling 9. Soil Pollution 10. Industrial solid waste collection and disposal. 11. Waste-to-energy combustion 12. Sanitary landfills composting <p>II. <u>Hazardous Waste Management</u></p> <ol style="list-style-type: none"> 1. Identification, Sources and Characteristics of Hazardous Wastes; 2. Hospital Waste Management Practices; 3. Legal Aspects; 4. Auditing and Prevention; 5. Methods of Treatment and Disposal – physical, chemical, biological and thermal treatment 6. Emphasizes quantitative analyses
Pre-requisite	None
Related Courses	Wasterwater Engineering and Sanitation
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<p><u>Textbooks</u></p> <ul style="list-style-type: none"> • M.D. LaGrega, P.L. Buckingham, and J.C. Evans (2001).

	<i>Hazardous Waste Management (2nd Edition).</i> McGraw-Hill.			
	<u>References:</u> <ul style="list-style-type: none">• Tchobanoglous, Theisen and Vigil (1993). <i>Integrated Solid Waste Management</i>. McGraw-Hill.• <i>Solid and Hazardous Waste Management</i>, Ethiopia Public Health Training Initiative, The Carter Center• LaGrega, Buckingham, and Evans (1994).<i>Hazardous Waste Management</i>. McGraw-Hill.			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in solid and hazardous waste management first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data			X	
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Increase understanding of solid and hazardous waste issues in disaster events	1	1	1	2	2	1	1
2	Increase knowledge of roles of environmental health practitioners in addressing solid and hazardous waste issues	1	1	1	2	2	2	2
3	Increase understanding of the basic elements of solid and hazardous waste planning, collection, and disposal	1	1	1	2	2	1	1
Total		1	1	1	2	2	1.33	1.33
Average		1.38						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0629 Engineering Economics

Item	Description
Title	Engineering Economics
Credits and no. of hours	2 (2-0)
Offering year and semester	Second Year-Fourth Semester
Aim	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 engineering economic decisions.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• Understanding the basic concepts in economic analysis• Able to understand the cost concepts and the time value of money• Measuring the worth of investment and comparison of alternatives;• Able to get the idea of project feasibility analysis and capability of decision making under risk and uncertainty
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Introduction/Engineering Economic Decision</u><ul style="list-style-type: none">1. Introduction2. Origins of engineering economics3. What are the principles of engineering economics?4. Engineering economics and design processII. <u>Cost Concepts and Design Economics</u><ul style="list-style-type: none">1. Introduction2. Cost estimating and cost terminology3. The general economic environment4. Cost-driven design optimizationIII. <u>Money-Time Relationships and Equivalence</u><ul style="list-style-type: none">1. Introduction2. Why consider return to capital?3. Origin of interest, simple interest and compound interest4. The concept of equivalence5. Notation and cash-flow diagrams and tablesIV. <u>Applications of Money-Time Relationships</u><ul style="list-style-type: none">1. Introduction2. Determining the minimum attractive rate of return3. The present worth method, the future worth method and the annual worth method4. The internal rate of return method and external rate of return methodV. <u>Comparing Alternatives</u><ul style="list-style-type: none">1. Introduction2. The basic concepts for comparing alternatives3. The study (analysis) period4. Case 1: Useful lives are equal to the study period5. 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			
Prerequisite	None			
Related Courses	Accounting			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Park, Chan S.(2004), <i>Fundamentals of Engineering, Economics</i> Edition, Upper Saddle River, NJ., Prentice Hall			
	<u>References:</u> • Sullivan, W.G., Wicks, E.M and J.T Luxor (2003). <i>Engineering Economy</i> (12 th Edition). Prentice Hall • Pannerselvam, R. (2006). <i>Engineering Economics</i> (5 th Edition). Prentice-Hall.			
Evaluation Method(s)	Assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	60% 40%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering	X			
Design/conduct experiments/analyze data	X			
Use modern tools and techniques			X	
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility		X		
Communicate effectively		X		
Ability to function in a group and in multi-disciplinary team		X		
Remarks				

No.	Course Outcomes	Program 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	Understanding the basic concepts in economic analysis	2	1	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
3	Measuring the worth of investment and comparison of alternatives;	2	2	1	2	2	1	1
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
Total		2	1.5	1	2.25	2	1.25	1.25
Average		1.60						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0630 River Engineering

Item	Description
Title	River Engineering
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	The main objective of this course is to make observations and develop hypotheses about river processes by selecting and implementing appropriate methods of data collection for addressing the engineering problems. Also, identify the appropriate engineering solutions by analyzing, summarizing and interpreting the field data
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Develop a working knowledge of natural river processes and their analysis• Promote critical, holistic thinking about river manipulation and response• Recognition of risks, benefits and appropriate application of conventional and state-of-the-art river engineering practices and design methods• Predict outcomes of interactions between river processes and river manipulations• Cultivate awareness of ecological outcomes of decisions about river management, including impact minimization.• Learn methods for restoration of rivers from adversely impacted states to more natural conditions• Become familiar with the engineering design process, including problem analysis, data collection, and design presentation
Academic Staff Responsible	
Syllabus	<p>I. <u>River Hydraulics</u></p> <ol style="list-style-type: none">1. The one-dimensional equations of hydraulics2. Structures, controls, and boundary conditions3. River Channel Pattern and Fluvial Processes4. Behavior of Alluvial Rivers; <p>II. <u>Measurement and Analysis</u></p> <ol style="list-style-type: none">1. Hydrometry and the hydraulics behind it2. The analysis and use of stage and discharge measurements <p>III. <u>Sediment Transport</u></p> <ol style="list-style-type: none">1. General2. Aggradations and Degradation3. Natural physical processes in alluvial rivers4. Local Scours5. Initiation of motion6. Bedforms and Flow Regimes7. Alluvial roughness8. Transport formulae

	<p>9. Unsteady aspects</p> <p>IV. <u>River Morphology</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Planform 3. Longitudinal profile 4. Bends 5. Channel Characteristics 6. Bifurcations and Confluences <p>V. <u>River Engineering</u></p> <ol style="list-style-type: none"> 1. Introduction 2. Bed regulation 3. Discharge control 4. Water level control 5. Water quality control 6. River training and Bank Protection Works 7. Navigation and Dredging Sediment Movement in River Channels, 8. River engineering for different purposes 9. Impact of River Modification 10. Problem Analysis and Impact Minimization <p>VI. <u>River Engineering and Sedimentation</u></p> <ol style="list-style-type: none"> 1. Sediment sources and sediment characteristics 2. Bed forms and flow resistance 3. Sediment transport 4. Bed load formulas 5. Suspended load formulas 6. Total load 7. Watershed sediment yield 8. Reservoir sedimentation 9. River training and riverbank protection works 10. Sediment control devices
Pre-requisite	None
Related Courses	Hydrology, Hydraulics, Water Resources Engineering
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Moderate Computer Knowledge
Course Materials and References	<p>Textbooks:</p> <ul style="list-style-type: none"> • Chang, H.H. (1988). <i>Fluvial Process in River Engineering</i>. John Wiley & Sons, New York <p>References:</p> <ul style="list-style-type: none"> • Anandale, G.W. (1987). <i>Reservoir Sedimentation</i>, Elsevier. New York. • Borland, W.M. (1981). <i>Reservoir Sedimentation, A chapter in River Mechanics</i> by H.W. Shan, Colorado State University Fort Collins, Colorado. • WMO (1981). <i>Measurement of River Sediments</i>. Operational Hydrology Report No. 16. World Meteorological Organization, Geneva. • Van Rijn, L. (1986). <i>Manual on Sediment Transport Measurements</i>. Delft Hydraulics Laboratory.

	<ul style="list-style-type: none">• Vogen, S., <i>Life in Moving Fluids</i>• Federal Interagency Stream Restoration working Group, <u>Stream Corridor Restoration: Principles, Processes, and Practices</u> -available online at: http://www.nrcs.usda.gov/technical/stream_restoration/• French, <i>Open Channel Hydraulics</i>. McGraw Hill, 739 pp• Chow, <i>Open Channel Hydraulics</i>. McGraw Hill, 680 pp• Yang, <i>Sediment Transport</i>. McGraw Hill, 369 pp			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-semester exam (30%) and Final examination (50%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
	30%			
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No .	Course Outcomes	Program 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	Develop a working knowledge of natural river processes and their analysis	1	1	1	2	2	1	1
2	Promote critical, holistic thinking about river manipulation and response	2	1	1	2	2	1	1
3	Recognition of risks, benefits and appropriate application of conventional and state-of-the-art river engineering practices and design methods	2	2	1	2	2	1	1
4	Predict outcomes of interactions between river processes and river manipulations	2	2	1	2	2	1	1
5	Cultivate awareness of ecological outcomes of decisions about river management, including impact minimization.	1	1	1	2	2	2	1
6	Learn methods for restoration of rivers from adversely impacted states to more natural conditions	2	2	1	2	2	1	1
7	Become familiar with the engineering design process, including problem analysis, data collection, and design presentation	2	2	1	2	2	1	1
Total		1.71	1.57	1	2	2	1.14	1
Average		1.48						
1= some relation 2= Moderate relation 3= Extensive relation								

Seventh Semester

En.WEE 0745 Irrigation Engineering

Item	Description
Title	Irrigation Engineering
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Seventh Semester
Aim	To provide an understanding of the basic knowledge and understanding of irrigation engineering and management. It covers the topics of basic soil-plant-water relationships, different mode of irrigation system and design criteria of different irrigation system, irrigation water management
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understand the basic relationship among soil, plant and water • Able to develop the understanding of different mode of irrigation system and its applicability • Able to design different irrigation system • Understand the Irrigation Water management system • Finally, Able to start or developing the irrigation planning and developing
Academic Staff Responsible	
Syllabus	<p>I. <u>Soil-Plant-Water Relationships</u></p> <ol style="list-style-type: none"> 1. Soil properties 2. Evapotranspiration 3. Soil water balance 4. Crop water requirements <p>II. <u>Mode of Irrigation System</u></p> <ol style="list-style-type: none"> 1. Need and mode of irrigation 2. Merits and demerits of irrigation 3. Crop and crop seasons 4. Consumptive use of water 5. Duty and Factors affecting duty 6. Irrigation efficiencies 7. Planning and Development of irrigation projects <p>III. <u>Design of Irrigation Systems</u></p> <ol style="list-style-type: none"> 1. Types of farm irrigation systems 2. Irrigation methods 3. Surface irrigation (furrow, flooding) 4. Overhead irrigation (sprinkler) 5. Sub-surface irrigation (drip) <p>IV. <u>Irrigation Water management</u></p> <ol style="list-style-type: none"> 1. Need for optimization of water use 2. Minimizing irrigation water losses 3. On farm development works 4. Percolation ponds 5. Participatory irrigation management 6. Water users associations 7. Changing paradigms in water management 8. Performance evaluation <p>V. <u>Irrigation Planning and Development</u></p> <ol style="list-style-type: none"> 1. Feasibility studies

	2. Land resource assessment 3. Irrigation potential (water sources) 4. Project appraisal and implementation VI. <u>Laboratory Sessions:</u> 1. Characterization of components 2. A laboratory irrigation network 3. Design of sprinkler irrigation system 4. Design of trickle irrigation system 5. Infiltration and Chemigation
Pre-requisite	Hydrology, Engineering Economics
Related Courses	Hydrology, Hydraulic Structure, Irrigation and Drainage Engineering
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<u>Textbook & Materials:</u> <ul style="list-style-type: none"> Asawa G. L. (1992). <i>Irrigation Engineering</i>. Wiley Eastern Limited, New Delhi
	<u>References:</u> <ul style="list-style-type: none"> Ali I. (1993). <i>Irrigation and Hydraulic Structures: Theory, Design, and Practice</i>. IEER, NED University of Engineering and Technology, Pakistan Bos, M. (1989). <i>Discharge Measurement Structures</i>. ILRI Publication 20, The Netherlands, Cuenca R. H. (1989). <i>Irrigation System Design: An Engineering Approach</i>. Prentice Hall, NJ, International Commission on Irrigation and Drainage (ICID) (1998). <i>Planning the Management, Operation and Maintenance of Irrigation and Drainage Systems</i>. World Bank Technical Paper No. 389. World Bank, Washington D.C. James L. (1988). <i>Principles of Farm Irrigation System Design</i>. John Wiley and Sons, New York Jensen M. E. (1998). <i>Design and Operation of Farm Irrigation Systems</i>. Monograph No. 3, ASAE Kay M. (1986). <i>Surface Irrigation Systems and Practice</i>. Cranfield Press, UK Murty V. V. N. (1998). <i>Land and Water Management Engineering (2nd Edition)</i>. Kalyani Publishers, India Novak P., Moffat A. I. B. Nalluri C., and Narayanan R. (1990). <i>Hydraulic Structures</i>. Unwin Hyman, London Ritzema, H. P. (Editor-in-Chief) (1994). <i>Drainage Principles and Applications</i>. ILRI publication 16, International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands.
Evaluation Method(s)	Laboratory and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)

Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in irrigation engineering first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			

No.	Course Outcomes	Program 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	Understand the basic relationship among soil, plant and water	1	1	2	2	2	1	1
2	Able to develop the understanding of different mode of irrigation system and its applicability	2	1	2	2	2	1	1
3	Able to design different irrigation system	2	2	2	2	2	1	2
4	Understand the Irrigation Water management system	1	1	1	2	2	1	1
5	Finally, Able to start or developing the irrigation planning and developing	1	1	2	2	2	1	1
Total		1.4	1.2	1.28	2	2	1	1.2
Average		1.44						
1= some relation		2= Moderate relation		3= Extensive relation				

