

CURRICULUM
For
THREE YEARS' DIPLOMA OF ASSOCIATE
ENGINEER
IN
ARTIFICIAL INTELLIGENCE TECHNOLOGY

Entry Level: - Matriculation (Science) or Equivalent

Duration of Course: - Three Years

Credit Hours: **67** (Annual System)

Methodology: Theory 40%

Practical 60 %

Examination System: Annual System (the same as other DAEs programs)

National University of Technology
NUTECH

DAE in ARTIFICIAL INTELLIGENCE TECHNOLOGY**SCHEME OF STUDIES****FIRST YEAR**

Course code		Course Name	T	P	C
Gen	111	Islamiat & Pakistan Studies	1	0	1
TTQ/CIVICS	111	Tarjuma Tul Quran/CIVICS	1	0	1
CIT	101	Occupational Health Safety & Environment	1	0	1
Eng	112	English	2	0	2
GenC	112	Chinese Language-1	2	0	2
Math	123	Applied Mathematics-I	3	0	3
Phy.	132	Applied Physics	1	3	2
Ch.	132	Applied Chemistry	1	3	2
BDT	121	Computer Tool Software Application	0	3	1
SWT	112	Introduction to Computer Programming with JAVA	1	3	2
SWT	122	Introduction to database concepts and SQL Programming	1	3	2
AIT	112	Fundamentals and Ethics of Artificial Intelligence	2	0	2
AIT	122	Application Technology of Artificial Intelligence	1	3	2
Total			17	18	23

SECOND YEAR

Course code		Course Name	T	P	C
Gen	201	Islamiat & Pak Studies	1	0	1
TTQ/CIVICS	211	Tarjuma Tul Quran/CIVICS	1	0	1
Math	233	Applied Mathematics-II	3	0	3
Mgm	211	Business Communication	1	0	1
GenC	212	Chinese Language-2	2	0	2
MgmC	212	Understanding China	2	0	2
CIT	223	Computer Networks	2	3	3
MTR	272	Digital Logic Design	1	3	2
SWT	223	Web Development with JAVA	1	6	3
AIT	212	Basics of Machine Learning	1	3	2
AIT	223	Data collection and processing technology	2	3	3
Total			17	18	23

THIRD YEAR

Course Code		Course Name	T	P	C
Gen	301	Islamiat & Pak Studies	1	0	1
AIT	312	Basics of Graphic Design	1	3	2
CIT	333	Operating System	2	3	3
SWT	332	Machine Learning Applications	1	3	2
AIT	323	Digital Image Process Technology	2	3	3
AIT	332	Dungeon & Dragons(D&D) of Intelligent Dialogue System	1	3	2
AIT	343	Computer Vision Technology Application	2	3	3
AIT	352	Pytorch-Based AI Application Development	1	3	2
AIT	362	Intelligent Embedded Development Technology	1	3	2
AIT	371	Project Training	0	3	1
Total			12	27	21

اسلامیات / مطالعہ پاکستان

نی پی سی
1 0 1
کل وقت: 20 گھنٹے

GEN III

حصہ اول اسلامیات

حصہ دوم مطالعہ پاکستان

موضوعات حصہ اول اسلامیات

سہل اول

کتاب و سنت

(۱) قرآن مجید

1- تعارف قرآن مجید 2- نزول قرآن 3- مکی و مدنی سورتوں کی خصوصیات 4- وحی کی اقسام 5- پندرہ منتخب آیات مع ترجمہ

- 1.1 تنالوا البر حتی تنفقوا مما تحبون
- 1.2 واعتصموا بحبل اللہ جمیعاً ولا تفرقوا
- 1.3 ولا یجر منکم شأن قوم علی ان لا تعدلوا
- 1.4 ان اللہ یمرکم ان تودوا الامانات الی اهلها
- 1.5 ان اللہ یمر بالعدل والاحسان
- 1.6 ان الصلوٰۃ تنہی عن الفحشاء والمنکر
- 1.7 لقد کان لکم فی رسول اللہ سۃ حسنہ
- 1.8 ان اکرمکم عند اللہ اتقاکم
- 1.9 وما آتاکم الرسول فخذرو وما نہی عنہوا فانتہوا
- 1.10 ولوفوا بالعہد
- 1.11 وما شروہن بالمعروف
- 1.12 یمحق اللہ الربو ویربب الصمۃ
- 1.13 واصبر علی ما اصابک
- 1.14 وقولوا قولا سدیداً
- 1.15 ان الدین عند اللہ الاسلام

(ب) سنت

- 1- سنت کی اہمیت
- 2- دس منتخب احادیث مع ترجمہ و تخریج

- 1- ایمان لا عمل بالنیات
- 2- اہمیت لا تم مکارم الاخلاق
- 3- لا یوم من احدکم حق یحب الا خیرہ ما یحب لنفسه
- 4- المسلم من سلم المسلمون من سبہ المسلمون من لسانہ ویدہ
- 5- قل اعنت باللہ سلم استقم
- 6- حیر کم خیر کم لا الہ
- 7- سبب المسلم فسوق وقتالہ کفر
- 8- المؤمن الخوالمومن
- 9- کئی المسلم عسی المسلم حر لم یجمعه و مالہ و فرقہ
- 10- ایہ المذلق ثلاث اذا حدیث کذب و قاتل و تمن خائن و اتاؤ فنا خلف

دین اسلام

2.1 ہندام کے بنیادی مقصد کی وضاحت اور انسان کی افغروی و لائقی زندگی پر ان کے اثرات

- 1- توحید
- 2- رسالت
- 3- آخرت
- 4- ملائکہ
- 5- اسطانی کتب
- 2.2 عبادات

1- نماز 2- روزہ 3- حج 4- زکوٰۃ

مندرجہ بالا عبادات کی اہمیت و فضیلت، مکملیں اور انسان کی افغروی و معاشرتی زندگی پر ان کے اثرات

مدرسہ کی مقاصد

۱۔ قرآن مجید

عمومی مقصد: طالب علم یہ سمجھنے کے قائل ہو کہ اسلام کی تعلیمات کا اصل سرچشمہ قرآن مجید ہے
خصوصی مقصد: طالب علم اس قائل ہو جائے گا کہ

۱۔ قرآن مجید کی تشریف کر سکے گا

۲۔ قرآن مجید کے نزول کی صورت بیان کر سکے

۳۔ قرآن مجید کی کئی روایتی سورتوں کی پہچان کر سکے

۴۔ منتخب آیات کا ترجمہ و تشریح کر سکے

عمومی مقصد: یہ سمجھنے کے قائل ہو مے گا کہ منتخب قرآنی آیات کے ذریعے اسلامی تعلیمات کا مفہوم کیا ہے

۱۔ قرآنی آیات کا ترجمہ و تشریح کر سکے

۲۔ قرآنی تعلیمات کی روشنی میں اپنی اور معاشرتی اصلاح کر سکے

۲۔ سنت

عمومی مقصد: طالب علم سنت نبوی کی اہمیت اور ضرورت کو اچھی طرح سمجھنے کے قائل ہو جائے گا
خصوصی مقصد:

۱۔ سنت کی تشریف بیان کر سکے

۲۔ سنت کی اہمیت و ضرورت کی وضاحت کر سکے

۳۔ سنت کی روشنی میں امور حسنہ پر عمل کر سکے

۴۔ منتخب احادیث پر عمل

عمومی مقصد: احادیث کی روشنی میں اخلاقی اقدار سے سکھای حاصل کر سکے

خصوصی مقصد: احادیث کا ترجمہ و تشریح کر سکے

رسول اللہ ﷺ کے اقوال و سنت کا، پیرو، کا جذبہ مدد ہو سکے

دین اسلام

عمومی مقاصد: دین اسلامی کے بنیادی مقاصد اور عہدات کے بارے میں جان سکنے اور بیان کر سکنے
خصوصی مقاصد

لفظ دین اسلام کے لغوی اور اصطلاحی معنی بیان کر سکنے

اسلام کے بنیادی مقاصد کی اہمیت بیان کر سکنے

اسلام کے بنیادی مقاصد سے انسان کی انفرادی و اجتماعی زندگی پر پڑنے والے اثرات بیان کر سکنے

عہدات کے لفظی و اصطلاحی معنی بیان کر سکنے

عقیدے اور عہدات کا فرق بیان کر سکنے

عہدات (نماز، روزہ، حج، زکوٰۃ کے فوری احکامات اور نسلی زندگی پر ان کی اثرات بیان کر سکنے

اسلامی مقاصد و عہدات کے مطابق اپنی زندگی ڈھل کر ایک اچھا مسلمان بن سکنے

اخیر مسلم طلباء کے لئے

GEN III

نصاب اختلاقیات سہ ماہی

حصہ دوم مطالعہ پاکستان

نئی نئی نئی

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کل وقت - 20 گھنٹے

موضوعات

اختلاقیات کی تعریف اور اہمیت
اختلاقیات کا معیار (کانون: عقل، الہی کتب)
مندرجہ ذیل اخلاق کی وضاحت

☆ دولت داری

☆ وہ داری

☆ نظم و ضبط

☆ راست گوئی

☆ صبر و استقامت

☆ حوصلہ مند بننا

☆ وقت کی پابندی

☆ صفائی

☆ اعتدال

☆ باہمی احترام

☆ مصلحت

تسلب اخلاقیات (سلسلہ اول)

تدریسی مقاصد

عمومی مقاصد: اعلیٰ تعلقات کی وجہ سے اعلیٰ رتبی میں قتل قدر مستند کر سکے
خصوصی مقاصد: جالب اس علم سے اس تھیں ہو گا کہ

- ۱۵ موضوعات کا مطلب بیان کر سکے
- ۱۶ عملی زندگی سے مشابہت کی نشاندہی کر سکے
- ۱۷ اپنی شخصیت اور معاشرے پر موضوعات کے مثبت اثرات پیدا کرنے کے طریقے بیان کر سکے
- ۱۸ وراثت داری کی اہمیت بیان کر سکے
- ۱۹ وفا داری کی اہمیت بیان کر سکے
- ۲۰ نظم و ضبط کی افلاحت بیان کر سکے
- ۲۱ صدق بیان کی ضرورت بیان کر سکے
- ۲۲ حوصلہ مندی کے فوائد بیان کر سکے
- ۲۳ بات کی پابندی کے فوائد بیان کر سکے
- ۲۴ صفائی اور باہمی اختیار سے حسن کلر کوگی کو بیان کر سکے
- ۲۵ مصلحت کے فوائد بیان کر سکے

موضوعات

- 1- حریتِ فکر: سماجی قوم میں آزادیِ فکر کی تاریخی مساعفوں میں سیاسی آزادی کی اہمیت اور ضرورت۔ ذاتی، جمعی غلامی کے تعلقات
- 2- نظریہ پاکستان
قیام پاکستان کی اساس و دین اسلام، قیام پاکستان کی غرض، غرضتِ نظریہ پاکستان کی وضاحت۔ نظریہ پاکستان اور مردمِ اقبال اور قائد اعظم کے ارشادات کی روشنی میں
- 3- نظریہ پاکستان کا تاریخی پسو
محمد بن قاسم کی فتح، مفید خلف مانی اور شہد اہل اللہ کی تبلیغی خدمات سید احمد شہید کی تحریکِ مجاہدین
- 4- قیامی تحریکیں
پہلی گزیرہ - تحریکِ اسلامیہ (پیشہ - درست فلاحی - مسند) اسلامیہ کانٹریبلوں (انجمنِ حمایتِ اسلام لاہور)

مطالعہ پاکستان (حصہ دوم)
تدریسی مقاصد
حریت فکر:

- عمومی مقصد
- طالب علم یہ جان لے کہ اسلام میں اور مسلمان قوم میں آزادی فکر کی کیا اہمیت ہے
- خصوصی مقاصد
- ۱۵۰ حریت فکر کا معنی و مفہوم بیان کر سکے
- ۱۵۱ آزادی فکر کی اہمیت بیان کر سکے
- ۱۵۲ خصوصاً "اسلام میں آزادی اظہار رائے" کی اہمیت بیان کر سکے
- ۱۵۳ ذاتی غلطی کے قومی سطح پر نقصانات کے بیان کر سکے
- ۱۵۴ بدسلکی غلطی قومی سطح پر نقصانات بیان کر سکے
- نظریہ پاکستان
- عمومی مقصد:
- نظریہ پاکستان (دین اسلام) سے پوری طرح واقفیت ہو جائے
- خصوصی مقاصد:
- ۱۵۵ نظریہ کی تعریف بیان کر سکے اور اس کی وضاحت کر سکے
- ۱۵۶ نظریہ پاکستان کی تعریف کر سکے اور اس کا مفہوم بیان کر سکے
- ۱۵۷ علامہ اقبال اور قائد اعظم کے فرمودات کی روشنی میں نظریہ پاکستان بیان کر سکے
- نظریہ پاکستان کا تاریخی پسو
- عمومی مقصد
- ۱۵۸ نظریہ پاکستان کے تاریخی پس منظر سے واقفیت حاصل کر سکے
- خصوصی مقاصد:
- ۱۵۹ محمد بن قاسم کے بارے میں بیان کر سکے

- ۱۰۔ محمد بن قاسم کے ہندوستان پر حملہ کی وجہ بیان کرئے
- ۱۱۔ محمد بن قاسم کے ہندوستان پر حملہ کے اثرات بیان کرئے
- ۱۲۔ بیان کرئے کہ ہندوستان میں ہندو مسلم دو قومی نظریہ کیلئے آغاز کیا ہے
- ۱۳۔ مہد لطف طائی کی علمی خدمات بیان کرئے
- ۱۴۔ شاد ولی اللہ کی علمی خدمات بیان کرئے
- ۱۵۔ مہد لطف طائی اور شاد ولی اللہ نے جو تبلیغ دین اور مسلمانوں میں سیاسی شعور پیدا کیا اسے بیان کرئے

علمی تحریکیں

عمدہ ای مقصد

- ۱۶۔ برصغیر کی علمی تحریکوں سے آگاہی حاصل اور کرئے
- ۱۷۔ مخصوص مقصد:
- ۱۸۔ علمی مرکز - راجہ بندہ - ترویج العلماء خدمت السلام، اسلامیہ کالج - انجمن حمایت اسلام نے تعلیم کے ذریعہ سیاسی شعور مسلمانوں میں پیدا کیا اسے بیان کرئے
- ۱۹۔ آئینہ ہند کے سلسلہ میں تحریک مہذبین کی خدمات بیان کرئے

Tarjuma Tul Quran/CIVICS

Course Code: TTQ/CIVICS - 111

Total Contact Hours: 32

Theory: 32

Practical: 0

T P C

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As per Syllabus of BISE from PCTB Book

نمبر شمار	فہرست عنوانات	نمبر شمار	نمبر شمار	فہرست عنوانات	نمبر شمار
95	سُورَةُ الْاَنْفَالِ: تعارف اور خصوصیات	12	i	قرآن مجید کے آداب	1
97	سُورَةُ الْاَنْفَالِ: مضامین اور اہم نکات	13	ii	ہدایات برائے اساتذہ کرام	2
100	سُورَةُ الْاَنْفَالِ: متن و ترجمہ	14	iii	مقاصد تدریس	3
110	سُورَةُ الْاَنْفَالِ: مشق	15	1	سُورَةُ الْبَقَرَةِ: تعارف اور خصوصیات	4
114	سُورَةُ التَّوْبَةِ: تعارف اور خصوصیات	16	3	سُورَةُ الْبَقَرَةِ: مضامین اور اہم نکات	5
117	سُورَةُ التَّوْبَةِ: مضامین اور اہم نکات	17	6	سُورَةُ الْبَقَرَةِ: متن و ترجمہ	6
119	سُورَةُ التَّوْبَةِ: متن و ترجمہ	18	53	سُورَةُ الْبَقَرَةِ: مشق	7
138	سُورَةُ التَّوْبَةِ: مشق	19	57	سُورَةُ آلِ عِمْرَانَ: تعارف اور خصوصیات	8
142	ماذیل پیچہ برائے جماعت گیارھویں	20	60	سُورَةُ آلِ عِمْرَانَ: مضامین اور اہم نکات	9
145	رموز و قاف قرآن مجید	21	63	سُورَةُ آلِ عِمْرَانَ: متن و ترجمہ	10
146	تصدیقی سرٹیفکیٹ	21	91	سُورَةُ آلِ عِمْرَانَ: مشق	11

ہدایات برائے اساتذہ کرام

1. ترجمہ قرآن مجید کی تدریس اس طرح کیجیے کہ طلبہ کی کردار سازی ہو سکے۔ وہ علم و عمل میں ترقی کر سکیں اور قرآن مجید سے ان کے تعلق اور محبت میں اضافہ ہو۔ تدریس قرآن مجید کا بنیادی مقصد تربیت، اصلاح اور کردار سازی ہے۔
2. عربی متن کے ساتھ ترجمہ پڑھایا جائے۔ ترجمہ پر خاص توجہ دیتے ہوئے اسے بار بار دہرایا جائے، تاکہ طلبہ کو اس سے زیادہ سے زیادہ آگاہی حاصل ہو اور وہ اُس کو سمجھ سکیں۔
3. عربی متن کی تلاوت کے دوران یہ خیال رکھا جائے کہ الفاظ کو ادا کرنے کا طریقہ بالکل درست ہو۔
4. کلاس میں ایسے طلبہ و طالبات سے تلاوت کرائی جائے جن کی تجوید درست ہو۔
5. جہاں تک ممکن ہو سکے اساتذہ خود بھی با وضو ہوں اور طلبہ کو بھی اس کا پابند بنائیں، تاکہ پاکیزگی اور طہارت کے ساتھ اس عمل کو انجام دیا جائے اور روحانی برکات کا بھی حصول ہو۔
6. طلبہ میں قرآن مجید کی تلاوت کے آداب کا مذاکرہ کرائیے۔
7. قرآنی نصوص/متن سے متعلق سوال و جواب کے ذریعے سے طلبہ کی استعداد میں اضافہ کیجیے۔
8. سابقہ اسباق کے اعادے کا اصول اپنائیے۔
9. کونز پروگرام، آن لائن ایپ اور دستاویزی فلم سے استفادہ کرتے ہوئے تدریس کی کوشش کیجیے۔
10. متعلقہ جماعت کے لیے مقتدرہ حصہ قرآن مجید کی تمام سورتوں کا تعارف اور مرکزی مضامین پر مشتمل تفصیلی مختصر اور کثیر الانتخابی سوالات کے ذریعے سے امتحان لیں۔
11. گیارہویں جماعت کے لیے مختص ذخیرہ قرآنی الفاظ میں سے ہی ماڈل پیپر کی طرز پر امتحان لیا جائے۔
(گیارہویں جماعت کے منتخب ذخیرہ الفاظ قرآنی اور ماڈل پیپر اس کتاب کا حصہ ہیں۔)
12. نمبروں کی تقسیم سے متعلق ہدایات کے لیے ماڈل پیپر سے استفادہ کریں۔