En.WEE 0732 Urban Drainage Engineering and Management

Item	Description
Title	Urban Drainage Engineering and Management
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Eighth Semester
Pre-requisite	None
Aim	This course is designed to provide an understanding of fundamental and advanced knowledge of the design and management of urban drainage.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understand the urban water cycle and its water system components, their characteristics and functioning within greater urban infrastructure systems • Understand urban water management problems including ability to: identify water systems' demand; deal with climatic and hydrologic uncertainties and/or extremes; institutional limitations; and work within a data-constrained environment • Be able to make appropriate and critical use of methods, techniques and tools necessary to monitor, analyse and design urban water systems including water supply infrastructure, drinking water treatment and distribution, wastewater collection, treatment, transport and disposal systems and drainage systems • Understand water infrastructure/asset planning, financing and management, and utility management • Be familiar with the concept of integrated water resources management (IWRM) and its application to a variety of water management problems at the urban catchment scale
Academic Staff Responsible	
Syllabus	<p>I. <u>Urban Drainage</u></p> <ol style="list-style-type: none"> 1. Review of Urban Hydrology 2. Effect of Urbanization 3. Design Storm 4. Flow in Channel and Pipe 5. Storm Water Facilities 6. Case Studies <p>II. <u>Surface Water Quality</u></p> <ol style="list-style-type: none"> 1. Pollutants Sources 2. Water Quality Control 3. Case Studies <p>III. <u>Computer Modeling in Urban Drainage</u></p> <ol style="list-style-type: none"> 1. Hydrodynamic Model 2. ST/AD/WQ in Sewers 3. Real Time Control 4. Field Measurement of Drainage Flow and Water Level <p>IV. <u>Planning</u></p> <ol style="list-style-type: none"> 1. Planning Procedure 2. Steps in Planning

	3. Master Plan and Alternatives 4. Case Studies V. <u>Storm Water Management</u> 1. Management Principle 2. Structural measures 3. Nonstructural measures 4. Case Studies			
Pre-requisite	None			
Related Courses	Irrigation and Drainage Engineering			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbook:</u> <ul style="list-style-type: none">Butler, David and John W. Davies (2004). <i>Urban Drainage</i> (2nd Edition). Spon Press			
	<u>References:</u> <ul style="list-style-type: none">Geiger, W.F. (1993). <i>Lecture Note on Urban Storm Water Management</i>. IAHR Lecture, Workshop-Seminar at AIT, FebruaryQasim, Syred R., Edward M. Motley, Gaung Zhu (2000). <i>Water Works Engineering - Planning, Design and Operation</i>. Prentice-Hall PTR, Upper Saddle River, NJ 07458Stahre, P. and Urbona, B. (1990). <i>Stormwater Detention for Drainage, Water Quality and CSO Management</i>. Prentice Hall, 338 p.Wanielista, M.P. (1989). <i>Stormwater Management: Quantity and Quality</i>. Ann Arbor Science, 383 p			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-semester exam (30%) and Final examination (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and exercise. Students can be exposed to different problems in urban drainage management first and then learn the solution by tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understand the urban water cycle and its water system components, their characteristics and functioning within greater urban infrastructure systems	1	1	1	2	2	1	1
2	Understand urban water management problems including ability to: identify water systems’ demand; deal with climatic and hydrologic uncertainties and/or extremes; institutional limitations; and work within a data-constrained environment	1	1	1	2	2	1	1
3	Be able to make appropriate and critical use of methods, techniques and tools necessary to monitor, analyse and design urban water systems including water supply infrastructure, drinking water treatment and distribution, wastewater collection, treatment, transport and disposal systems and drainage systems	1	2	1	2	2	1	1
4	Understand water infrastructure/asset planning, financing and management, and utility management	1	1	1	2	2	1	1
5	Be familiar with the concept of integrated water resources management (IWRM) and its application to a variety of water management problems at the urban catchment scale	1	1	1	2	2	1	1
Total		1	1.2	1	2	2	1	1
Average		1.31						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0733 Water Resources Engineering

Item	Description
Title	Water Resources Engineering
Credits and no. of hours	4 (4-0)
Offering year and semester	Fourth Year-Seventh Semester
Aim	To provide an understanding of a firm foundation in the concepts in water resources engineering and to prepare interested students for future careers in water supply, hydropower, and river engineering management
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Understanding the physical basic of water resources, the nature of demands for water resources and difficulties in matching supply and demand and the role of the environmental manager.• Able to understand the basic concept of hydropower engineering• Able to understand the idea of reservoir design and optimization• Get a firm concept of river engineering and sediments.
Academic Staff Responsible	
Syllabus	<p>I. <u>Water Withdrawals and Uses</u></p> <ol style="list-style-type: none">1. Water use classification2. Water for energy3. Water for agriculture4. Water supply/withdrawals <p>II. <u>Water Distribution</u></p> <ol style="list-style-type: none">1. Water distribution systems2. Pipe flow equation3. System components4. Hydraulics of simple networks5. Pump systems analysis6. Network simulation7. Hydraulic transients <p>III. <u>Hydropower Engineering</u></p> <ol style="list-style-type: none">1. Principles of hydropower engineering2. Hydropower water conveyance system3. Determining energy potential <p>IV. <u>Reservoir Design and Optimization</u></p> <ol style="list-style-type: none">1. Surface-water reservoir systems2. Mass curve analysis3. Sequent peak analysis4. Reservoir operation rules5. Reservoir simulation
Pre-requisite	Fluid Mechanics, Hydrology
Related Courses	Hydrology, Water Supply Engineering, Ground water

	Engineering, River Engineering			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Linseley R.K., Franzini J.B., Freyberg D.L., and Tchobanoglous G. (1992). <i>Water-Resources Engineering</i>. McGraw Hill Book Co.,			
	<u>References:</u> <ul style="list-style-type: none">Mays L. W. (2005). <i>Water Resources Engineering</i>. John Wiley & Sons, Inc.,Goodman, A. S. (1984). <i>Principles of Water Resources Planning</i>. Prentice-Hall, Inc.Loucks, D. P., Stedinger, J. R., and Haith, D. A. (1981). <i>Water Resources Systems Planning and Analysis</i>, Prentice-HallPrakash, A. (2003). <i>Water Resources Engineering: Handbook of Essential Methods and Design</i>, ASCE PublicationsAllam, Gamal Ibrahim Y. (1994). <i>Decision Support System for Integrated Watershed Management</i>. Colorado State University			
Evaluation Method(s)	Assignments (20%) Mid-term Exam (30%) Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in water resources engineering first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding of the primary drivers of flood and drought risk and the interactions between elements of the flood risk system, including feedbacks	1	1	1	2	2	1	1
2	Understanding of the basics of the hydrological sciences required as inputs to flood and drought risk analysis, and the associated tools used in those sciences.	1	1	1	2	2	1	1
3	Able to understand the impacts, assessment, mitigation and risk analysis of floods and drought	2	1	1	2	2	1	2
Total		1.33	1	1	2	2	1	1.33
Average		1.38						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0734 Air Quality Management

Item	Description
Title	Air Quality Management
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Seventh Semester
Aim	This introductory course provides an overview of air quality management. Topics include background of air quality monitoring, types of air pollutants and related health impacts, pollutant sampling and measurement devices, pollutant distributions and dispersal modes as well available methods to control the pollutants. Control management includes both physical and chemical mechanisms, as well as other policy/regulation approaches.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• To provide general understanding of air quality assessment and the background for management with respect to the problems of air pollution.• To assess air quality monitoring and to understand policy-making in response to air quality issues.• To provide an overview on the selection of air pollution control technology.
Academic Staff Responsible	
Syllabus	<ul style="list-style-type: none">I. <u>Background Information</u><ul style="list-style-type: none">1. Introduction, definitions and units2. Typical concentrations of air contaminants in ambient air and stack gases3. Evaluation of closure between two sets of independent results4. Aerosol particle size distributions5. Aerosol mechanics6. Scattering and absorption of light, global issues7. Air quality regulations8. Internet access related to air qualityII. <u>Sources of Industrial Air Pollution</u> General Methods to Control the Emission of Contaminants into the Atmosphere<ul style="list-style-type: none">1. Modify process, modify feed stream, shutdown source, modify social norms, and demand side management2. Ancillary air pollution control devices3. Duct and fan considerations4. Collection efficiencyIII. <u>Particulate Contaminant Control</u><ul style="list-style-type: none">1. Mechanisms to remove particulate contaminants from gas streams2. Gravitational settling chambers3. Centrifugal separators4. Wet scrubbers5. Fabric filters6. Electrostatic precipitators Summary

	IV. <u>Gaseous Contaminant Control</u> 1. Mechanisms to remove gaseous contaminants from gas streams 2. Combustion stoichiometry 3. Adsorption 4. Absorption V. <u>Meteorological Considerations</u> 1. Dependence of pressure on height 2. Dependence of temperature on height 3. Dry and wet adiabatic lapse rates 4. Potential temperature and its gradient 5. Dependence of wind speed on height 6. Maximum mixing depth 7. Wind rose 8. General characteristics of elevated point sources VI. <u>Dispersion of Air Contaminants</u> 1. Point source 2. Line source 3. Puff source 4. Multiple sources			
Pre-requisite	None			
Related Courses	Environmental Studies, Toxic Organics and Trace Metals in Ecosystem			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Wark, K., Warner, C.F., and Davis W., <i>Air Pollution: Its Origin and Control</i> (3 rd Edition), Addison Wesley Longman Publishing Company, Inc. Menlo, CA, pp. 573			
	• Davis, W.T. (Ed.) (2000), <i>Air Pollution Engineering Manual</i> . John Wiley and Sons, NY • Vatauvuk, W.M. (1991), <i>Estimating Costs of Air Pollution Control</i> . Lewis Publishers, MI			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70 % 30 %	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			

Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	To provide general understanding of air quality assessment and the background for management with respect to the problems of air pollution.	1	1	1	2	2	2	1
2	To assess air quality monitoring and to understand policy-making in response to air quality issues.	1	1	1	2	2	1	1
3	To provide an overview on the selection of air pollution control technology.	2	1	1	2	2	1	1
Total		1.33	1	1	2	2	1.33	1
Average		1.38						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0735 Seminar I (Research Proposal)

Note: This seminar will be presented on specific research topic.

En.WEE 0736 Waste Reduction and Recycling

Item	Description
Title	Water Reduction and Recycling
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	The objective of this course is to provide the knowledge of different steps involved in waste management from its generation to treatments and disposal. It also discusses different technology options including recycling, biological decomposition, recycling, thermal treatment and landfill.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• The building of student's knowledge and understanding of waste reduction, recycling, industrial incineration and recovery by means of lectures, site visits and project work.• Have an awareness of the broad range of environmental issues that might impact the country• Have a broad understanding of the key aspects of waste management, especially the waste management options of reduction, reuse, recycling and disposal• Understand the financial and legislative importance of managing wastes• Understand the capability of identification of potential areas to reduce the waste production• Develop a waste disposal strategy• Be aware of the additional available sources of guidance and support
Academic Staff Responsible	
Syllabus	<p>I. <u>Waste Generation</u></p> <ol style="list-style-type: none">1. Impact of Waste2. Relationship Water Management and Sustainable Development3. Polluter and Producer Pays Principle <p>II. <u>Characterization</u></p> <ol style="list-style-type: none">1. Properties of Solid Waste2. Composition of Solid Waste and Options for Recovery Or Reuse3. Physical, Chemical, and Biological Properties <p>III. <u>Quantity</u></p> <ol style="list-style-type: none">1. Variations2. Collection Rates3. Sour Separation <p>IV. <u>Public Services, Collection and Transportation</u></p> <ol style="list-style-type: none">1. Public Cleansing2. Collection Systems, Equipment and Requirements3. Transport System4. Transfer Systems <p>V. <u>Recycling</u></p> <ol style="list-style-type: none">1. Waste Minimization

	2. Basic unit processes 3. Processing VI. <u>Biological Decomposition</u> 1. Aerobic and anaerobic processes 2. Assessment of Process Performances 3. Application and Requirements VII. <u>Selected Recycling Issues</u> 1. Paper and plastic recycling 2. Mineral waste recycling 3. Waste Electric and Electronic Equipment VIII. <u>Thermal Treatment</u> 1. Waste to Energy Processes 2. Emission Control 3. Ash Management IX. <u>Landfill</u> 1. Sitting, Design and Construction 2. Operation and Maintenance 3. Emission Control and Treatment			
Pre-requisite	None			
Related Courses	Solid and Hazardous Waste Management			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Various (2010). <i>Reduce, Reuse, Recycle!</i> , The Rosen Publishing Group Incorporated, ISBN: 1615323872			
	<u>References</u> • Richard, C. Porter. (2002). <i>The Economics of Waste</i> , Resources for the Future, ISBN: 1891853422 • Polprasert, C. (2007). <i>Organic Waste Recycling: Technology and Management</i> (3 rd Edition). IWA Publishing, London, ISBN: 184339121X			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	

Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	The building of student's knowledge and understanding of waste reduction, recycling, industrial incineration and recovery by means of lectures, site visits and project work.	1	1	1	2	2	2	1
2	Have an awareness of the broad range of environmental issues that might impact the country	1	1	1	2	2	2	1
3	Have a broad understanding of the key aspects of waste management, especially the waste management options of reduction, reuse, recycling and disposal	1	1	1	2	2	2	1
4	Understand the financial and legislative importance of managing wastes	1	1	1	2	2	1	1
5	Understand the capability of identification of potential areas to reduce the waste production	2	1	1	2	2	1	1
6	Develop a waste disposal strategy	1	1	1	2	2	1	1
7	Be aware of the additional available sources of guidance and support	1	1	1	2	2	1	1
Total		1.14	1	1	2	2	1.42	1
Average		1.36						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0737 Floods and Droughts

Item	Description
Title	Floods and Droughts
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	Floods and droughts are one of the most destructive natural phenomena in Asia and around the world. They can cause serious damage to life, properties, public utilities and infrastructures. They hamper social and economic growth of developing countries. Knowledge on hydrology of floods and droughts; understanding on their causes, frequencies and magnitudes are required to achieve effective management and mitigation measures of floods and droughts.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Understanding of the primary drivers of flood and drought risk and the interactions between elements of the flood risk system, including feedbacks• Understanding of the basics of the hydrological sciences required as inputs to flood and drought risk analysis, and the associated tools used in those sciences.• Able to understand the impacts, assessment, mitigation and risk analysis of floods and drought
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction and Overview</u></p> <ol style="list-style-type: none">1. Hydrologic cycle and processes2. Hydrologic measurements3. Extreme events4. Forecasting and warning5. Impact and mitigation6. Definitions: hazard, disaster, vulnerability, risk <p>II. <u>Hydrology of Floods and Droughts</u></p> <ol style="list-style-type: none">1. Estimation techniques (unit hydrograph, statistical analysis)2. Flood characteristics and routing3. Drought types and severity4. Hydrologic and hydraulic models <p>III. <u>Forecasting and Warning System</u></p> <ol style="list-style-type: none">1. Overview of forecasting models2. Equipments for forecasting3. Flood and Drought Warning4. Warning procedure and dissemination <p>IV. <u>Impacts and Assessment</u></p> <ol style="list-style-type: none">1. Impacts: physical, socio-economic and environmental2. Assessment tools and techniques3. Vulnerability and capacity assessment4. Stakeholder participation

	<p>V. <u>Floods and Mitigation</u></p> <ol style="list-style-type: none"> 1. Mitigation Measures 2. Preparedness, Readiness, Emergency Response and Rehabilitation 3. Flood Damages 4. Institutional Arrangement 5. Collaboration and Coordination <p>VI. <u>Droughts and Mitigation</u></p> <ol style="list-style-type: none"> 1. Mitigation and Adaptation Measures 2. Drought Damages 3. Drought Management 4. Institutional Arrangement 5. Collaboration and Coordination <p>VII. <u>Risk Management</u></p> <ol style="list-style-type: none"> 1. Framework of risk management 2. Risk decision-making principles 3. Risk assessment methods 4. Prevention, preparedness and mitigation 5. Tools, strategies and organizational arrangements
Pre-requisite	None
Related Courses	Water Resources Planning and Management, Soil and Water Conservation Engineering
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<p><u>Textbooks:</u></p> <p>Selected materials and lecture notes provided by the instructor.</p>
	<p><u>References:</u></p> <ul style="list-style-type: none"> • ESCAP (1991). <i>Manual and Guidelines for Comprehensive Flood Loss Prevention and Management</i>. United Nations, No. ST/ESCAP/933, Bangkok, Thailand • New South Wales Government (1986). <i>Flood Plain Development Manual</i>. New South Wales, Sydney, Australia • Tingsanchali, T. (1996). <i>Floods and Human Interaction</i>. Professorial Inaugural Lecture, Asian Institute of Technology, Bangkok, Thailand • Devereux, Stephen, <i>The impact of droughts and floods on food security and policy options to alleviate negative effects</i>
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)

Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in floods and droughts first and then learn the solution by tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Understanding of the primary drivers of flood and drought risk and the interactions between elements of the flood risk system, including feedbacks	3	3	3	3	2	2	2
2	Understanding of the basics of the hydrological sciences required as inputs to flood and drought risk analysis, and the associated tools used in those sciences.	2	2	2	2	2	2	2
3	Able to understand the impacts, assessment, mitigation and risk analysis of floods and drought	3	2	2	2	3	3	3
Total		1.14	1	1	1	1	1	1
Average		1.02						
1= some relation 2= Moderate relation 3= Extensive relation								

Eight Semester

En.WEE 0844 Environmental Health and Sanitation

Item	Description
Title	Environmental Health and Sanitation
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	To provide an understanding of different diseases causing environmental pollutants, their effects on human health and different policies and management measures to protect the environment and human health
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • To explain the relationship between the environment and water, sanitation and hygiene related diseases; • To present standards and key indicators related water supply, sanitation and hygiene in emergencies • To provide basic information about control measures for improving environmental conditions • To discuss the importance of addressing long term needs of the community at the onset of the emergency and throughout its duration
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction</u></p> <ol style="list-style-type: none"> 1. Understanding the significance of the environment for human health 2. Human population pressures and pollution dynamics 3. Common terms and definitions in environmental health sciences <p>II. <u>Environmental Toxicology</u></p> <ol style="list-style-type: none"> 1. What is toxicology and why is it important to public health? 2. Terminologies and definitions 3. Relationships between pollutant exposure and toxic response 4. Linkages to risk assessment of the likelihood for environmental diseases <p>III. <u>Environmental Policies to Protect Human Health</u></p> <ol style="list-style-type: none"> 1. Overview of the environmental regulatory process in the US 2. Pollutant risk assessment in policy development 3. Environmental health regulations in place to protect human health <p>IV. <u>Contributions of Environmental Health Sciences to Disease Understanding</u></p> <ol style="list-style-type: none"> 1. Role of environmental health sciences in protecting the public from environmental disease 2. Detection and characterization of environmentally induced disease 3. Limits and deficiencies in environmental disease assessment <p>V. <u>Toxic Metals and Elements</u></p>

	<ol style="list-style-type: none"> 1. Overview of types and sources of toxic metals in the environment 2. Essential metals and their potential for toxicity 3. Metal-related environmental disease
	<p>VI. <u>Environmental Organic Chemicals</u></p> <ol style="list-style-type: none"> 1. Major classes of pesticides, routes of exposure, and their health effects 2. PCBs and Dioxins in the environment 3. Organic solvents and poly-aromatic hydrocarbons in air and water 4. Household cleaning agents, plasticizers, and environmental estrogens
	<p>VII. <u>Ionizing and Non-Ionizing Radiation</u></p> <ol style="list-style-type: none"> 1. Types/ sources of ionizing radiation 2. How is radiation measured, and what are “safe” levels? 3. Health effects of ionizing radiation (burns, mutations, cancers) 4. Environmental hazards of disposal of ionizing wastes 5. Non-ionizing radiation and health
	<p>VIII. <u>Water Quality and Health</u></p> <ol style="list-style-type: none"> 1. Sources of drinking water 2. Common contaminants of drinking water and linkages to disease 3. Treatment of water for human consumption (tap versus bottled) 4. Environmental quality criteria for US surface waters 5. Beach and coastal pollution, disease pathogens, harmful algae
	<p>IX. <u>Air Quality and Health</u></p> <ol style="list-style-type: none"> 1. Sources and causes of outdoor air pollution 2. Chemical agents of air pollution and smog 3. Health effects of outdoor air pollution 4. US air quality standards to protect public health 5. Sources/causes of indoor air pollution 6. Chemical/biological agents of indoor air pollution 7. Health effects of poor indoor air quality
	<p>X. <u>Pollution and Global Change</u></p> <ol style="list-style-type: none"> 1. Overview of agents responsible (CO₂, CH₄, CFCs) and mechanisms of action 2. Human and ecosystem health effects of global climate change
	<p>XI. <u>Environmental Disease from Wildlife and Insect Vectors</u></p> <ol style="list-style-type: none"> 1. Terminologies and definitions in vector-borne disease science 2. Diseases from wildlife (vertebrate) reservoirs 3. Diseases from insect reservoirs 4. Environmental control and prevention of vector-borne diseases
	<p>XII. <u>Food Sanitation and Safety</u></p> <ol style="list-style-type: none"> 1. Types of health hazards in food

	<div>2. Examples of food-borne illnesses</div> <div>3. Common microbial and bacterial agents of illness</div> <div>4. Viral agents, worms, metals, chemicals</div> <div>5. Prevention of food-borne disease</div> <div>6. US regulations for food safety</div> <div>XIII. <u>Hazardous Materials Management and Disposal</u></div> <div>1. Hazardous agents in municipal solid waste</div> <div>2. Solid waste treatment and disposal</div> <div>3. Sanitation and public health (sewage treatment)</div> <div>4. Animal waste management and health</div> <div>XIV. <u>Occupational Health and Industrial Hygiene</u></div> <div>1. History and overview of industrial hygiene</div> <div>2. Agents/causes of occupational diseases</div> <div>3. Examples and case studies of common occupational disease processes</div> <div>4. Prevention of occupational diseases</div>			
Pre-requisite	None			
Related Courses	Environmental Studies, Environmental Impact Assessment			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Basic Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> <div>• Frumkin, H. (2005). <i>Environmental Health: From Global to Local</i>. John Wiley & Sons, ISBN: 0787973831</div>			
	<u>References</u> <div>• Moeller, D.W. (2005), <i>Environmental Health</i>. Harvard University Press, ISBN: 0674014944.</div> <div>• Yassi, A. (2001). <i>Basic Environmental Health</i>. Oxford University Press, USA, ISBN: 019513558X</div>			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-semester exam (30%) and Final examination (50%)			
Time Distribution: <div><div>• Lectures</div><div>• Tutorials/exercises</div><div>• Laboratory</div><div>• Case study</div><div>• Fieldwork</div><div>• Home study</div></div>	70%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in chemistry first and then learn the solution by laboratory works.		
	30%			
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with		X		

other disciplines				
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	To explain the relationship between the environment and water, sanitation and hygiene related diseases;	1	1	1	2	2	1	1
2	To present standards and key indicators related water supply, sanitation and hygiene in emergencies	1	1	1	2	2	1	1
3	To provide basic information about control measures for improving environmental conditions	2	1	1	2	2	1	1
4	To discuss the importance of addressing long term needs of the community at the onset of the emergency and throughout its duration	1	1	1	2	2	1	1
Total		1.25	1	1	2	2	1	1
Average		1.32						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0839 Hydraulic Structures

Item	Description
Title	Hydraulic Structures
Credits and no. of hours	3 (2-2)
Offering year and semester	Fourth Year-Eight Semester
Aim	<p>The main objectives of this course are</p> <ul style="list-style-type: none">• To use the knowledge and skills studied previously, especially, on fluid mechanics, hydraulics and hydrology• To recognize the different types of hydraulic structures,• To understand its purpose and function and• To select the most appropriate structure and location for a specific problem to design,• To analyze and to proof that the hydraulic structure is save and economical• To broaden skills in team work, communication and planning through small projects
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none">• Use and integrate the fundamental and basics studied towards the goal of selecting, analyzing and designing of hydraulic structures.• Cope with decision making by designing, analyzing and proofing the safe and economical hydraulic structure.• Work in a team and learn successful group interaction for a project.
Academic Staff Responsible	
Syllabus	<p>I. <u>Introduction</u></p> <ol style="list-style-type: none">1. Importance of Hydraulic Structure2. Classification of Hydraulic Structure according to use3. Principles of design hydraulic structures <p>II. <u>Dams</u></p> <ol style="list-style-type: none">1. Historical review2. Type of dams3. Selection of type of dam4. Forces acting on dam5. Gravity dams6. Arch dams7. Canals8. Design and Canal Falls <p>III. <u>Spillways</u></p> <ol style="list-style-type: none">1. General2. Types of spillways3. Ogee type spillway4. Energy Dissipation5. Energy dissipation on spillways6. Hydraulic jump energy dissipation <p>IV. <u>Regulators</u></p> <ol style="list-style-type: none">1. Channel diversion2. Head regulator

	3. Cross regulator 4. Cross structures 5. Aqueducts and transitions 6. Culverts 7. Bridges 8. Other Structures V. <u>Flow measurement structures</u> 1. Culverts 2. Gates 3. Valves			
Pre-requisite	None			
Related Courses	Water Resources Engineering, Hydraulics			
Teaching and Learning methods	Lectures, tutorials and assignments			
Computer Knowledge	Moderate Computer Knowledge			
Course Materials and References	<u>Textbooks:</u> • Novak, P., Moffat, A. Nalluri, C. and Narayanan, R. (2001). <i>Hydraulic Structures</i> (3 rd Edition)			
	<u>References:</u> • Varshney, R., Gupta, S. and Gupta, R. (1992). <i>Theory and Design of Irrigation Structures</i> . • Ray, K., et al, (1992). <i>Water Resources Engineering</i> . McGraw-Hill. • U.S. Bureau of Reclamation (1997). <i>Design of Small Dams</i> , U.S. Government Office. • Peterka, A. (1978), <i>Hydraulic Design of Stilling Basins and Energy Dissipators</i> . Engineering Monograph No. 25, Bureau of Reclamation.			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: • Lectures • Tutorials/exercises • Laboratory • Case study • Fieldwork • Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in hydraulic structures first and then learn the solution by tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			

Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Use and integrate the fundamental and basics studied towards the goal of selecting, analyzing and designing of hydraulic structures.	1	2	1	2	2	1	1
2	Cope with decision making by designing, analyzing and proofing the safe and economical hydraulic structure.	2	2	1	2	2	1	1
3	Work in a team and learn successful group interaction for a project.	1	1	1	2	2	2	2
Total		1.33	1.67	1	2	2	1.33	1.33
Average		1.52						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0840 Construction Project Management

Item	Description
Title	Construction project management
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth Year-Eight Semester
Aim	<p>The main objectives of this course are</p> <ul style="list-style-type: none"> • To use the knowledge and skills studied previously, especially, on fluid mechanics, hydraulics and hydrology • To recognize the different types of hydraulic structures, • To understand its purpose and function and • To select the most appropriate structure and location for a specific problem to design, • To analyze and to proof that the hydraulic structure is save and economical • To broaden skills in team work, communication and planning through small projects
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Use and integrate the fundamental and basics studied towards the goal of selecting, analyzing and designing of hydraulic structures. • Cope with decision making by designing, analyzing and proofing the safe and economical hydraulic structure. • Work in a team and learn successful group interaction for a project.
Academic Staff Responsible	
Syllabus	<p>I. <u>Review of construction industry</u> II. <u>Construction management in term of functionality</u> III. <u>Timetable techniques for construction project</u> IV. <u>Cost estimation of constructions</u> V. <u>Cost estimation of infrastructural constructions</u> VI. <u>Cost estimation of building construction projects</u> VII. <u>Administrative affairs of construction contracts</u> III. <u>Financial affairs of construction projects</u> IX. <u>Machinery power</u> X. <u>Selection and usage of machinery</u> XI. <u>Cost of machinery</u> XII. <u>Quality and efficiency of products</u> III. <u>Work safety</u></p>
Pre-requisite	None
Related Courses	Construction materials and methods, Engineering economics
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Moderate Computer Knowledge
Course Materials and References	<p><u>Textbooks:</u></p> <ul style="list-style-type: none"> •

	<u>References:</u> <ul style="list-style-type: none">Construction management fundamentals, 2nd edition, By Knutson, Kraig: Schexnayder, C J; Fiori, Christine & Mayo, R. E.			
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)			
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in hydraulic structures first and then learn the solution by tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	Use and integrate the fundamental and basics studied towards the goal of selecting, analyzing and designing of hydraulic structures.	1	1	1	2	2	1	1
2	Cope with decision making by designing, analyzing and proofing the safe and economical hydraulic structure.	1	1	1	2	2	1	1
3	Work in a team and learn successful group interaction for a project.	1	1	1	2	2	2	2
Total		1	1	1	2	2	1.33	1.33
Average		1.38						
1= some relation 2= Moderate relation 3= Extensive relation								

En.WEE 0838 Water Resources Planning & Management

Item	Description
Title	Water Resources Planning & Management
Credits and no. of hours	3 (3-0)
Offering year and semester	Fourth Year-Eight Semester
Aim	To provide an understanding of a firm foundation in water excess management concepts, storm water control, economics in water resources, linear programming for water resources, integrated water resources management and planning
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Understand different technique and management issues of flood, drought and storm water control • Able to start developing master and strategic water resources planning • Able to deal with water supply/demand issues including water demand management, reservoir storage and other structural and non-structural methods • Understand the application of engineering economy and linear programming in water resources • The students should be able to know how to implement IWRM in different regions.
Academic Staff Responsible	
Syllabus	<p>I. <u>Assessment of Ground water and Surface Water Resources</u></p> <ol style="list-style-type: none"> 1. Hydrologic Cycle 2. Groundwater Resources <ul style="list-style-type: none"> • Types of Aquifers • Groundwater Flow • Groundwater as a Storage Medium 3. Surface Water Resources 4. Water Balance 5. Available Renewable Water Resources <ul style="list-style-type: none"> • Water Scarcity <p>II. <u>Water Resources Planning</u></p> <ol style="list-style-type: none"> 1. Planning Concepts and Definitions. 2. Aim of Water Resources Planning 3. Levels of Water Resources Planning 4. Measurement of Objectives (Utility Trade-off Analysis) 5. Function and Role of Water Resources 6. Risk and Uncertainty 7. Phases of Water Resources Planning 8. Water Master Planning 9. Data Requirements for Water Resources Planning 10. Determination of Sustainable Yield 11. Methods of Forecasting Population 12. Storage Reservoirs <p>III. <u>Water Resources Management</u></p> <ol style="list-style-type: none"> 1. Functions of Water Resources Management 2. Water Scarcity and its impacts

	<p>3. Water Shortages vs. WRM</p> <p>IV. <u>Water Demand Management</u></p> <ol style="list-style-type: none"> 1. Concept 2. Potential Stresses on Water Demand 3. The Demand Management Approach 4. Water Demand and Water Quality Management <p>V. <u>Linear Programming Applications in Water Resources</u></p> <ol style="list-style-type: none"> 1. Introduction to linear programming 2. Linear programming model 3. Assumptions of linear programming 4. Simplex method for linear programming <p>VI. <u>Integrated Water Resource Management</u></p> <ol style="list-style-type: none"> 1. What is IWRM? 2. IWRM principles 3. Concept of integration 4. Socio-economic and environmental consideration 5. Institutional arrangement 6. Management instruments 7. Participatory approach and decentralization <p>VII. <u>Integrated Watershed Management</u></p> <ol style="list-style-type: none"> 1. Watershed basics (Scope, Integrated Watershed Management) 2. Watershed assessment (Watershed inventory, tools for watershed analysis) 3. Watershed planning and management (multi-objective planning, watershed economics, emerging and future issues in watershed)
Pre-requisite	Hydrology, Engineering Economics, Water Resources Engineering
Related Courses	Hydrology
Teaching and Learning methods	Lectures, tutorials and assignments
Computer Knowledge	Basic Computer Knowledge
Course Materials and References	<p><u>Textbook & Materials:</u></p> <ul style="list-style-type: none"> • Linseley, R.K., Franzini, J.B., Freyberg, D.L., and Tchobanoglous G. (1992). <i>Water-Resources Engineering</i>, McGraw Hill Book Co. <p><u>References:</u></p> <ul style="list-style-type: none"> • Mays, L. W. (2005). <i>Water Resources Engineering</i>. John Wiley & Sons, Inc. • Hillier F. S. and Lieberman G. J. (2001). <i>Introduction to Operation Research</i>. McGraw Hill Book Co. • Cech T. V. (2009). <i>Principles of Water Resources: History, Development, Management, and Policy</i> (3rd Edition). John Wiley and Sons Inc. • Stephenson D. (2003). <i>Water Resources Management</i>. Swets and Zeitlinger B.V. Lisse, The Netherlands, • Chandrakumar G. and Mukundan N. (2006). <i>Water Resources Management: Thrust and Challenges</i>. Sarup and Sons.

	<ul style="list-style-type: none">• Heathcote, I.W. (1998). <i>Integrated Watershed Management: Principles and Practice</i>. John Wiley and Sons, Inc., New York.• Brooks, K. N., P. F. Ffolliott, H.M.Gregerson, and J.L. Thames (1991). <i>Hydrology and the Management of Watersheds</i>. Iowa State University Press, Ames.			
Evaluation Method(s)	Laboratory Exercises (20%), Mid-term Exam (20%) and Final Exam (60%)			
Time Distribution: <ul style="list-style-type: none">• Lectures• Tutorials/exercises• Laboratory• Case study• Fieldwork• Home study	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and the practice. Students can be exposed to different problems in water resources planning & management first and then learn the solution by laboratory works.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines			X	
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No .	Course Outcomes	Program 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	Understand different technique and management issues of flood, drought and storm water control	1	1	1	2	2	2	1
2	Able to start developing master and strategic water resources planning	1	1	1	2	2	2	1
3	Able to deal with water supply/demand issues including water demand management, reservoir storage and other structural and non-structural methods	3	1	1	2	2	2	1
4	Understand the application of engineering economy and linear programming in water resources	1	1	1	2	2	1	1
5	The students should be able to know how to implement IWRM in different regions.	2	1	1	2	2	1	1
Total		1.6	1.2	1	2	2	1.6	1
Average		1.48						
1= some relation 2= Moderate relation 3= Extensive relation								

En. WEE 0841 Seminar II (Research Project)

Note: Students will conduct a research under the supervision of a professor selected by department.

En.WEE 0842Transboundary Water

Item	Description
Title	Transboundary Water
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	This course aims to provide an overview of planning, policy, and development of water resources in the international setting, with emphasis on transboundary situations. They will also learn basic concepts of water rights and international law pertaining to transboundary water use and protection and how concepts are applied to various transboundary water resources problems.
Key Learning Outcomes	<p>Key learning outcomes of this course should be as follows:</p> <ul style="list-style-type: none"> • Students will be able to understand the context of international and transboundary water resources issues and their relation to engineering planning and design as well as economic development. • Students will be able understand the advantages and limitations of various types of international water conventions, treaties and agreements and how it affect water resources development. • Students will understand how planning and management decision-making processes have been undertaken in selected basins of the world. • Students will be able to critically evaluate literature in international water resources planning and development.
Academic Staff Responsible	
Syllabus	<p>I. <u>Water Availability</u></p> <ol style="list-style-type: none"> 1. Availability of global water resources and their uses 2. Distribution of transboundary water resources 3. General problems in management of transboundary water resources <p>II. <u>Global Climate Change</u></p> <ol style="list-style-type: none"> 1. Introduction to climate change and water 2. Impact on Freshwater Resources <p>III. <u>Water Conventions</u></p> <ol style="list-style-type: none"> 1. Major legal instruments for water allocation in international settings <p>IV. <u>Water Conflict</u></p> <ol style="list-style-type: none"> 1. Overview of conflict negotiation and cooperation <p>V. <u>Overview of Asian Basins</u></p> <ol style="list-style-type: none"> 1. Case Study : Mekong River Basin 2. Case Study : Ganges 3. Case Study: Indus River Basin 4. Case Study: Helmand River Basin 5. Case Study: Hari/Harirud River Basin 6. Case Study: Aral Sea 7. Case Study: Rhine River

	8. Case Study: Knowle Namaskar Basin 9. Case Study: Murgab Basin 10. Case Study: Amazon Basin 11. Case Study: Salween River Basin 12. Case Study: Disi aquifer in Saudi Arabia and Jordan		
Pre-requisite	None		
Related Courses	None		
Teaching and Learning methods	Lectures, tutorials and assignments		
Computer Knowledge	Basic Computer Knowledge		
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none">Dinar, A., S. Dinar, S. McCaffrey, D. McKinney, “<u>Bridges over Water</u>”, World Scientific Publishing Company, (2007), ISBN-13: 978-9812568939		
	References: <ul style="list-style-type: none">McKinney, D. C. (2008). <i>Transboundary Water Challenges: Case Studies</i>. University of Texas at Austin<i>Water for the Poor Act</i> (2010), Bureau of Oceans, Environment, and Science, U.S. Department of State,Bates et al., 2008, <i>Climate Change and Water</i><i>International Waters: Review of Legal and Institutional Frameworks</i> (2011), UNDP-GEFILA, Helsinki (1996). <i>Rules on the Uses of the Water of International Rivers</i>.UN-ECHE, Helsinki (1992). <i>Convention on the Protection and Use of Transboundary Watercourses and International Lakes</i>.		
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)		
Time Distribution: <ul style="list-style-type: none">LecturesTutorials/exercisesLaboratoryCase studyFieldworkHome study	30% 		

No.	Course Outcomes	Program 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	Students will be able to understand the context of international and trans boundary water resources issues and their relation to engineering planning and design as well as economic development.	2	2	1	2	2	2	2
2	Students will be able understand the advantages and limitations of various types of international water conventions, treaties and agreements and how it affect water resources development.	2	3	1	2	2	2	2
3	Students will understand how planning and management decision-making processes have been undertaken in selected basins of the world.	1	2	3	2	2	2	2
4	Students will be able to critically evaluate literature in international water resources planning and development.	2	1	2	2	2	1	2
Total		1	1.14	1	1.14	1.14	1	1.14
Average		1.08						
1= some relation		2= Moderate relation		3= Extensive relation				

En. WEE 0843 Soil and Water Conservation Engineering

Item	Description
Title	Soil and Water Conservation Engineering
Credits and no. of hours	2 (2-0)
Offering year and semester	Fourth Year-Eighth Semester
Aim	To provide an understanding of the basic principles of soil and water conservation, erosion and flood control practices and structures in agricultural basins and river beds, hydrologic and hydraulic design of control and protection structures.
Key Learning Outcomes	Key learning outcomes of this course should be as follows: <ul style="list-style-type: none">• To be able to understand the principles of engineering measures for protection of soil and water resources.• To be able to design soil and water conservation structures and facilities.• To be able to determine and solve the problems relating to sustainability of soil and water resources.
Academic Staff Responsible	
Syllabus	<p>I. <u>Soil Erosion Control Practices</u></p> <ol style="list-style-type: none">1. Agronomical practices2. Contouring3. Crop rotation4. Strip cropping5. Vegetative control of gullies6. Vegetated water ways7. Mulching8. Green manuring pastures and Agro-forestry. <p>II. <u>Contour and Graded Bunds</u></p> <ol style="list-style-type: none">1. Types, Layout, Design construction, Cost estimation and maintenance2. Bench Terraces3. Types, Design construction, Layout, Cost estimation and maintenance4. Land clearing, Leveling and grading <p>III. <u>Gully Control Structures</u></p> <ol style="list-style-type: none">1. Types of temporary & permanent gully control structures2. Planning and design of soil bed earthen bunds3. Wooden post and woven wire check dam4. Loose rock fill dam5. Drop spillway6. Chute and drop inlet spillway <p>IV. <u>Land Slides & Erosion Control on Hills</u></p> <ol style="list-style-type: none">1. Stream bank erosion2. Planning, design & construction of vegetative & machinery spur3. Coastal erosion control practices4. Wind erosion and its control practices <p>V. <u>Rain Water Harvesting & Storage Structures</u></p> <ol style="list-style-type: none">1. Water harvesting techniques