Occupational Health Safety & Environment

Course Code: CIT-101

Total Contact Hours: 32

Theory: 32

Practical: 0

T P C

1 0 1

This introductory course on computer-related health and safety in the IT industry aims to instill a strong safety mindset in students. It covers the various causes of safety hazards in IT workplaces, helping students identify and understand these risks. The course emphasizes the importance of maintaining a safe work environment and teaches theoretical principles of health and safety specific to the IT industry.

Learning Outcomes: The students will be able to

- Recognize Health and Safety Issues in IT: Learn about health and safety problems in IT workplaces and with computers and smart devices.
- Apply Environmental Protection Concepts: Understand and use ideas to protect the environment while working with computers.
- Practice Safety Measures: Follow safety steps to protect physical, mental health of individual and group in computer labs and workplaces.
- Incorporate Health and Safety in Daily Life: Develop habits for maintaining mental and physical health and safety every day, while using computers or working in information technology environment.

COURSE CONTENTS

1 Understanding General OHS Concepts 04 Hours

1.1 What is OHS?

- 1.1.1. Introduction to Occupational Health and Safety (OHS)
- 1.1.2. OHS regulations and legislation
- 1.1.3. Identifying potential workplace hazards and risks
- 1.1.4. Roles and responsibilities of employers, employees, and supervisors in maintaining a safe workplace

2 Physical, Mental, and Social Health Issues 12 Hours

2.1 Eyesight Issues

- 2.1.1. Digital eyestrain, dryness, blurred vision, headaches
- 2.1.2. Solutions: 20-20-20 rule, monitor adjustment, avoiding glare, maximizing screen size, screen lighting and setting adjustment, document holder use, artificial tears, washing face with water
- 2.2. Wrist, Elbow & Hand, Arm, Shoulder Issues
- 2.2.1. Repetitive strain injury, carpal tunnel syndrome, symptoms of overuse injuries
- 2.2.2. Occupational overuse syndrome, work-related upper limb disorder (WRULD)

2.3. Backbone & Neck Issues

- 2.3.1. Lower back pain or neck pain due to poor workstation design, bad chair, poor posture, sitting for long periods

2.4. Legs and Feet Issues

2.4.1. Increased risk of blood clots from sitting without stretching legs

2.5. Hearing Issues

2.5.1. Hearing loss from high volume headphone use

2.6. Mental Health Issues

2.6.1. Nervous breakdowns, photosensitive epileptic seizures, sleep disorders from late-night device use

2.7. Social Health Issues

2.7.1. Stress disorders, behavioral problems, loneliness, depression, anxiety, aggression, low social relationships, obsessive-compulsive disorder (OCD)

2.8. Lifestyle Diseases

2.8.1. Obesity, constipation, digestion issues, diabetes, hypertension, cardiovascular issues from long sittings and sedentary lifestyle

2.8.2. Solutions: reduce junk and processed diet, soda, caffeine, use green and leafy vegetables, fruits, dairy and protein, eating and sleeping time according to circadian rhythm, daily exercise and social interaction, meditation and prayers

3 Introduction to OHS in Information Technology

04 Hours

3.1. OHS in IT

3.1.1. Understanding OHS regulations and legislation in the IT industry

3.1.2. Identifying potential workplace hazards and risks in IT environments

3.2. Ergonomics and Workplace Design

3.2.1. Ergonomic principles and best practices in IT workstations

3.2.2. Assessing and mitigating ergonomic risks in IT work environments

3.2.3. Designing and maintaining a safe and comfortable IT workplace

3.3. Electrical Safety and IT Equipment

3.3.1. Electrical hazards in IT environments

3.3.2. Safe use and maintenance of IT equipment and tools

3.3.3. Proper handling and storage of batteries and other power sources

3.4. Emergencies and IT Incidents

3.4.1. Preparing for and responding to emergencies in IT workplaces

3.4.2. IT incident response and management

3.4.3. IT security and data protection during emergencies

4. OHS Considerations While Working Online

06 Hours

4.1. Introduction to OHS for Remote Workers

4.1.1. Understanding OHS for remote workers

4.1.2. Regulations and legislation for remote work

4.1.3. Identifying potential workplace hazards and risks while working online

4.2. Ergonomics and Workstation Setup for Remote Work

4.2.1. Ergonomic principles and best practices for remote workstations

4.2.2. Assessing and mitigating ergonomic risks in remote work environments

4.2.3. Designing and maintaining a safe and comfortable remote work environment

4.3. Cyber Security and Information Security for Remote Work

4.3.1. Understanding cyber security risks and threats for remote workers

4.3.2. Strategies for protecting sensitive personal and organizational information

4.3.3. Best practices for secure remote access and online communication

4.3.4. Reporting individual cyber security issues to local and online organizations

4.4. Work-Life Balance and Mental Health in Remote Work

- 4.4.1. Maintaining a healthy work-life balance while working remotely
- 4.4.2. Strategies for preventing burnout and promoting mental health and well-being
- 4.4.3. Communicating effectively with colleagues and supervisors while working remotely

4.5. Emergency Preparedness

- 4.5.1. Incident management for remote work
- 4.5.2. Preparing for and responding to emergencies in remote work environments
- 4.5.3. Incident response and management in remote work environments
- 4.5.4. Cyber security and data protection during emergencies while working online

4. Workstation/Workshop Designing

06 Hours

5.1. Setting Up a Computer Lab

- 5.1.1. Considerations for sunlight, artificial lighting, fresh air, ventilation, social interaction, gender-based harassment, noise, heat, radiation

5.2. Workshop Layout Preparation

- 5.2.1. Designing a suitable workshop layout based on lab space and equipment ratio

5.3. Workstation Setup

- 5.3.1. Minimum working space for individuals and teams

5.4. Routine Cleaning and Maintenance

- 5.4.1. Designing and following SOPs and checklists for cleaning and maintenance

5.5. Precaution Measures

- 5.5.1. Noise, heat, electrostatic discharge precautions, reporting, and correction procedures
- 5.6. Working Posture and Sitting Position
 - 5.6.1. Correct posture and sitting positions concerning table, chair, keyboard, and display

REFERENCE BOOKS

1. Safety Practices and Procedures by National Institute of Science and Technical Education (NISTE), Islamabad.
2. "Health and Safety in a Changing World" by Robert Dingwall, Sidney Stark, and Kirstie Ball, 2021, Routledge, ISBN: 9780367350152
3. "Ergonomics for Beginners: A Quick Reference Guide" by Jan Dul and Bernard Weerdmeester, 2019, CRC Press, ISBN: 9780367350138
4. "Digital Minimalism: Choosing a Focused Life in a Noisy World" by Cal Newport, 2019, Publisher: Portfolio, ISBN: 9780525536512

INSTRUCTIONAL OBJECTIVES

1. Understanding General OHS Concepts

- 1.1. Define Occupational Health and Safety (OHS) and its importance.
- 1.2. Describe OHS regulations and legislation.
- 1.3. Identify potential workplace hazards and risks.
- 1.4. Explain the roles and responsibilities of employers, employees, and supervisors in maintaining a safe workplace.

2. Physical, Mental, and Social Health Issues

- 2.1. Eyesight Issues
 - 2.1.1. Explain digital eyestrain, dryness, blurred vision, and headaches.
 - 2.1.2. Apply solutions such as the 20-20-20 rule, monitor adjustment, avoiding glare, maximizing screen size, screen lighting and setting adjustment, document holder use, artificial tears, and washing the face with water.
- 2.2. Wrist, Elbow & Hand, Arm, Shoulder Issues
 - 2.2.1. Describe repetitive strain injury, carpal tunnel syndrome, and symptoms of overuse injuries.
 - 2.2.2. Identify occupational overuse syndrome and work-related upper limb disorder (WRULD).
- 2.3. Backbone & Neck Issues
 - 2.3.1. Explain lower back pain or neck pain caused by poor workstation design, bad chair, poor posture, and sitting for long periods.
- 2.4. Legs and Feet Issues
 - 2.4.1. Describe the increased risk of blood clots from sitting without stretching legs.
- 2.5. Hearing Issues
 - 2.5.1. Explain hearing loss from high volume headphone use.
- 2.6. Mental Health Issues
 - 2.6.1. Describe nervous breakdowns, photosensitive epileptic seizures, and sleep disorders from late-night device use.
- 2.7. Social Health Issues
 - 2.7.1. Explain stress disorders, behavioral problems, loneliness, depression, anxiety, aggression, low social relationships, and obsessive-compulsive disorder (OCD).
- 2.8. Lifestyle Diseases
 - 2.8.1. Describe obesity, constipation, digestion issues, diabetes, hypertension, and cardiovascular issues from long sittings and sedentary lifestyle.
 - 2.8.2. Apply solutions such as reducing junk and processed diet, soda, caffeine, using green and leafy vegetables, fruits, dairy and protein, eating and sleeping time according to circadian rhythm, daily exercise and social interaction, meditation, and prayers.

3. Introduction to OHS in Information Technology

- 3.1. OHS in IT
 - 3.1.1. Understand OHS regulations and legislation in the IT industry.
 - 3.1.2. Identify potential workplace hazards and risks in IT environments.
- 3.2. Ergonomics and Workplace Design
 - 3.2.1. Explain ergonomic principles and best practices in IT workstations.
 - 3.2.2. Assess and mitigate ergonomic risks in IT work environments.
 - 3.2.3. Design and maintain a safe and comfortable IT workplace.

- 3.3. Electrical Safety and IT Equipment
 - 3.3.1. Identify electrical hazards in IT environments.
 - 3.3.2. Practice safe use and maintenance of IT equipment and tools.
 - 3.3.3. Properly handle and store batteries and other power sources.
- 3.4. Emergencies and IT Incidents
 - 3.4.1. Prepare for and respond to emergencies in IT workplaces.
 - 3.4.2. Implement IT incident response and management.
 - 3.4.3. Ensure IT security and data protection during emergencies.

4. OHS Considerations While Working Online

- 4.1. Introduction to OHS for Remote Workers
 - 4.1.1. Understand OHS for remote workers.
 - 4.1.2. Explain regulations and legislation for remote work.
 - 4.1.3. Identify potential workplace hazards and risks while working online.
- 4.2. Ergonomics and Workstation Setup for Remote Work
 - 4.2.1. Apply ergonomic principles and best practices for remote workstations.
 - 4.2.2. Assess and mitigate ergonomic risks in remote work environments.
 - 4.2.3. Design and maintain a safe and comfortable remote work environment.
- 4.3. Cyber Security and Information Security for Remote Work
 - 4.3.1. Understand cyber security risks and threats for remote workers.
 - 4.3.2. Implement strategies for protecting sensitive personal and organizational information.
 - 4.3.3. Apply best practices for secure remote access and online communication.
 - 4.3.4. Report individual cyber security issues to local and online organizations.
- 4.4. Work-Life Balance and Mental Health in Remote Work
 - 4.4.1. Maintain a healthy work-life balance while working remotely.
 - 4.4.2. Implement strategies for preventing burnout and promoting mental health and well-being.
 - 4.4.3. Communicate effectively with colleagues and supervisors while working remotely.
- 4.5. Emergency Preparedness
 - 4.5.1. Manage incidents for remote work.
 - 4.5.2. Prepare for and respond to emergencies in remote work environments.
 - 4.5.3. Implement incident response and management in remote work environments.
 - 4.5.4. Ensure cyber security and data protection during emergencies while working online.

5. Workstation/Workshop Designing

- 5.1. Setting Up a Computer Lab
 - 5.1.1. Consider sunlight, artificial lighting, fresh air, ventilation, social interaction, gender-based harassment, noise, heat, and radiation.
- 5.2. Workshop Layout Preparation
 - 5.2.1. Design a suitable workshop layout based on lab space and equipment ratio.
- 5.3. Workstation Setup
 - 5.3.1. Determine minimum working space for individuals and teams.
- 5.4. Routine Cleaning and Maintenance
 - 5.4.1. Design and follow SOPs and checklists for cleaning and maintenance.
- 5.5. Precaution Measures
 - 5.5.1. Implement noise, heat, electrostatic discharge precautions, reporting, and correction procedures.
- 5.6. Working Posture and Sitting Position
 - 5.6.1. Practice correct posture and sitting positions concerning table, chair, keyboard, and display.

ENGLISH

Course Code: Eng-112

Total Contact Hours: 64

Theory: 64

Practical: 0

T P C

2 0 2

AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"

1 PROSE/TEXT 16 Hours

1.1 First eight essays of Intermediate English Book-II

2 CLOZE TEST 4 Hours

2.1 A passage comprising 50-100 words will be selected from the text. Every 11th word or any word for that matter will be omitted. The number of missing words will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3 GRAMMAR 26 Hours

- 3.1 Sentence Structure.
- 3.2 Tenses.
- 3.3 Parts of speech.
- 3.4 Punctuation.
- 3.5 Change of Narration.
- 3.6 One word for several
- 3.7 Words often confused

4. COMPOSITION 8 Hours

- 4.1 Letters/Messages
- 4.2 Job application letter
- 4.3 For character certificate/for grant of scholarship
- 4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles
- 4.5 Essay writing
- 4.6 Technical Education, Science and Our life, Computers, Environmental Pollution, Duties of a Student.

5. TRANSLATION 10 Hours

- 5.1 Translation from Urdu into English.
For Foreign Students: A paragraph or a dialogue.

REFERENCE BOOKS

1. Intermediate English Book-II.
2. An English Grammar and Composition of Intermediate Level.
3. A Hand Book of English Students Bzy Gatherer.

INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

- 1.1 Manipulate, skimming and scanning of the text.
- 1.2 Identify new ideas.
- 1.3 Reproduce facts, characters in own words
- 1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT

- 2.1 Rewrite words to fill in the blanks recalling the text.
- 2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

- 3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
- 3.2 State classification of time, i.e. present, past and future and use verb tense correctly in different forms to denote relevant time.
- 3.3 Identify function words and content words.
- 3.4 Use marks of punctuation to make sense clear.
- 3.5 Relate what a person says in direct and indirect forms.
- 3.6 Compose his writings.
- 3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS

- 4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.
- 4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
- 4.3 Describe steps of a good composition writing.
- 4.4 Describe features of a good composition.
- 4.5 Describe methods of composition writing
- 4.6 Use these concepts to organize facts and describe them systematically in practical situation.

5. APPLY RULES OF TRANSLATION

- 5.1 Describe confusion.
- 5.2 Describe rules of translation.
- 5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

CHINESE LANGUAGE

Course Code: GenC-112

Total Contact Hours: 64

Theory 64

Practical 0

T	P	C
2	0	2

PART ONE

AIMS: This course consists of 32 classes (including mid-term test and final test). After completing this part, students can master the primary Chinese language knowledge taught in the content of the course, and be able to achieve and exceed the **HSK level One**.

INSTRUCTION OBJECTIVE The course is mainly for zero-based learners. Through the study of this course, learners can lay a solid language foundation and have a preliminary understanding of Chinese language structure, including Pinyin, Chinese characters, words, grammar and other knowledge. After completing this course, learners can understand and use some basic words and sentences, and complete the most basic communication, such as greeting, asking, introducing, shopping and so on.

COURSE CONTENTS

PART ONE

- 1. LESSON 1 HELLO VS NĪHǎO** **1 Hour**
This lesson briefly introduces pinyin and spelling methods.
- 2. HELLO!** **1 Hour**
This lesson briefly introduces the sentence patterns used in greeting, such as dialogue, greeting farewell, and introducing one's own name.
- 3. LESSON 3 I AM THAI** **1 Hour**
Teach students to understand basic classroom language, learn to use "national + person" for simple communication dialogue, and introduce which country they come from.
- 4. LESSON 4 WHAT'S THE DATE TODAY** **1 Hour**
This lesson introduces the expression of numbers, years, months, etc., and teaches students to ask about a date and answer it.
- 5. LESSON 5 THIS IS MY BROTHER** **1 Hour**
By introducing family members, students can understand the simple words when asking about family status and introduce them briefly.
- 6. LESSON 6 I'M NINETEEN YEARS OLD** **2 Hours**
This lesson expands quantifiers and animal names, and introduces the expression of age, so that students can ask and answer each other's age correctly.
- 7. LESSON 7 WHAT TIME IS IT** **2 Hours**
This lesson introduces the usage of hours, minutes and seconds, so that students can describe their lives with time points.
- 8. LESSON 8 WHAT DO YOU LIKE TO DO ON WEEKENDS** **2 Hours**
This lesson introduces the expressions of hobbies, interests, activities and other related nouns, so as to help students communicate with each other by using simple linking sentences.
- 9. SEMI-MID-TERM REVIEW** **2 Hours**
Mid-term review is a summary of the knowledge learned in the past. The test paper uses the knowledge points learned in the past to design listening questions, answering questions by looking at pictures, connecting questions, filling in blanks, etc., which are illustrated with pictures and interesting, and can test students' learning effect.
- 10. LESSON 9 INTRODUCE YOURSELF** **2 Hours**
Explain the related expressions related to self-introduction, and students can correctly introduce their names, families, ages, hobbies, school majors, etc. 2
- 11. LESSON 10 MY FATHER IS IN BEIJING** **2 Hours**
This lesson introduces the names of major cities in China, Britain and Europe, and introduces the use of "person + place" in sentences.