	<ol style="list-style-type: none"> Types of water harvesting structures Planning, design & maintenance of ponds and reservoir Field visit of problematic area and study of different types of erosion control structures & water harvesting structures. <p>VI. <u>Estimation of land shaping and grading for development</u></p> <ol style="list-style-type: none"> Study of working of scraper Leveler and grader Operation of grader for leveling Study of working and operation of bulldozer Efficiency test of earth moving machineries Drainage and chemical treatment of land Preparation of seed beds for rain fed farming Design, drawing and preparation of estimates for different soil conservation structures 	
Pre-requisite	None	
Related Courses	Hydrology	
Teaching and Learning methods	Lectures, tutorials and assignments	
Computer Knowledge	Basic Computer Knowledge	
Course Materials and References	<u>Textbooks:</u> <ul style="list-style-type: none"> Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993), <i>Soil and Water Conservation Engineering</i> (4th Edition). John Wiley and Sons Inc., USA, 4th Edition, 	
	<u>References:</u> <ul style="list-style-type: none"> FAO Soils Bulletin No. 57 (1987). <i>Soil and Water conservation in Semi-arid Areas</i>. Hudson N.W (Ed) FAO, Rome FAO Soils Bulletin No. 68 (1993). <i>Field Measurement of Soil Erosion and Runoff</i>. Hudson, N.W (Ed.) FAO, Rome Hudson, N.W. (1992). <i>Soil Conservation</i>. BT. Batsford, London, UK Hudson, N.W. (1992). <i>Land Husbandry</i>. BT Batsford, London, UK Lal, R. (Editor) (1994). <i>Soil Erosion Research Methods</i>. Soil and Water Conservation Society Ankeny, USA Morgan, R.P.C. (1995). <i>Soil Erosion and Conservation</i> (2nd Edition). Longman Scientific and Technical, Burnt Hill, UK Pierce F.J. and Frye, W. W. (1998). <i>Advances in Soil and Water Conservation</i>. Ann Arbor Press, Michigan Ward, A.D., and Elliot, W. J. (1995). <i>Environmental Hydrology</i>. CRC Press Inc. Boca Raton, Florida 	
Evaluation Method(s)	Tutorials and assignments (20%), Mid-term Exam (30%) and Final Exam (50%)	
Time Distribution:		
<ul style="list-style-type: none"> Lectures Tutorials/exercises Laboratory 	70% 30%	As per teaching and learning method, the instructor is required to distribute the time according to the pace of coverage of the theory and exercise. Students can be exposed to different problems in soil and water conservation engineering first and then learn the solution by

<ul style="list-style-type: none">• Case study• Fieldwork• Home study		tutorials/exercise.		
Relationship of this Course to Program Learning Outcome				
	None	Some	Moderate	Extensive
Apply mathematics, science and engineering				X
Design/conduct experiments/analyze data	X			
Use modern tools and techniques	X			
Critical thinking and apply knowledge concurrence with other disciplines	X			
Understand professional and ethical responsibility	X			
Communicate effectively	X			
Ability to function in a group and in multi-disciplinary team	X			
Remarks				

No.	Course Outcomes	Program 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	To be able to understand the principles of engineering measures for protection of soil and water resources.	1	1	1	2	2	1	1
2	To be able to design soil and water conservation structures and facilities.	1	2	1	2	2	1	1
3	To be able to determine and solve the problems relating to sustainability of soil and water resources.	2	1	1	2	2	1	2
Total		1.33	1.33	1	2	2	1	1.33
Average		1.43						
1= some relation 2= Moderate relation 3= Extensive relation								

Course Syllabus of Islamic Culture

د اسلامی ثقافت دځانگې تحصیلي نصاب
نصاب تحصیلي دیپارتمنت ثقافت اسلامی

صنف اول الی صنف چهارم - ثقافت اسلامی										
ردیف	مضامین	کودنمبر مضمون	نوعیت مضمون	کتاب عبادت	دیپارتمنت مربوطه	ساعات درسی در هفته			مجموع ساعات درسی در سمسٹر	
1	جهان بینی اسلامی	SL-IC 0101	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
2	عبادات و حکمت های آن	SL-IC0201	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
3	نظام اخلاقی اسلام	SL-IC 0301	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
4	نظام اجتماعی اسلام	SL-IC 0401	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
5	نظام سیاسی اسلام	SL-IC 0501	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
6	نظام اقتصادی اسلام	SL-IC 0601	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
7	قرآن و علوم معاصر	SL-IC 0701	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
8	تمدن اسلامی	SL-IC 0801	پوهنتون شمول	1	ثقافت اسلامی	1		1	16	ندارد
--	مجموعه کریدیت ها و ساعات درسی در هشت سمسٹر			8	---			126	--	

شماره	نوعیت مضمون	تعداد کريدیت	فیصدي بر اساس کريدیت
1	اساسی	0	0%
2	تخصصی	0	0%
3	پوهنتو شمول و اختیاری	8	100%
4	کار عملی و منوگراف	0	0%

مفردات مضمون جهان بینی اسلامی

مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارتمنت:	ثقافت اسلامی
اسم مضمون:	جهان بینی اسلامی
کود مضمون:	SL-IC 0101
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	اول
سمستر:	اول

شرح مختصر مضمون:

جهان بینی اسلامی در کاریکولم تحصیلی ثقافت اسلامی اولین و مهمترین مضمون از مضامین پوهنتون شمول ثقافت اسلامی است که محصلان را بعد از آشنایی به مفهوم ثقافت اسلامی و انواع جهان بینی های مطرح در جهان، به اساسات جهان بینی اسلامی به گونه علمی و مستدل آگاه می سازد. قرار گرفتن مضمون جهان بینی اسلامی به عنوان نخستین مضمون ثقافت اسلامی در کاریکولم تحصیلی ثقافت اسلامی بر حسب رعایت تسلسل منطقی و علمی صورت گرفته است، زیرا با توجه به اینکه عقاید و باور ها، اساس و بستر احکام تکلیفی به شمار می روند، این مضمون بنیادین، مناسبترین مدخلی برای سایر مضامین ثقافت به شمار می رود. محصلان در ختم سمستر با مطالعه و آگاهی ازین مضمون توانایی خواهند داشت تا پیرامون موضوعات اساسی جهان بینی که عبارت از شناخت: خدا، انسان و هستی می باشد، همراه با براهین و به گونه اکادمیکی، شناخت کلی حاصل نموده و در نتیجه می توانند به تنظیم رابطه درست و شایان یک انسان آگاه و خردمند، با پروردگار هستی، انسان با انسان و چگونگی بهره گیری از نعمت عالم هستی اقدام نمایند.

اهداف آموزشی:

- آشنایی کامل با مفاهیم اساسی ثقافت اسلامی، ابزارشناخت و گونه های شناخت، جهان بینی اسلامی و بیان آیات و احادیثی که در باره جهان بینی و عقاید اسلامی آمده است
- تشخیص و شناخت درست جهان بینی اسلامی و مقایسه آن با دیگر جهان بینی های غیر اسلامی.
- تبیین و توضیح نقش ایمان و عقیده اسلامی و ضرورت استفاده از وحی در تنظیم سالم حیات دنیوی و اخروی و بیداری حس حضور خدا در همه عرصه های زندگی.
- ارائه دلایل نقلی و عقلی بر اعتدال گرایی و فطری بودن ارزش های عقاید اسلامی و رابطه شرایع آسمانی و برتریت جهان بینی اسلامی بر سایر جهان بینی ها.
- توانایی دفاع علمی و اکادمیکی از عقاید و باور های اسلامی و تلاش در ترویج آن.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

- ورود به مضمون ثقافت اسلامی
 - تعریف ثقافت اسلامی
 - منابع ثقافت اسلامی

- اهداف ثقافت اسلامی
- فهم واستحکام عقیده اسلامی
- فهم درست عبادات اسلامی
- تربیه شخصیت اسلامی
- دفاع از معتقدات و اندوخته های اسلامی
- تعریف و انواع جهان بینی
- انواع جهان بینی
- جهان بینی توحیدی، جهان بینی فلسفی و جهان بینی علمی
- تعریف دین ، ایمان ، اسلام و شریعت
- برتریت جهان بینی اسلامی
- موضوعات جهان بینی اسلامی
- ایمان
- بیان واژه های : معجزه ، کرامت - شفاعت - توسل اتفاقی و اختلافی.
- انسان شناسی
- معرفت
- عبادت
- اعمار زمین
- اقامت شریعت اسلامی
- طبیعت شناسی

نتایج متوقعه رشته						نتایج متوقعه مضمون	ردیف
6. انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پروردگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی .	ن.م.ر.	1	1	1	1		
5. بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی.	ن.م.ر.	3	3	3	3		
4. ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلائل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.	ن.م.ر.	1	1	1	1		
3. تربیه کادر های متخصص ، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت هماهنگی ایجاد نمایند.	ن.م.ر.	2	2	2	2		
2. تربیه جوانان آگاه ، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی	ن.م.	2	2	2	2		
1. شنایی علمی و آکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و مبانی کلی اسلام ، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر .	ن.م.ر.	3	3	3	3		
آشنایی کامل با مفاهیم اساسی ثقافت اسلامی، ابزار شناخت و گونه های شناخت، جهان بینی اسلامی و بیان آیات و احادیثی که در باره جهان بینی و عقاید اسلامی آمده است						1	
تشخیص و شناخت درست جهان بینی اسلامی و مقایسه آن با دیگر جهان بینی های غیر اسلامی.						2	

3	تبیین و توضیح نقش ایمان و عقیده اسلامی و ضرورت استفاده از وحی در تنظیم سالم حیات دنیوی و اخروی و بیداری حس حضور خدا در همه عرصه های زندگی.	3	3	1	2	1	1
4	ارایه دلایل نقلی و عقلی بر اعتدال گرایی و فطری بودن ارزش های عقاید اسلامی و رابطه شرایع آسمانی و برتریت جهان بینی اسلامی بر سایر جهان بینی ها .	3	2	1	2	3	1
5	توانایی دفاع علمی و اکادمیکی از عقاید و باور های اسلامی و تلاش در ترویج آن.	3	2	2	1	2	1
مجموع		3	2.2	1.8	2.4	2.4	1
3= مطابقت کامل 2= مطابقت نسبی 1= کمترین مطابقت							

منابع یا مأخذ:	
مأخذ اساسی	جهان بینی اسلامی - دیپارتمنت ثقافت اسلامی
مأخذ کمکی	1. سلجوقی، صلاح الدین (1346)، تجلی خدا در آفاق و آنفس 2. قرضاوی، یوسف (1388)، حقیقت توحید. 3. حوی، سعید، اسلام دین فطرت 4. ریگی شفا، عبدالرؤف (1394)، اسلام از دیدگاه عقل، اول (دیجیتال) www.Aqeedeh.com 5. افغانی، سید جمال الدین، رد نیچیریه 6. مودودی، ابو اعلی (1362)، مبادی اسلام، 1362، دارالعروه للدعوه الاسلامیه

مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارتمنت:	ثقافت اسلامی
اسم مضمون:	عبادات و حکمت های آن
کود مضمون:	SL-IC 0201
تعداد کریدیت:	1 کریدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	اول
سمستر:	دوم

شرح مختصر مضمون:

در کاریکوم تحصیلی ثقافت اسلامی عبادات و حکمت های آن دومین مضمون از مضامین پوهنتون شمول ثقافت اسلامی می باشد، که محصلان را به مفهوم عبادات که هدف اساسی آن بیان شمولیت عبادت در تمام عرصه های زنده گی انسان است به گونه علمی و مستدل آگاه می سازد. عبادات در حقیقت ثمره ایمان و شناخت معبود یکتا و آگاهی از نیاز های روحی و مادی انسانی است که در سمستر اول تحت عنوان جهان بینی اسلامی به بحث گرفته شده است ولزوماً مناسبت دارد تا به تعقیب آن عبادات و حکمت های آن به بحث گرفته شود. محصلان در ختم سمستر با مطالعه و آگاهی از این مضمون توانایی خواهند داشت تا پیرامون مفهوم عبادات، انواع، شروط و حکم هریک با حکمت ها و آثار مرتبه بر آنها شناخت کلی حاصل نموده و در نتیجه بدانند که عبادت يك ضرورت مبرم و فطری انسانی بوده، همانگونه که انسان جهت تقویه امور فزیکي خویش به آب و غذا ضرورت دارد؛ جهت تقویه امور روحی و معنوی خویش نیز به عبادت ضرورت دارد و با توجه به وسعت مفهوم عبادت، انسان را به عنوان عضو وقت شناس، منظم، مفید و پرتلاش در جامعه تقدیم می نماید.