12. **LESSON 11 I CAME TO BEIJING BY PLANE** **2 Hours**
This lesson introduces the means of transportation and how to express long sentences in combination with the time and place learned before.
13. **LESSON 12 I EAT AT THE COMPANY** **2 Hours**
This lesson introduces the polite expressions used in eating.
14. **LESSON 13 THE WEATHER IS FINE ON MONDAY** **2 Hours**
It shows the conversations and topics that may appear when you want to date.
15. **LESSON 14 HOW MUCH IS IT ALTOGETHER** **2 Hours**
This lesson introduces the vocabulary and sentences commonly used in shopping, and how to use Chinese for daily shopping.
16. **LESSON 15 WHAT WOULD YOU LIKE TO HAVE** **2 Hours**
This lesson introduces the classic Chinese and Thai cuisine, the terms of treating guests, and the communicative terms of how to order food in restaurants.
17. **LESSON 16 THE BATHROOM IS NEXT TO THE PANTRY** **2 Hours**
This lesson introduces location and location words, and how to use location words to introduce the location of a place.
18. **SEMI- FINAL REVIEW** **2 Hours**
Similar to the mid-term test questions, it is a test of important knowledge points of the course to test students' learning effect. This lesson briefly introduces pinyin and spelling methods.

PART TWO

AIMS After completing this part, students can master the basic Chinese language knowledge taught in the content of the course, and be able to reach and exceed **HSK Level TWO**.

INSTRUCTION OBJECTIVE Learners can master the language knowledge and use some basic grammar and sentence patterns in communication, learn to express personal feelings and attitudes in Chinese, and can complete communicative functions such as gratitude, apology, introduction and farewell, and begin to understand Chinese cultural knowledge and cultivate interest in learning.

COURSE CONTENTS

1. **LESSON 1 I WAS STILL SLEEPING AT 7 O'CLOCK** **1 Hour**
This lesson introduces the grammatical points of "still", so that students can correctly understand the meaning of sentences related to "still" and use this sentence pattern correctly for communication.
2. **LESSON 2 IT WILL BE CLOUDY TOMORROW** **1 Hour**
By introducing the weather in several Chinese cities, explain how to use temperature to answer weather questions.
3. **LESSON 3 THAT ONE IS FIVE HUNDRED DOLLARS CHEAPER THAN THIS ONE** **1 Hour**
This lesson explains comparative sentences, and compares them in terms of price, height and temperature, so that students can understand comparative sentences thoroughly.
4. **LESSON 4 THIS IS A FAMILY PHOTO** **1 Hour**
This lesson introduces family members in detail through appearance, clothing and occupation, so that students can master more detailed description methods.
5. **LESSON 5 IT IS FORBIDDEN TO TAKE PICTURES HERE** **2 Hours**
This lesson leads students to understand the relevant knowledge points of expressing commands, such as forbidden and forbidden, so that students can correctly understand the meaning of words in daily life.
6. **LESSON 6 I CAN'T FIND SOMETHING** **2 Hours**
This lesson introduces the use of language points in "V + should + result complement", so that students can correctly use relevant sentence patterns in communication.
7. **LESSON 7 I HAVE BEEN TO SICHUAN AND SEEN PANDAS** **2 Hours**
This lesson introduces Chinese culture through "V + have been to", such as the Great Wall,

the Forbidden City, national treasures, etc., so that students can use this sentence pattern correctly in communication.

8. LESSON 8 I HOPE YOU CAN COME TO MY WEDDING **2 Hours**

By introducing Chinese weddings, this lesson enables students to master the verbal usage of banquet invitation, holiday blessing, emotional expression and euphemistic refusal.

SEMI-MID-TERM REVIEW **2 Hours**

This section leads students to review the knowledge points they have learned in the past and conduct mid-term tests through reading pictures, listening questions and connecting questions to test students' learning effect.

9. LESSON 9 BE ILL, TAKE MORE REST **2 Hours**

This lesson introduces the vocabulary related to illness and the doctor's medication advice, so that students can correctly describe and understand the doctor's meaning in the process of seeing a doctor.

10. LESSON 10 THE STATION IS JUST ACROSS THE ROAD **2 Hours**

This lesson introduces the way of asking places and answers by asking directions, which helps students to use relevant sentence patterns for practical communication questions and answers.

11. LESSON 11 SHE SINGS VERY WELL **2 Hours**

This lesson focuses on hobbies and introduces the correct use of related words in sentences.

12. LESSON 12 DID YOU DO WELL IN THE EXAM **2 Hours**

By describing the examination process and the situation of answering questions, students can correctly understand the instructions of the examination room, the distribution of questions and the analysis of test paper problems

13. LESSON 13 BUY TWO AND GET ONE FREE **2 Hours**

This lesson introduces the commodity names of supermarkets, as well as common terms such as promotional activities, discounts and price reductions.

14. LESSON 14 WE'RE A NEW RESTAURANT **2 Hours**

This lesson helps students understand how to understand the waiter's recommendation and put forward the food requirements for ordering.

15. LESSON 15 THE GIRL IS DRESSED IN WHITE CLOTHES **2 Hours**

This lesson introduces others' clothes and how to use grammar points to describe the state of something through "V + be dressed in".

16. LESSON 16 YOU CAN BE DISCHARGED FROM HOSPITAL NEXT WEEK **2 Hours**

This lesson introduces a variety of expressions, such as hospitalization, visiting patients and discharge, so that students can understand the language of hospital scenes and strengthen their multi-scene communication ability.

17. SEMI- FINAL REVIEW **2 Hours**

This section is similar to the mid-term review, which leads students to review the knowledge points they have learned in the past and conduct final tests by looking at pictures, listening questions, connecting questions, etc., to test students' learning effect.

REFERENCE BOOKS:

Tang Chinese Course 1 for Part Two

Tang Chinese Course 2 for Part Two

APPLIED MATHEMATICS-I

Course Code: Math-123

Theory 96

Practical 0

T P C

3 0 3

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

AIMS: After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors, Mensuration, Matrices and Determinants.
2. Develop skill, mathematical attitudes and logical perception in the use of mathematical
3. instruments as required in the technological fields.
4. Acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

1. QUADRATIC EQUATIONS

6 Hours

- 1.1 Standard Form
- 1.2 Solution
- 1.3 Nature of roots
- 1.4 Sum & Product of roots
- 1.5 Formation
- 1.6 Problems

2. BINOMIAL THEOREM

6 Hours

- 2.1 Factorials
- 2.2 Binomial Expression
- 2.3 Binomial Co-efficient
- 2.4 Statement
- 2.5 The General Term
- 2.6 The Binomial Series
- 2.7 Problems.

3. PARTIAL FRACTIONS

6 Hours

- 3.1 Introduction
- 3.2 Linear Distinct Factors Case I
- 3.3 Linear Repeated Factors Case II
- 3.4 Quadratic Distinct Factors Case III
- 3.5 Quadratic Repeated Factors Case IV
- 3.6 Problems

4. FUNDAMENTALS OF TRIGONOMETRY

6 Hours

- 4.1 Angles
- 4.2 Quadrants
- 4.3 Measurements of Angles
- 4.4 Relation between Sexagesimal & circular system
- 4.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
- 4.6 Problems

5. TRIGONOMETRIC FUNCTIONS AND RATIOS	6 Hours
5.1 Trigonometric functions of any angle	
5.2 Signs of trigonometric Functions	
5.3 Trigonometric Ratios of particular Angles	
5.4 Fundamental Identities	
5.5 Problems	
6. GENERAL IDENTITIES	6 Hours
6.1 The Fundamental Law	
6.2 Deductions	
6.3 Sum & Difference Formulae	
6.4 Double Angle Identities	
6.5 Half Angle Identities	
6.6 Conversion of sum or difference to products	
6.7 Problems	
7. SOLUTION OF TRIANGLES	6 Hours
7.1 The law of Sines	
7.2 The law of Cosines	
7.3 Measurement of Heights & Distances	
7.4 Problems	
8. VECTORS AND PHASORS	12 Hours
8.1 Scalars and Vectors	
8.2 The unit Vectors i, j, k	
8.3 Direction Cosines	
8.4 Dot Product	
8.5 Cross Product	
8.6 Analytic Expressions for dot and cross products	
8.7 Phasors	
8.8 Significance of j Operator	
8.9 Different Forms	
8.10 Algebraic Operations	
8.11 Problems	
9. COMPLEX NUMBERS	9 Hours
9.1 Introduction and Properties	
9.2 Basic Operations	
9.3 Conjugate	
9.4 Modulus	
9.5 Different Forms	
9.6 Problems	
10. BOOLEAN ALGEBRA AND GATE NETWORKS	15 Hours
10.1 Concept and basic laws	
10.2 Sums of product and products of sums	
10.3 Binary, decimals and octal, presentation of decimal numbers in BCD	