اهداف آموزشی:

- آشنایی کامل با مفاهیم اساسی عبادات، انواع، شروط، احکام و حکمت های هریک.
- شناخت و درک تفاوت عبادات اسلامی از عبادات شعائری سایر کیش های ساختگی بشری
- تشریح و توضیح احکام عبادات خاص و عام به گونه علمی و اکادمیکی، شناخت پیامد های فردی و اجتماعی ترک عبادات اسلامی در روشنایی دلایل شرعی.
- ارایه دلایل نقلی و عقلی بر حکمت ها و آثار مرتبه بر رعایت عبادات مالی و نقش آن در بر بهبود وضعیت اقتصادی و اجتماعی جامعه اسلامی و انسانی.
- شناخت بدعت ها و آثار مرتبه بر آن، دوری از قضاوت های افراطی و تفریطی در احکام عبادات.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)**پیشگفتار**

فصل اول : تعریف عبادت در لغت و اصطلاح

- شروط عبادت
- اهداف عبادت

- مراتب عبادت
- شمولیت و فراگیری عبادت در اسلام
- فصل دوهفم: ارکان اسلام و حکمت های آنها
- کلمه شهادت و جایگاه آن در عبادات
- نماز و حکمت های آن
- روزه و حکمت های آن
- زکات و حکمت های آن
- حج و حکمت های آن
- فصل سوم : حکم تارك عبادات
- تارك نماز
- تارك روزه
- تارك زکات
- تارك حج
- فصل چهارم: بدعت در عبادات
- تعریف بدعت
- اقسام بدعت
- دلایل تحریم بدعت
- اسباب انتشار بدعت
- پیامد های زشت بدع

جدول نقشه مفهومی نتایج متوقعه مضمون و رشته

ردیف	نتایج متوقعه رشته	نتایج متوقعه مضمون					
		1. شنایی علمی و اکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و مبانی کلی اسلام ، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر .	2. تربیه جوانان آگاه ، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی	3. تربیه کادر های متخصص ، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت همآهنگی ایجاد نمایند.	4. ارایه دانش نظری جهت تبیین و توضیح مسائل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.	5. بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی.	6. انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پروردگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی .
1	آشنایی کامل با مفاهیم اساسی عبادات،انواع ،شروط ، احکام و حکمت های هریک،.	3	2	2	3	1	
2	شناخت و درک تفاوت عبادات اسلامی از عبادات شعائری سایر کیش های ساختگی بشری	3	2	2	1	1	

1	3	2	2	3	3	تشریح و توضیح احکام عبادات خاص و عام به گونه علمی و اکادمیکی ، شناخت پیامد های فردی و اجتماعی ترک عبادات اسلامی در روشنائی دلایل شرعی.	3
1	1	2	2	2	3	ارایه دلایل نقلی و عقلی بر حکمت ها و آثار مرتبه بر رعایت عبادات مالی و نقش آن در بر بهبود وضعیت اقتصادی و اجتماعی جامعه اسلامی و انسانی .	4
1	2	1	2	3	3	شناخت بدعت ها و آثار مرتبه بر آن ، دوری از قضاوت های افراطی و تفریطی در احکام عبادات.	5
1	2	1.6	2	2.4	3	مجموع	
3= مطابقت کامل 2= مطابقت نسبی 1= کمترین مطابقت							

منابع یا مأخذ:	
1. مأخذ اساسی	عبادات و حکمت های آن - دیپارتمنت ثقافت اسلامی
2. مأخذ کمکی	<p>1. قرضاوی، یوسف (1394)، عبادت در اسلام، اول (دیجیتال) www.Aqeedeh.com</p> <p>2. اصلاحی، مولانا یوسف (1383)، فقه آسان، انتشارات میوند</p> <p>3. قادر مرزی، ملا مسعود (1394)، تجلی حکمت در فلسفه ی پزشکی احکام، 1394</p> <p>4. الموصلی (1377)، الاختیار لتعلیل المختار،</p> <p>5. شیخ صدوق (1390)، علل الشرائع، انتشارات وانک</p>

مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارټمنت:	ثقافت اسلامی
اسم مضمون:	نظام اخلاقی اسلام
کود مضمون:	SL-IC 0301
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	دوم
سمستر:	سوم

شرح مختصر مضمون:

نظام اخلاقی اسلام که متأسفانه در جوامع اسلامی امروزی کمتر جنبه تطبیقی و عملی دارد، در کاریکولم تحصیلی ثقافت اسلامی سومین مضمون از مضامین پوهنتون شمول ثقافت اسلامی می باشد، این مضمون ارتباط انسان را با نفس خودش و افراد جامعه از حیث اخلاق نیکو و یا رفتاری های نا شایسته مورد بررسی قرار می دهد. نظام اخلاقی در اسلام سرچشمه تمامی نظامهای دیگر است. از همینجاست که پیامبر اسلام اخلاق را مستقیماً با عقیده و عبادت ارتباط داده است. محصلان در ختم سمستر با مطالعه و آگاهی ازین مضمون توانایی خواهد داشت تا در مورد مفهوم اخلاق، فضایل و مکارم اخلاق در فرد و جامعه و تأثیرات آن و در مورد رذایل اخلاقی در فرد و جامعه و پیامدهای بد آن، راه های علاج آن، شناخت و معلومات کامل بدست آورده و در نتیجه، با دوری از علل و اسباب آغشته شدن در اخلاق رذیله و تلاش در الگو گیری از اسوه حسنه می توانند خود را به اخلاق نیکو و حمیده مزین سازند.

اهداف آموزشی:

- آشنایی کامل با مفاهیم اساسی علم اخلاق، مبانی اخلاق اسلامی، فضایل و رذایل اخلاقی از دیدگاه اسلام ارتباط اخلاق و عقاید و عبادات اسلامی.
- تشخیص و شناخت درست اخلاقیات اسلامی و مقایسه آن با دیدگاه سایر مکاتب اخلاق غیر اسلامی.
- شناخت مکلفیت های اخلاقی یک مسلمان از منابع اخلاق اسلامی و سهگیری فعالانه در نشر دعوت و ارزش های اخلاقی اسلام.
- ارائه دلایل نقلی و عقلی بر حکمت ها و آثار مرتبه ارزش های اخلاقی و پیامد گرفتاری به رذایل اخلاقی
- اسباب آغشته شدن به رذایل اخلاقی و طرق درمان آن از منظر اخلاق اسلامی.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

پیشگفتار- محتویات مضمون:

فصل اول: مفهوم نظام اخلاقی

- تعاریف نظام اخلاقی
- اخلاقی اسلام
- فلسفه انواع اخلاق
- منابع اخلاق اسلامی

- مبانی نظام اخلاق اسلامی

فصل دوم: ارزشهای اخلاقی در نگرش اسلامی

- فضایل اخلاق
- ارشادات قرآن، سنت و سلف صالح در ارتباط به اخلاق
- ارتباط اخلاق با ایمان، عبادات و معاملات
- تربیه و پرورش اخلاق { تزکیه نفس - عرایز انسانی و طرق دیگر }

فصل سوم: مکارم اخلاق

- نمونه های از مکارم اخلاقی فردی
- نمونه های از مکارم اخلاقی اجتماعی
- پیامد های مکارم اخلاقی در اصلاح فرد و جامعه

فصل چهارم : رذایل اخلاقی

- نمونه های از رذایل اخلاقی فردی
- نمونه های از رذایل اخلاقی اجتماعی
- علل و اسباب آغشته شدن به رذایل اخلاقی
- پیامدهای زشت رذایل اخلاقی در انحراف فرد و جامعه
- علاج رذایل اخلاقی در اسلام

نتایج متوقعه رشته	
ن.م.ر.	6. انکشاف مهارت های تحقیقات علمی و توسعه فکری سام اسلامی و انسانی جهت تنظیم رابطه درست انسان با پرورگار و جامعه انسانی و بهره گیری سام از نعمات ارزنده عالم هستی .
ن.م.ر.	5. بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سام و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی.
ن.م.ر.	4. ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.
ن.م.ر.	3. تربیه کادر های متخصص ، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سام اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت هماهنگی ایجاد نمایند.
ن.م.	2. تربیه جوانان آگاه ، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی
ن.م.ر.	1. شنایی علمی و اکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و مبانی کلی اسلام ، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر .
نتایج متوقعه مضمون	
ن.م.ر.	

1	آشنایی کامل با مفاهیم اساسی علم اخلاق ، مبانی اخلاق اسلامی ، فضایل و رذایل اخلاقی از دیدگاه اسلام ارتباط اخلاق و عقاید و عبادات اسلامی.	3	2	2	1	1	3
2	تشخیص و شناخت درست اخلاقیات اسلامی و مقایسه آن با دیدگاه سایر مکاتب اخلاق غیر اسلامی.	3	2	1	2	1	1
3	شناخت مکلفیت های اخلاقی یک مسلمان از منابع اخلاق اسلامی و سهگیری فعالانه در نشر دعوت و ارزش های اخلاقی اسلام.	3	2	2	1	1	2
4	ارایه دلایل نقلی و عقلی بر حکمت ها و آثار مرتبه ارزش های اخلاقی و پیامد گرفتاری به رذایل اخلاقی	3	3	2	1	2	3
5	اسباب آغشته شدن به رذایل اخلاقی و طرق درمان آن از منظر اخلاق اسلامی.	3	2	1	2	1	2
	مجموع	3	2.2	1.6	1.4	1.2	2.2
3= مطابقت کامل 2= مطابقت نسبی 1= کمترین مطابقت							

منابع یا مأخذ:	
1. مأخذ اساسی	نظام اخلاقی اسلام - دیپارتمنت ثقافت اسلامی
2. مأخذ کمکی	1. محمد غزالی، اخلاق مسلمان 2. طباهر، عقیف عبدالفتاح (1388)، روح الدین اسلامی، 3. امام غزالی (1393)، احیاء علوم الدین، فردوس 4. ناصع علوان، عبدالله (1394)، چگونه فرزندان خود را تربیت کنیم، دیجیتال

مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارتمنت:	ثقافت اسلامی
اسم مضمون:	نظام اجتماعی اسلام
کود مضمون:	SL-IC 0401
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	دوم
سمستر:	چهارم

شرح مختصر مضمون:

نظام اجتماعی اسلام در سلسله ی مضامین ثقافت اسلامی، چهارمین مضمون است که با رعایت تسلسل منطقی میان مطالب ثقافت اسلامی در سمستر های چهارم تدریس می شود. آگاهی ازین نظام، که روابط ذات البینی را میان افراد جامعه اسلامی و رابطه جامعه اسلامی را با سایر جوامع غیر اسلامی، مطابق به رهنمود های آیات قران مجید و احادیث پیامبر اسلام بیان می دارد، از ضرورت های مبرم جامعه اسلامی برای هر مسلمان شمرده می شود. محصلان بعد از مطالعه و فراگیری این مضمون معلومات کامل و مستدل را در مورد مفهوم نظام اجتماعی اسلام، اصول، مبانی و ویژگی های آن، در مورد ساختار فرد و ساختار خانواده، انحلال خانواده و روابط و آداب اجتماعی، مبارزه با انحرافات اجتماعی بدست آورده و در نتیجه، آداب و مکلفیت هایش را در عرصه های زندگی فردی و اجتماعی در پرتوی رهنمود های نظام اجتماعی اسلام رعایت و در بهبود اوضاع اجتماعی مسئولانه سهم فعال خواهد گرفت.

اهداف آموزشی:

- آشنایی کامل با نظام با اساسات نظام اجتماعی اسلام و بیان آیات و احادیثی که در باره اجتماع و زندگی اجتماعی آمده است.
- درک و شناخت رابطه میان ساختار های فردی نظام اجتماعی اسلام با مبانی ساختارهای خانواده گی و اجتماعی اسلام.
- شناخت دلایل و رهنمود های شرعی حاکم بر جامعه و تفکیک آن از عرف های ناپسند
- تشخیص اسباب خشونت خانواده گی و راه های حل آن
- توانایی دفاع علمی و اکادمیکی از ارزش ها و کفالت نظام اجتماعی اسلام و طرق روش مبارزه با انحرافات اجتماعی از منظر اسلام

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)**پیشگفتار- محتویات مضمون:****فصل اول: مفهوم نظام اجتماعی**

- تعریف نظام اجتماعی اسلامی
- اصول و مبانی نظام اجتماعی اسلامی
- ویژگی های نظام اجتماعی اسلامی
- اهداف نظام اجتماعی اسلامی { ذکر تشویق اسلام به برخی از خدمات اجتماعی و عام المنفعه ضروری هست }

فصل دوهم: ساختار جامعه اسلامی از دیدگاه اسلام

- ساختار فرد
- ساختار خانواده

فصل سوم: انحلال خانواده و راه های حل مشکلات آن

- اسباب انحلال خانواده
- اسباب خشونت خانواده گی و راه های حل آن
- تحدید نسل و تنظیم خانواده از دیدگاه اسلام

فصل چهارم: روابط واداب اجتماعی

- رابطه فرد با فرد
- رابطه فرد با اجتماع

فصل پنجم: مبارزه با انحرافات در جامعه اسلامی

- انحرافات اخلاقی
- اختلاط و مفسد آن
- فحشاء و عریانی
- مسکرات و مخدرات
- قمار
- موسیقی و رقص
- سوی استفاده از ابزار های معاصر (انترنیت، شبکه های اجتماعی، وتلویزیون)

۱	<p>نتایج متوقعه مضمون</p> <p>آشنایی کامل با نظام با اساسات نظام اجتماعی اسلام و بیان آیات و احادیثی که در باره اجتماع و زندگی اجتماعی آمده است.</p>	<p>نتایج متوقعه رشته</p> <ol style="list-style-type: none"> 1. شنایی علمی و اکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و مبانی کلی اسلام ، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر . 2. تربیه جوانان آگاه ، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی 3. تربیه کادر های متخصص ، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت همهآهنگی ایجاد نمایند. 4. ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع. 5. بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی. 6. انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پروردگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی .

۲	درک و شناخت رابطه میان ساختار های فردی نظام اجتماعی اسلام با مبانی ساختارهای خانواده گی و اجتماعی اسلام.	3	3	1	2	1
۳	شناخت دلایل و رهنمود های شرعی حاکم بر جا معه و تفکیک آن از عرف های ناپسند	3	3	2	3	1
۴	تشخیص اسباب خشونت خانواده گی و راه های حل آن	3	2	3	1	2
۵	توانایی دفاع علمی و اکادمیکی از ارزش ها و کفالت نظام اجتماعی اسلام و طرق روش مبارزه با انحرافات اجتماعی از منظر اسلام	3	2	1	2	1
مجموع		3	2.6	1.8	1.8	1.6
۳= مطابقت کامل ۲= مطابقت نسبی ۱= کمترین مطابقت						

منابع یا مأخذ:	
1. مأخذ اساسی	نظام اجتماعی اسلام - دیپارتمنت ثقافت اسلامی
2. مأخذ کمکی	1. زحیلی، وهبه (1394)، فقه خانواده، دیجیتال 2. مودودی، ابو الا علی (1394)، حجاب در اسلام، دیجیتال 3. قطب، سید، عدالت اجتماعی اسلام، انجمن تربیه افکار 4. ایوب، حسن، سلوک اجتماعی در اسلام 5. سباعی، مصطفی، همکاری های اجتماعی

مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارتمنت:	ثقافت اسلامی
اسم مضمون:	نظام سیاسی اسلام
کود مضمون:	SL-IC 0501
تعداد کریدیت:	1 کریدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	سوم
سمستر:	پنجم

شرح مختصر مضمون:

نظام سیاسی اسلام از جمله نظام هایست که امروزه بیشتر از هر زمان دیگر دچار شبهات و تاخت و تاز قرار گرفته و حتی منجر به شیوع مفکوره پوچ جدائی دین از سیاست میان بعضی از مسلمانان نا آگاه گردیده است. در این نظام که در سمستر های پنجم تدریس می شود، محصلان در ختم این سمستر شناخت و معلومات کلی و مستدل را در مورد دلایل اثبات را بطنه مستحکم دین و سیاست، اصول و مبانی ساختار سیاسی و اهداف نظام سیاسی در اسلام حاصل نموده و در نتیجه خواهند دانست که دولت در نظام سیاسی اسلام چگونه تشکیل می شود؟ حقوق و وظایف رئیس دولت چیست؟ مکلفیت های رعیت کدام ها اند؟ چگونه دولت اسلامی ارتباطات خویش را با دولت های دیگر باید قایل سازد؟ و همچنان در مورد جنگ و صلح و اهمیت آن در اسلام و اینکه چگونه اسلام صلح را تأمین نموده و گونه های مختلف صلح، صلح با تمام کشورهای جهان طبق شروط و اهداف آن چگونه تحقق می یابد.

اهداف آموزشی:

- آشنایی کامل با مفهوم سیاست، نظریه سیاسی اندیشه اسلامی در منظومه نظام سیاسی اسلام، شناخت اساسات نظام سیاسی اسلام حقوق و جایب رعیت و حاکم اسلامی.
 - شناخت رابطه دین و سیاست از منابع شرعی و عقلی، عوامل پندار جدایی دین و سیاست رابه اسلام و دموکراسی
 - درک و شناخت منابع نظام سیاسی اسلام، قوای متشکله و صلاحیت های هریک اهمیت شورای در نظام سیاسی اسلام
 - شناخت طرق انتخاب حاکم اسلامی، اسباب عزل و حکم خروج در برابر حاکم
 - معرفت اصول تأمین عدالت اجتماعی، تعامل با اتباع غیرمسلمان و چگونگی رابطه دولت اسلامی با دولت های غیر اسلامی
- حالات صلح و جنگ.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

پیشگفتار- محتویات مضمون: مفهوم نظام سیاسی در اسلام

- مبانی نظام سیاسی اسلامی
- ویژگی های نظام سیاسی اسلامی
- اهداف نظام سیاسی اسلامی
- اسلام و سیاست
- دلایل اثبات وجود نظام سیاسی در اسلام
- عوامل جدائی دین از دولت یا سیاست

- پیامد های جدائی دین از سیاست
- اسلام و دموکراسی

فصل دوهفتم: دولت در نظام سیاسی اسلامی

- تعریف دولت
- عناصر متشکله دولت
- ارکان دولت

فصل سوم: وظایف دولت در نظام سیاسی اسلام

- تحکیم شریعت و عدالت اجتماعی.
- تأمین امنیت
- تأمین آزادی های عمومی
- اقامه عدالت
- دفاع از حریم دولت
- امر به معروف ونهی از منکر
- جمع آوری زکات
- نشر دعوت
- تأمین حقوق رعیت و واجبات رعیت در برابر دولت
- تأمین خدمات وسهولت زندهگی برای مردم
- فراهم نمودن زمینه تربیت وتعلیم برای همه

فصل چهارم: روابط دولت

- روابط دولت اسلامی با دولت های اسلامی
- روابط دولت اسلامی با دولت های غیر اسلامی

فصل پنجم : صلح درنظام سیاسی اسلام

- تعریف صلح
- شروط صلح
- اهمیت صلح در اسلام
- انواع صلح
- نماد های صلح در اسلام.

جدول نقشه مفهومی نتایج متوقعه مضمون و رشته

ردیف	شرح	نتایج متوقعه مضمون	نتایج متوقعه رشته					
			ن.م.ر.	ن.م.	ن.م.ر.	ن.م.ر.	ن.م.ر.	ن.م.ر.
1	آشنایی کامل با مفهوم سیاست، نظریه سیاسی اندیشه اسلامی در منظومه نظام سیاسی اسلام، شناخت اساسات نظام سیاسی اسلام حقوق و جایب رعیت و حاکم اسلامی .	3	3	2	1	2	1	
2	شناخت رابطه دین و سیاست از منابع شرعی و عقلی، عوامل پندار جدایی دین و سیاست رابه اسلام و دموکراسی	3	2	3	1	2	1	

1	1	2	2	3	3	درک و شناخت منابع نظام سیاسی اسلام ، قوای متشکله و صلاحیت های هریک اهمیت شورای در نظام سیاسی اسلام	3
	1	1	2	2	3	شناخت طرق انتخاب حاکم اسلامی ، اسباب عزل و حکم خروج در برابر حاکم	4
1	2	2	1	3	3	معرفت اصول تأمین عدالت اجتماعی،تعامل با اتباع غیرمسلمان و چگونگی رابطه دولت اسلامی با دولت های غیر اسلامی ،حالات صلح و جنگ .	5
						مجموع	
3=مطابقت کامل 2=مطابقت نسبی 1=کمترین مطابقت							

منابع یا مأخذ:	
1. مأخذ اساسی	نظام سیاسی اسلام - دیپارتمنت ثقافت اسلامی
2. مأخذ کمکی	1. استاد سیاف، دین و دولت (اصول نظام سیاسی اسلام) 2. سنهوری، عبدالرازق(1389)، نظریه ء دولت در فقه اهل سنت، 3. قرضاوی ، یوسف (1384)، اصول فقه سیاسی اسلام، 4. الرحمن، گوهر، اسلامی سیاست 5. خلاف، عبدالوهاب، سیاست شرعی

اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارټمنټ:	ثقافت اسلامی
اسم مضمون:	نظام اقتصادی اسلام
کود مضمون:	SL-IC 0601
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	سوم
سمستر:	ششم

شرح مختصر مضمون:

اقتصاد به عنوان شاهرگ حیات بشری از ضرورت های مبرم بشر است. دین مقدس اسلام نه تنها در مورد نظام اقتصادی از خود احکام دارد، بلکه یکی از مهمترین عرصه های عبادت در اسلام عبادت مالی می باشد. بر همین اساس است که نظام اقتصادی اسلام در سمسترهای ششم در قالب کاریکوم ثقافت اسلامی تدریس می شود. محصلان بعد از ختم این سمستر معلومات کلی را در مورد نظام اقتصادی اسلام و سایر مکاتب معروف اقتصادی، مال و اهمیت و هدف آن در اسلام، انواع مالکیت، عواید و مصارف مال و شروط استفاده و جمع آوری حاصل نموده و در نتیجه طبق رهنمود های اسلام در تطبیق اندوخته هایش در بهبود اقتصادی فردی و اجتماعی تلاش همگانی نماید.

اهداف آموزشی:

- آشنایی کامل با مفاهیم کلی مباحث نظام اقتصادی اسلام و کسب معلومات مقایسوی از مکاتب اقتصادی وضعی.
- درک تفاوت های اساسی مکاتب اقتصادی سوسیالزم و کاپیتالزم با نظام اقتصادی اسلام در موضوعات درآمد، مصرف و توزیع سرمایه.
- شناخت انواع مالکیت و خصوصیات هریک در نظام های اقتصادی اسلام.
- معرفت اسباب مشروع مالکیت خصوصی و اسباب محرمه مالکیت در اسلام، شناخت انواع ربا، احکام و فلسفه حرمت آن و اجناس ربوی.
- شناخت انواع شرکت های مشروع، آشنای با انواع بیمه حکم آن.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

فصل اول: پیشگفتار- محتویات مضمون

- مفهوم اقتصاد اسلامی
- تاریخ تدوین اقتصاد اسلامی
- اهمیت اقتصاد اسلامی
- ✓ اصول و مصادر اقتصاد اسلامی
- ✓ خصوصیات و ویژگی های اقتصاد اسلامی

- ✓ ارتباط اقتصاد با عبادت اسلامی
- ✓ بررسی و نقد نظام های اقتصادی معاصر و برتری نظام اقتصادی اسلام
- فصل دوهفتم: عواید دولت اسلامی (زکات، عشر، خراج، معادن، وقف و مالیات)
 - نگاهی به مالکیت در اسلام
 - انواع مالکیت
 - اسباب مالکیت در اقتصاد اسلامی
 - تعریف عقد شروط ارکان و انواع آن
 - بیع و شراء
 - ✓ تعریف بیع، شروط، ارکان و انواع آن
 - ✓ بیع مشروع (سلم اجاره ..) و بیع نا مشروع { اشاره به احتکار و ربا نیز صورت گیرد }
 - ✓ اختارات در بیع
 - ✓ اجاره، هبه، وصیت،
 - شراکت و انواع آن
 - ✓ عنان- وجوه - ابدان - مضاربت - مزارعت و مساقات - مفاوضه - بانکداری - بیمه
 - ✓ حقوق کارگر و کارفرما
 - عقود تبرعات : وصیت هبه با ذکر ارکان و شروط آن.- قرض حسنه
 - عقود امانات : عاریه - ودیعه - رهن
- فصل سوم : مصارف مال
 - مصارف مشروع و نا مشروع
 - نفقه
 - ✓ تعریف، شروط و انواع آن
 - زکات { اشاره به علاج فقر با زکات مهم است }
 - صدقات و کفارات

ردیف	نتایج متوقعه مضمون	نتایج متوقعه رشته					
		1	2	3	4	5	6
1	آشنایی کامل با مفاهیم کلی مباحث نظام اقتصادی اسلام و کسب معلومات مقایسوی از مکاتب اقتصادی وضعی.	ن.م.ر.	ن.م.	ن.م.ر.	ن.م.ر.	ن.م.ر.	ن.م.ر.
		3	2	1	2	1	6
		شناختی علمی و آکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و مبانی کلی اسلام، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر.	تربیه جوانان آگاه، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی	تربیه کادر های متخصص، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت هماهنگی ایجاد نمایند.	ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.	بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی.	انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پروردگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی.

2	درک تفاوت های اساسی مکاتب اقتصادی سوسیالزم و کاپیتالزم با نظام اقتصادی اسلام در موضوعات درآمد ، مصرف و توزیع سرمایه .	3	2	2	1	2	1
3	شناخت انواع مالکیت و خصوصیات هریک در نظام های اقتصادی اسلام.	3	3	3	1	1	1
4	معرفت اسباب مشروع مالکیت خصوصی و اسباب محرمه مالکیت در اسلام ، شناخت انواع ربا ، احکام و فلسفه حرمت آن و اجناس ربوی .	3	2	2	1	3	1
5	شناخت انواع شرکت های مشروع ، آشنای با انواع بیمه حکم آن .	3	2	1	2	2	1
مجموع		3	2.2	1.4	1.8	1.8	1
3=مطابقت کامل 2=مطابقت نسبی 1=کمترین مطابقت							

منابع یا مأخذ:	
1 . مأخذ اساسی	نظام اقتصادی اسلام - دیپارتمنت ثقافت اسلامی

<p>1. عنبرانی، تقی (1394)، اقتصاد اسلامی، دیجیتال</p> <p>2. عبدالعزیز، نعمانی، نظام اقتصادی اسلام</p> <p>3. طهماسی، مبادی علم اقتصاد، انتشارات خجسته</p> <p>4. قرضاوی، یوسف، مبادی اقتصاد اسلامی</p>	<p>2. مأخذ کمکی</p>
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مقطع تحصیلی:	لیسانس
اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارتمنت:	ثقافت اسلامی
اسم مضمون:	قرآن و علوم معاصر
کود مضمون:	SL-IC 0701
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	چهارم
سمستر:	هفتم

شرح مختصر مضمون:

قرآن و علوم معاصر عنوان هفتمین مضمون ثقافت اسلامی است که در سمستر های هفتم در قالب کاریکولم تحصیلی ثقافت اسلامی تدریس می شود. این مضمون به گونه ی کلی ارتباط مطالب قرآنی را با علوم امروزی بیان میکند و از ضرورت های مبرم جهت فهم درست اسلام میباشد. زیرا تکنالوژی امروزی برخی از جوانان را که از قرآن معلومات کاملی ندارند دوچار شک و تردیدهای خطرناک نموده است، مانند این گمان که در عصر پیشرفت علم و تکنالوژی مطالب قرآنی قابلیت تطبیقش را از دست داده است. در حالیکه هر قدر علوم معاصر اکتشافات جدید را ایجاد نماید بجز بیان نمودن اشارات علمی که در قرآن مجید و سنت پیامبر اسلام قبل از یکهزارو چهارصد سال آمده است، چیزی دیگری نمیشد. محصلان بعد از فراگیری این مضمون در ختم سمستر معلومات کلی علمی را پیرامون مراحل و گونه های نزول قرآن کریم، حقوق قرآن کریم، ابعاد اعجاز قرآن کریم و رابطه اکتشافات علمی با مطالب قرآن را بدست آورده و در نتیجه به عظمت و گستردگی اعجاز علمی قرآن کریم بیشتر آشنا شده و در تطبیق دستورات قرآن در زندگی فردی و اجتماعی خویش تلاش عاشقانه نموده و در تمام عرصه های حیات شان هدفمندتر گام خواهند داشت..

اهداف آموزشی:

- آشنایی کامل به مباحث عمومی و کلی قرآن کریم، مراحل و گونه های نزول کریم ابعاد اعجاز و برخی از نمونه های اعجاز این کلام جاودانه الهی.
- شناخت و درک حقوق قرآن کریم، معرفت مقاصد و اهداف قرآن کریم
- شناخت ابعاد اعجاز قرآن کریم، رابطه قرآن کریم با اکتشافات علمی معاصر و چگونگی میزان اعتماد به نظریات ارایه شده علمی معاصر.
- آشنایی به مفاهیم معجزه، کرامت، استدراج و نمونه های از معجزات پیامبر اکرم (ص)
- شناخت مطالب قرآنی پیرامون خلقت سیارات، حرکات منظومه ها، تطور خلقت انسان، نزول باران، نظام زوجیت در هستی

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

پیشگفتار- محتویات مضمون:

- قرآن
- مراحل نزول قرآن

- جمع آوری قرآن
- فضائل قرآن کریم
- حقوق قرآن کریم
- نظریات برخی از دانشمندان غربی در مورد قرآن کریم
- خلاصه فصل اول
- پرسش ها
- مآخذ

فصل دوهم : علوم معاصر

- تمهید
- مفهوم علوم معاصر
- قرآن کریم و اکتشافات علمی معاصر
- نظریات برخی از دانشمندان علوم معاصر در مورد قرآن کریم
- معیار ها و ضوابط اعجاز علمی
- پیشرفت ساینس در پرتوی قرآن کریم
- اشتباهات نظریات ساینسی
- خلاصه فصل دوم
- پرسش ها
- مآخذ

فصل سوم: اعجاز قرآن کریم

- انواع معجزات قرآن کریم
- وجوه اعجاز قرآن کریم
- نمونه های اعجاز علمی قرآن کریم
- خلاصه فصل چهارم
- پرسش ها

نتایج متوقعه رشته		نتایج متوقعه مضمون	
1	آشنایی کامل به مباحث عمومی و کلی قرآن کریم، مراحل و گونه های نزول کریم ابعاد اعجاز و برخی از نمونه های اعجاز این کلام جاودانه الهی.	ن.م.ر.	3
2	تربیه جوانان آگاه ، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی	ن.م.	2
2	تربیه کادر های متخصص ، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت هماهنگی ایجاد نمایند.	ن.م.ر.	2
2	ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.	ن.م.ر.	2
1	بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعالیم حیات بخش اسلامی.	ن.م.ر.	1
1	انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پروردگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی .	ن.م.ر.	1

2	شناخت و درک حقوق قرآن کریم ، معرفت مقاصد و اهداف قرآن کریم	3	1	2	2	2	1
3	شناخت ابعاد اعجاز قرآن کریم ، رابطه قرآن کریم با اکتشافات علمی معاصر و چگونگی میزان اعتماد به نظریات ارایه شده علمی معاصر.	3	2	۱	3	1	2
4	آشنایی به مفاهیم معجزه ، کرامت ، استدراج و نمونه های از معجزات پیامبر اکرم (ص)	3	2	2	1	3	1
5	شناخت مطالب قرآنی پیرامون خلقت سیارات ،حرکات منظومه ها، تطور خلقت انسان، نزول باران ، نظام زوجیت در هستی	3	2	1	2	1	2
مجموع		3	1.8	2.6	2	1.6	1.4
3=مطابقت کامل 2=مطابقت نسبی 1=کمترین مطابقت							

منابع یا مأخذ:	
قرآن و علوم معاصر - دیپارتمنت ثقافت اسلامی	1. مأخذ اساسی
1. مخلص، عبدالرؤف (1394)، تجلی قرآن در عصر حاضر، 2. نابلسی، محمد راتب، دایره المعارف اعجاز علمی در پرتوی قرآن و سنت 3. زندانی، عبدالمجید (1382)، کتاب توحید، (1382)، جامعه القرآن، تهران 4. صابونی، علی، تبیان فی علوم القرآن 5. میلر، گری، قرآن کتاب شگفت انگیز 6. عبدالباقی، مصباح الله، قرآن کریم و علوم معاصر	2. مأخذ کمکی

مفردات مضمون تمدن اسلامی

اسم پوهنتون:	-----
اسم پوهنځی:	شرعیات
اسم دیپارټمنټ:	ثقافت اسلامی
اسم مضمون:	تمدن اسلامی
کود مضمون:	SL-IC 0801
تعداد کريدیت:	1 کريدیت
نوعیت مضمون:	پوهنتون شمول
پیشنیاز مضمون:	ندارد
صنف:	چهارم
سمستر:	هشتم

شرح مختصر مضمون:

مضمون تمدن اسلامی که در سمستر های هشتم در قالب کاریکولم تحصیلی مضامین ثقافت اسلامی تدریس می شود، در حقیقت جزء تاریخ فراموش شده اسلام در نزد مسلمانان امروزی و مخصوصاً قشر جوان جامعه بشمار می رود که آگاهی و فهم درست آن از نیاز های اساسی و ضرورت های مبرم محصلان می باشد. محصلان عزیز در ختم سمستر معلومات کلی را پیرامون مفهوم تمدن، عوامل ایجاد تمدن ها، عناصر سازنده تمدن ها، بخصوص عناصر تمدن اسلامی و نقش اسلام در اصلاح و تغییرات مثبت در روند های تمدنی بدست آورده و در نتیجه بتوانند علاوه بر بیان اساسات بعد وحیانی تمدن اسلامی از دستآورد های مسلمانان در عرصه های مختلف تمدنی با استناد به دلایل روشن در عرصه علوم مختلفه مانند: کیمیا، فزیک، ریاضی، طب، فارمسی، انجنیری، همچنان تاریخ، جغرافیه، فلسفه، علم فلك بر علاوه از علوم شرعی دفاع نموده و در نشر آن تلاش سازنده را انجام دهند.

اهداف آموزشی:

- آشنایی کامل با عناصر سازنده تمدن، تمدن های بشری قبل از اسلام،
- تبیین و توضیح عناصر سازنده تمدن به شکل عام و عناصر تمدن به شکل خاص همراه با
- ارایه دلایل مستند و قابل پذیرش علمی اکادمیکی.
- توانایی بر تشخیص اینکه رسول (اکرم ص) در دوره تأسیسی و توسعه تمدن اسلامی کدام تغییرات و اصلاحات را در تمدن بشری همیان آورده و چی اصول را جدیداً پی ریزی نموده اند
- اینکه به توانند با ارایه نمونه های از کار کرد های تمدنی خلفای راشدین در عرصه توسعه و گسترش تمدن اسلامی نقش ایشان را در برازندگی های فراموش شده تمدن اسلامی مسئولانه ایفا نمایند.
- دفاع مستدل ازین که به گونه عام تمدن امروزی بشریت مرهون سعی و تلاش مسلمانان دوره های نخستین تاریخ اسلام است.

شیوه های تدریس و آموزش:

ارایه ی لکچر، بحث آزاد و مناقشه، پاسخ به سوالات مربوط به عنوان درس بر اساس اصل محصل محوری.

مفردات درسی مضمون: (فصل ها و زیر فصل ها)

پیشگفتار- محتویات مضمون:

فصل اول: ورود به پدیده تمدن

- تعریف لغوی و اصطلاحی تمدن
- عناصر تمدن

- ویژگی های تمدن اسلامی

فصل دوهفم : تمدن اسلامی

- اسلام و تغییر در تمدن بشریت
 - مبانی علمی در کار نامه های رسول الله صلی الله علیه وسلم
 - معرفی مختصر از کار نامه های : سیاسی، اقتصادی، اجتماعی ، اخلاقی و..... رسول الله صلی الله علیه و سلم
 - نهاد های از اندوخته های علمی خلفای راشدین
 - بخشی از انجازات علمی و پیشرفتهای تکنالوژی مسلمانان پیشین
 - نمونه های از اندوخته های علمی و تکنالوژی در عرصه های:
 - نقش تمدن اسلامی در رفاه بشریت
 - علت عقب مانده گی مسلمانان امروزی و راه های بیرون رفت
 - گفتگوی تمدن ها
- فصل سوم: جوامع اسلامی و مفاهیم جدید

- محیط زیست
- حقوق بشر و حقوق زن
- آزادی بیان
- نقد و بررسی بردگی در اسلام

1	آشنایی کامل با عناصر سازنده تمدن، تمدن های بشری قبل از اسلام،	نتایج متوقعه مضمون					
5		1. شنایی علمی و آکادمیکی محصلان رشته های مختلف تحصیلات عالی با اصول و میانی کلی اسلام، آشنایی با جهان بینی های مطرح و ارتباط اسلام با دستاوردهای علوم معاصر.	2. تربیه جوانان آگاه، توانمند و ملتزم به ارزشها و اساسات فرهنگ و ثقافت اسلامی	3. تربیه کادر های متخصص، متعهد و معتدل اسلامی که بتوانند به عنوان الگوی های عملی تربیه سالم اسلامی دور از افراط و تفریط میان سعادت دنیا و آخرت همآهنگی ایجاد نمایند.	4. ارایه دانش نظری جهت تبیین و توضیح مسایل کلی اسلامی به مبتنی بر دلایل نقلی و عقلی با بیان آثار و حکمت های هر موضوع.	5. بلند بردن سطح دانش دینی و اسلامی محصلان به منظور حضور سالم و فعال شان در عرصه های مهم انکشاف های حیاتی فردی و اجتماعی جامعه انسانی و عناصر مؤثر در تحکیم صلح و ثبات کشور در پرتوی تعلیم حیات بخش اسلامی.	6. انکشاف مهارت های تحقیقات علمی و توسعه فکری سالم اسلامی و انسانی جهت تنظیم رابطه درست انسان با پرورگار و جامعه انسانی و بهره گیری سالم از نعمات ارزنده عالم هستی.
1		3	2	2	2	3	1

2	تبیین و توضیح عناصر سازنده تمدن به شکل عام و عناصر تمدن به شکل خاص همراه با ارایه دلایل مستند و قابل پذیرش علمی اکادمیکی.	3	2	3	1	2	1
3	توانایی بر تشخیص اینکه رسول (اکرم ص) در دوره تأسیسی و توسعه تمدن اسلامی کدام تغییرات و اصلاحات را در تمدن بشری به میان آورده و چی اصول را جدیداً پی ریزی نموده اند	3	2	3	1	2	1
4	اینکه به توانند با ارایه نمونه های از کار کرد های تمدنی خلفای راشدین در عرصه توسعه و گسترش تمدن اسلامی نقش ایشان را در برازندگی های فراموش شده تمدن اسلامی مسئولانه ایفا نمایند.	3	3	2	3	2	1
5	دفاع مستدل ازین که به گونه عام تمدن امروزی بشریت مرهون سعی و تلاش مسلمانان دوره های نخستین تاریخ اسلام است.	3	3	2	2	2	1
مجموع		3	2.4	2.4	1.8	1.2	1
۳= مطابقت کامل ۲= مطابقت نسبی ۱= کمترین مطابقت							

منابع یا مأخذ:	
تمدن اسلامی - دیپارتمنت ثقافت اسلامی	1. مأخذ اساسی
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