- 10.4 Interconversion of numbers
- 10.5 OR Gates and AND Gates
- 10.6 Logical Expressions and their simplifications
- 10.7 Demorgan's Theorems
- 10.8 NAND Gates and NOR Gates
- 10.9 Problems

11. PLANE ANALYTIC GEOMETRY AND STRAIGHT LINE

6 Hours

- 11.1 Coordinate system
- 11.2 Distance formula
- 11.3 Ration Formulas
- 11.4 Inclination and slope of line
- 11.5 Slope Formula
- 11.6 Problems

12. EQUATIONS OF THE STRAIGHT LINE

6 Hours

- 12.1 Some Important Forms
- 12.2 General form
- 12.3 Angle Formula
- 12.4 Parallelism and Perpendicularity
- 12.5 Problems

13. EQUATIONS OF THE CIRCLE

6 Hours

- 13.1 Standard and Central forms of equations
- 13.2 General Form of Equation
- 13.3 Radius and Coordinates of Center
- 13.4 Problems

REFERENCE BOOKS:

1. Ghulam Yasin Minhas, Technical Mathematics Vol I, Ilmi Kitab Khana, Lahore
2. Riaz Ali Khan, Polytechnic Mathematics Series Vol- I and Vol -II, Majeed Sons, Faisalabad.
3. Sana Ullah Bhatti, A Text Book of Algebra and Trigonometry, Punjab Text Book Board, Lahore
4. Sana Ullah Bhatti, A Text Book of Analytic Geometry and Calculus, Punjab Text Book Board, Lahore

INSTRUCTIONAL OBJECTIVES

1. USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATION

- 1.1 Define a standard quadratic equation.
- 1.2 Use methods of factorization and method of completing the square for solving the equations.
- 1.3 Derive quadratic formula.
- 1.4 Write expression for the discriminant.
- 1.5 Explain nature of the roots of a quadratic equation.
- 1.6 Calculate the sum and product of the roots.
- 1.7 Form a quadratic equation from the given roots.
- 1.8 Solve problems involving quadratic equations.

2. APPLY BINOMIAL THEOREM FOR THE EXPANSION OF BINOMIAL AND EXTRACTION OF ROOTS.

- 2.1 State binomial theorem for positive integral index.
- 2.2 Explain binomial coefficients:
 $(n,0), (n,1), \dots, (n,r), \dots, (n,n)$
- 2.3 Derive expression for the general term.
- 2.4 Calculate the specified terms.
- 2.5 Expand a binomial of a given index.
- 2.6 Extract the specified roots.
- 2.7 Compute the approximate value to a given decimal place.
- 2.8 Solve problems involving binomials.

3. APPLY DIFFERENT METHODS FOR RESOLVING A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS

- 3.1 Define a partial fraction, a proper and an improper fraction.
- 3.2 Explain all the four types of partial fractions.
- 3.3 Set up equivalent partial fractions for each type.
- 3.4 Explain the methods for finding constants involved.
- 3.5 Resolve a single fraction into partial fractions.
- 3.6 Solve problems involving all the four types.

4. UNDERSTAND THE SYSTEMS OF MEASUREMENT OF ANGLES.

- 4.1 Define angles and the related terms.
- 4.2 Illustrate the generation of an angle.
- 4.3 Explain sexagesimal and circular systems for the measurement of angles.
- 4.4 Derive the relationship between radian and degree.
- 4.5 Convert radians to degrees and vice versa.
- 4.6 Derive a formula for the circular measure of a central angle.
- 4.7 Use this formula for solving problems.

5. UNDERSTAND BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS.

- 5.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right

triangle.

5.2 Derive fundamental identities.

5.3 Find trigonometric ratios of particular angles.

5.4 Draw the graph of trigonometric functions.

5.5 Solve problems involving trigonometric functions.

6. USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS.

6.1 List fundamental identities.

6.2 Prove the fundamental law.

6.3 Deduce important results.

6.4 Derive sum and difference formulas.

6.5 Establish half angle, double and triple angle formulas.

6.6 Convert sum or difference into product and vice versa.

6.7 Solve problems.

7. USE CONCEPT, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES.

7.1 Define angle of elevation and angle of depression.

7.2 Prove the law of sines and the law of cosines.

7.3 Explain elements of a triangle.

7.4 Solve triangles and the problems involving heights and distances.

8. UNDERSTAND PRINCIPLES OF VECTORS AND PHASORS

8.1 Define unit vectors i, j, k .

8.2 Express a vector in the component form.

8.3 Explain magnitude, unit vector, direction cosines of a vector.

8.4 Explain dot product and cross product of two vector.

8.5 Deduce important results from dot and cross product.

8.6 Define phasor and operator j .

8.7 Explain different forms of phasors.

8.8 Perform basic Algebraic operation on phasors.

8.9 Solve problems on phasors.

9. USE PRINCIPLES OF COMPLEX NUMBERS IN SOLVING TECHNOLOGICAL PROBLEMS.

9.1 Define a complex number and its conjugate.

9.2 State properties of complex numbers.

9.3 Give different forms of complex numbers.

9.4 Perform basic algebraic operations on complex numbers.

9.5 Solve problem involving complex numbers.

10. SOLVE TECHNICAL PROBLEMS USING PRINCIPLES OF BOOLEAN ALGEBRA

10.1 Explain fundamental concepts of Boolean algebra

10.2 Explain binary numbers, octal numbers, decimal numbers and their interconversion.

10.3 Explain digital addition and multiplication and its applications to OR gates and AND Gates

10.4 Illustrate complementation and inversion

10.5 Evaluate logical expression

- 10.6 List basic Laws of Boolean Algebra
- 10.7 Explain De-Morgan's theorem
- 10.8 Explain basic duality of Boolean algebra
- 10.9 Derive Boolean expression
- 10.10 Explain combination of GATES
- 10.11 Illustrate sum of products and product of sum
- 10.12 Derive product of sum expression
- 10.13 Explain NAND Gates and NOR Gates
- 10.14 Use the map methods for simplifying expressions
- 10.15 Explain sub-cubes and covering

11. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY

- 11.1 Explain the rectangular coordinate system.
- 11.2 Locate points in different quadrants.
- 11.3 Derive distance formula.
- 11.4 Describe the ratio formula
- 11.5 Derive slope formula
- 11.6 Solve problems using the above formulae.

12. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.

- 12.1 Define equation of a straight line.
- 12.2 Derive slope intercept and intercept forms of equations of a straight line.
- 12.3 Write general form of equations of a straight line.
- 12.4 Derive an expression for angle between two straight lines.
- 12.5 Derive conditions of perpendicularity and parallelism of two straight lines.
- 12.6 Solve problems using these equations/formulae.

13. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATIONS OF CIRCLE

- 13.1 Define a circle.
- 13.2 Describe standard, central and general forms of the equation of a circle.
- 13.3 Convert general form to the central form of equation of a circle.
- 13.4 Deduce formula for radius and coordinates of the center of a circle.
- 13.5 Derive equation of the circle passing through three points.
- 13.6 Solve problems involving these equations.

Applied Physics

Course Code: Phy-132:

Total Contact Hours: 128

Theory: 32

Practical: 96

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1	3	2

Aims:

The students will be able to understand the fundamental principles and concept of Physics use these to solve problems in practical situations/technological courses and understand concepts to learn advance Physics/technical course.

COURSE CONTENTS

- | | |
|---|-----------------|
| 1. MEASUREMENTS | 03 Hours |
| 1.1. Fundamental units and derived units | |
| 1.2. Systems of measurement and S.I. units | |
| 1.3. Concept of dimensions, dimensional formula | |
| 1.4. Conversion from one system to another | |
| 1.5. Significant figures | |
| 2. SCALARS AND VECTORS | 03 Hours |
| 2.1. Revision of head to tail rule | |
| 2.2. Laws of parallelogram, triangle and polygon of forces | |
| 2.3. Resolution of a vectors by rectangular components | |
| 2.4. Multiplication of two vectors, dot product and cross product | |
| 3. MOTION | 04 Hours |
| 3.1. Review of laws and equations of motion | |
| 3.2. Law of conservation of momentum | |
| 3.3. Angular motion | |
| 3.4. Relation between linear and angular motion | |
| 3.5. Centripetal acceleration and force | |
| 3.6. Equations of angular motion | |
| 4. TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA | 04 Hours |
| 4.1. Torque | |
| 4.2. Centre of gravity and centre of mass | |
| 4.3. Equilibrium and its conditions | |
| 4.4. Torque and angular acceleration | |
| 4.5. Rotational inertia | |
| 5. SOUND | 04 Hours |
| 5.1. Longitudinal waves | |
| 5.2. Intensity, loudness, pitch and quality of sound | |
| 5.3. Units of intensity of level and frequency response of ear | |
| 5.4. Interference of sound waves silence zones, beats | |
| 5.5. Acoustics | |
| 5.6. Doppler effect | |

6. LIGHT	04 Hours
6.1. Review laws of reflection and refraction	
6.2. Image formation by mirrors and lenses	
6.3. Optical instruments	
6.4. Waves theory of light	
6.5. Interference, diffraction, polarization of light waves	
6.6. Applications of polarization in sunglasses, optical activity and stress analysis	
7. OPTICAL FIBER	02 Hours
7.1. Optical communication and problems	
7.2. Review total internal reflection and critical angle	
7.3. Structure of optical fiber	
7.4. Fiber material and manufacture	
7.5. Optical fiber – uses	
8. LASERS	03 Hours
8.1. Corpuscular theory of light	
8.2. Emission and absorption of light	
8.3. Stimulated absorption and emission of light	
8.4. Laser principles	
8.5. Structure and working of lasers	
8.6. Types of lasers with brief description	
8.7. Applications (Basic concepts)	
8.8. Material processing	
8.9. Laser welding	
8.10. Laser assisted machining	
8.11. Micro machining	
8.12. Drilling, scribing and marking	
8.13. Printing	
8.14. Lasers in medicine	
9. ELECTROMAGNETIC WAVES	03 Hours
9.1. Magnetic field around a current carrying conductor	
9.2. Electric field induced around a changing magnetic flux	
9.3. Moving fields	
9.4. Types of electromagnetic waves	
9.5. Generation of Radio waves	
9.6. Spectrum of electromagnetic waves	
10. ARTIFICIAL SATELLITES	02 Hours
10.1. Review law of gravitation	
10.2. Escape velocity	
10.3. Orbital velocity	
10.4. Geosynchronous and geostationary satellites	
10.5. Use of satellites in data communication	

REFERENCE BOOKS:

1. Tahir Hussain, Fundamentals of Physics Vol. – I and II
2. FaridKhawaja, Fundamental of Physics Vol. – I and II
3. Wells and Slusher, Schaum's Series Physics
4. Nelkon and Oyborn, Advanced Level Practical Physics
5. MehboobIllahi Malik and Inam-ulHaq, Practical physics
6. Wilson, Lasers – Principles and Applications
7. M. Aslam Khan and M. AkramSandhu, Experimental Physics Note Book

INSTRUCTIONAL OBJECTIVES

1. USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS

- 1.1 Write dimensional formulae for physical quantities.
- 1.2 Derive units using dimensional equations.
- 1.3 Convert a measurement from one system to another.
- 1.4 Use concepts of measurement and significant figures in problem solving.

2. USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS

- 2.1 Explain laws of parallelogram, triangle and polygon of forces.
- 2.2 Describe method of resolution of a vector into components.
- 2.3 Describe method of addition of vectors by rectangular components.
- 2.4 Differentiate between dot product and cross product of vectors.
- 2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors.

3. USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS

- 3.1 Use law of conservation of momentum to practical/technological problem.
- 3.2 Explain relation between linear and angular motion.
- 3.3 Use concepts and equations of angular motion to solve relevant technological problems.

4. USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS

- 4.1 Explain Torque.
- 4.2 Distinguish between Centre of gravity and centre of mass.
- 4.3 Explain rotational equilibrium and its conditions.
- 4.4 Explain rotational inertia giving examples.
- 4.5 Use the above concepts in solving technological problems.

5. UNDERSTAND CONCEPTS OF SOUND

- 5.1 Describe longitudinal wave and its propagation.
- 5.2 Explain the concepts: Intensity, loudness, pitch and quality of sound.
- 5.3 Explain units of intensity of level and frequency response of ear.
- 5.4 Explain phenomena of silence zones, beats.
- 5.5 Explain acoustics of buildings.
- 5.6 Explain Doppler's Effect giving mathematical expressions.

6. USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS AND LENSES

- 6.1 Explain laws of reflection and refraction.
- 6.2 Use mirror formula to solve problems.
- 6.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g., microscope, telescopes, camera and sextant.

7. UNDERSTAND WAVE THEORY OF LIGHT

- 7.1 Explain wave theory of light.
- 7.2 Explain phenomena of interference, diffraction, polarization of light waves.
- 7.3 Describe uses of polarization given in the course contents.

8. UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER

- 8.1 Explain the structure of the optical fiber.
- 8.2 Explain its principles of working.
- 8.3 Describe use of optical fiber in industry and medicine.

9. UNDERSTAND THE STRUCTURE, WORKING AND USES OF LASERS

- 9.1 Explain the stimulated emission of radiation.
- 9.2 Explain the laser principle.
- 9.3 Describe the structure and working of lasers.
- 9.4 Distinguish between types of lasers.
- 9.5 Describe the applications of lasers in the fields mentioned in the course's contents.

10. UNDERSTAND NATURE, TYPES, GENERATION AND SPECTRUM OF ELECTROMAGNETIC WAVES

- 10.1 Explain magnetic field due to current and electric field due to changing magnetic flux.
- 10.2 Explain moving fields.
- 10.3 Describe types of electromagnetic waves.
- 10.4 Explain generation of radio waves
- 10.5 Explain spectrum of electromagnetic waves.

11. UNDERSTAND TYPES AND USES OF ARTIFICIAL SATELLITES

- 11.1 Explain escape velocity.
- 11.2 Explain orbital velocity.
- 11.3 Distinguish between geosynchronous and geostationary satellites.
- 11.4 Describe uses of artificial satellites in data communication.

LIST OF PRACTICALS

96 Hours

1. Draw graphs representing the functions:
 - 1.1. $Y=mx$ for $m=0, 0.5, 1, 2$
 - 1.2. $Y=x^2$
 - 1.3. $Y=1/x$
2. Find the volume of a given solid cylinder using Vernier calipers.
3. Find the area of cross-section of the given wire using micrometer screw gauge.
4. Prove that force is directly proportional to (a) mass, (b) acceleration, using Fletcher's trolley.
5. Verify law of parallelogram of forces using Grave-sands apparatus.
6. Verify law of triangle of forces and Lami's theorem.

7. Determine the weight of a given body using:
 - 7.1. Law of parallelogram of forces.
 - 7.2. Law of triangle of forces.
 - 7.3. Lami's theorem.
8. Verify law of polygon of forces using grave-sands apparatus.
9. Locate the position and magnitude of resultant of like parallel forces.
10. Determine the resultant of two unlike parallel forces.
11. Find the weight of a given body using principle of moments.
12. Locate the centre of gravity of regular and irregular shaped bodies.
13. Find Young's Modules of Elasticity of a metallic wire.
14. Verify Hooke's Law using helical spring.
15. Study of frequency of stretched string with length.
16. Study of variation of frequency of stretched string with tension.
17. Study resonance of air column in resonance tube and find velocity of sound.
18. Find the frequency of the given tuning fork using resonance tube.
19. Find velocity of sound in rod by Kundt's tube.
20. Verify rectilinear propagation of light and study shadow formation.
21. Study effect of rotation of plane mirror on reflection.
22. Compare the refractive indices of given glass slabs.
23. Find focal length of concave mirror by locating centre of curvature.
24. Find focal length of concave mirror by object and image method.
25. Find focal length of concave mirror with converging lens.
26. Find refractive index of glass by apparent depth.
27. Find refractive index of glass by spectrometer.
28. Find focal length of converging lens by plan mirror.
29. Find focal length of converging lens by displacement method.
30. Find focal length of diverging lenses using converging lens.
31. Find focal length of diverging lens using concave mirror.
32. Find angular magnification of an astronomical telescope.
33. Find angular magnification of a simple microscope (magnifying glass).
34. Find angular magnification of a compound microscope.
35. Study working and structure of camera.
36. Study working and structure of sextant.
37. Compare the different scales of temperature and verify the conversion formula.
38. Determine the specific heat of lead shots.
39. Find the coefficient of linear expansion of a metallic rod.
40. Find the heat of fusion of ice.
41. Find the heat of vaporization.
42. Determine relative humidity using hygrometer.

APPLIED CHEMISTRY

Course Code: Ch-132

Total Contact Hours: 128

Theory 32

Practical 96

T P C

1 3 2

Pre-requisite: The student must have studied the subject of elective chemistry at Secondary school level.

AIMS After studying this course a student will be able to:

1. Understand the significance and role of chemistry in the development of modern technology.
2. Becomes acquainted with the basic principles of chemistry as applied in the study of relevant Technology.
3. Knows the scientific methods for production, properties and use of materials of industrial & technological significance.
4. Gain skill for the efficient conduct of practical in a chemistry lab.

1. INTRODUCTION

2 Hours

- 1.1 The scope and significance of the subject.
- 1.2 Orientation with reference to Technology.
- 1.3 Terms used & units of measurements in the study of chemistry.

2. FUNDAMENTAL CONCEPTS OF CHEMISTRY

2 Hours

- 2.1 Symbols, Valency, Radicals, formulas.
- 2.2 Chemical Reactions & their types.
- 2.3 Balancing of equations by ionic method.

3. ATOMIC STRUCTURE

2 Hours

- 3.1 Sub-atomic particles.
- 3.2 Bohr's Atomic Model.
- 3.3 The periodic classification of elements and periodic law
- 3.4 General characteristics of a period and group.

4. CHEMICAL BOND

2 Hours

- 4.1 Nature of chemical Bond.
- 4.2 Electrovalent bond with examples.
- 4.3 Covalent Bond (Polar and Non-polar, sigma & Pi Bonds with examples.
- 4.4 Co-ordinate Bond with examples.

5. SOLIDS AND LIQUIDS

3 Hours

- 5.1 The liquid and Solid's state.
The liquids and their general properties (Density, viscosity, surface tension capillary action etc).
- 5.3 Solids and their general properties.
- 5.4 Crystal structure of solids
- 5.5 Crystals of Si and Ge.

6. WATER	3 Hours
6.1 Chemical nature and properties.	
6.2 Impurities.	
6.3 Hardness of water (types, causes & removal)	
6.4 Scales of measuring hardness (Degrass Clark, French, PPM, Mgm per litre).	
6.5 Boiler feed water, scales and treatment.	
6.6 Sea-water desalination, sewage treatment.	
7. ACIDS, BASES AND SALTS	2 Hours
7.1 Definitions with examples.	
7.2 Properties, their strength, basicity & Acidity.	
7.3 Salts and their classification with examples.	
7.4 pH-value and scale.	
8. OXIDATION & REDUCTION	2 Hours
8.1 The process with examples.	
8.2 Oxidizing and Reducing agents.	
8.3 Oxides and their classifications.	
9. NUCLEAR CHEMISTRY	2 Hours
9.1 Introduction.	
9.2 Radioactivity (Alpha, beta and gamma rays).	
9.3 Half-life process.	
9.4 Nuclear reaction & transformation of elements.	
9.5 Isotopes and their uses.	
10. ALLOYS	2 Hours
10.1 Introduction with need.	
10.2 Preparation and properties.	
10.3 Some important alloys and their composition.	
11. CORROSION	2 Hours
11.1 Introduction with causes.	
11.2 Types of corrosion.	
11.3 Rusting of Iron	
11.4 Protective measures against corrosion.	
12. ELECTRO CHEMISTRY	2 Hours
12.1 Ionization and Arrhenius theory of Ionization.	
12.2 Electrolytes and Electrolysis.	
12.3 Faraday's Laws and numericals related to them.	
12.4 Application of Electrolysis (Electron, lathing etc).	
12.5 Electro Chemical cells.	
13. ELECTRICAL INSULATING MATERIALS.	2 Hours
13.1 Introduction.	
13.2 Solid insulators with chemical nature.	

- 13.3 Liquid insulators with chemical nature.
- 13.4 Gaseous insulators with chemical nature.
- 13.5 Uses and their classification.

14. SEMI CONDUCTORS.

2 Hours

- 14.1 Introduction
- 14.2 Atomic structure of silicon and germanium.
- 14.3 Bonding & Conductivity.
- 14.4 Energy bands in a semiconductor.

15. ETCHING PROCESS.

2 Hours

- 15.1 The process and its aims.
- 15.2 Etching reagents.
- 15.3 Applications of processors.

REFERENCE BOOKS:

- 1. Intermediate Text-Books of chemistry I & II
- 2. ILMI Applied Science by SH. Ata Mohammed
- 3. Materials science by J.C.Anderson & Leaver.
- 4. Polytechnic Chemistry by G.N.Ready (ELBS & Nelson, Hong Kong).
- 5. Chemistry for engineers by Eric Gyngell.

INSTRUCTIONAL OBJECTIVES

1. UNDERSTAND THE SCOPE, SIGNIFICANCE AND ROLE OF THE SUBJECT.

- 1.1 Define chemistry and its terms.
- 1.2 Define the units of measurements in the study of chemistry.
- 1.3 Explain the importance of chemistry in various fields of specialization.
- 1.4 Explain the role of chemistry in this technology.

2. UNDERSTAND LANGUAGE OF CHEMISTRY AND CHEMICAL REACTIONS.

- 2.1 Define symbol, valency, radical, formula with examples of each.
- 2.2 Write chemical formula of common compounds.
- 2.3 Define chemical reaction and equations.
- 2.4 Describe types of chemical reactions with examples.
- 2.5 Explain the method of balancing the equation by ionic method.

3. UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS.

- 3.1 Define atom.
- 3.2 Describe the fundamental sub atomic particles
- 3.3 Distinguish between atomic no. mass no. and between isotope and isobars.
- 3.4 Explain the arrangements of electrons in different shells and sub energy levels and understand bohr's atomic model.
- 3.5 Explain the grouping and placing of elements in the periodic table especially Si & germanium.
- 3.6 State the periodic law of elements.
- 3.7 Explain the trend of properties of elements based on their position in the periodic table.

3.8 Explain general characteristics of a period and a group.

4. UNDERSTAND THE NATURE OF CHEMICAL BONDS.

- 4.1 Define chemical Bond.
- 4.2 State the nature of chemical bond.
- 4.3 Differentiate between electrovalent and covalent bonding.
- 4.4 Explain the formation of polar and non-polar, sigma and pi-bond with examples.
- 4.5 Describe the nature of coordinate bond with examples.

5. UNDERSTAND THE STATES OF MATTER AND DISTINGUISHES SOLIDS FROM GASES.

- 5.1 Describe the liquid and solid states of matter.
- 5.2 State the general properties of liquid.
- 5.3 State the general properties of solid.
- 5.4 Explain the formation of crystals and their types.
- 5.5 Describe the crystal structure of Si and Ge.

6. UNDERSTAND THE CHEMICAL NATURE OF WATER.

- 6.1 Describe the chemical nature of water with its formula.
- 6.2 Describe the general impurities present in water.
- 6.3 Explain the causes and methods to remove hardness of water.
- 6.4 Express hardness in different units like mg/litre. p.p.m, degrees Clark and degrees French.
- 6.5 Describe the formation and nature of scales in boiler feed water.
- 6.6 Explain the method for the treatment of scales.
- 6.7 Explain the sewage treatment and desalination of sea water.

7. UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS.

- 7.1 Define acids, bases and salts with examples.
- 7.2 State general properties of acids and bases.
- 7.3 Differentiate between acidity and basicity.
- 7.4 Define salts, give their classification with examples.
- 7.5 Explain pH value of solution and pH scale.

8. UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION.

- 8.1 Define oxidation.
- 8.2 Illustrate the oxidation process with examples.
- 8.3 Define reduction.
- 8.4 Explain reduction process with examples.
- 8.5 Define oxidizing and reducing agents and give at least six examples of each.
- 8.6 Define oxides.
- 8.7 Classify the oxides and give examples.

9. UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY.

- 9.1 Define nuclear chemistry and radio activity.
- 9.2 Differentiate between alpha, beta and gamma particles.
- 9.3 Explain half-life process.
- 9.4 Explain at least six nuclear reactions resulting in the transformation of some elements.

9.5 State the uses of isotopes.

10. UNDERSTAND THE NATURE OF ALLOYS USED IN THE RESPECTIVE TECHNOLOGY.

- 10.1 Define alloy.
- 10.2 Explain different methods for the preparation of alloys.
- 10.3 Explain important properties of alloys.
- 10.4 Explain the composition, properties and uses of alloys.

11. UNDERSTAND THE PROCESS OF CORROSION.

- 11.1 Define corrosion.
- 11.2 Describe different types of corrosion.
- 11.3 State the causes of corrosion.
- 11.4 Explain the process of rusting of iron.
- 11.5 Describe methods to prevent/control corrosion.

12. UNDERSTAND THE APPLICATION OF ELECTROCHEMISTRY IN DIFFERENT FIELDS OF INDUSTRIES.

- 12.1 Define ionization, electrolyte and electrolysis.
- 12.2 Describe Arrhenius theory of ionization.
- 12.3 State Faraday's laws of electrolysis.
- 12.4 Apply Faraday's laws of different fields of industry.
- 12.5 Solves numerical problem on Faraday's Laws.
- 12.6 Explain the construction and working of Daniel cell and lead accumulator.

13. KNOW THE USE OF INSULATING MATERIALS.

- 13.1 Define insulator, conductor.
- 13.2 Classify solid, liquid and gaseous insulators with their chemical nature.
- 13.3 Describe their uses.

14. UNDERSTAND THE NATURE AND CHEMISTRY OF SEMI CONDUCTORS.

- 14.1 Define semi -conductors.
- 14.2 Draw the atomic structure of silicon and germanium.
- 14.3 Describe the process of bonding and conductivity in conductors and semi-conductors.
- 14.4 Explain energy bands in semi- conductors.

15. USE ETCHING PROCESS IN DIFFERENT FIELDS OF TECHNOLOGY.

- 15.1 Define etching process and its aims.
- 15.2 Enlist the chemicals/reagents used in the process.
- 15.3 Explain the use of the process in the technology.

1. To introduce the common apparatus, glassware and chemical reagents used in the chemistry lab.
2. To purify a chemical substance by crystallization.
3. To separate a mixture of sand and salt.
4. To find the melting point of substance.
5. To find the pH of a solution with pH paper.
6. To separate a mixture of inks by chromatography.
7. To determine the co-efficient of viscosity of benzene with the help of Ostwald viscometer.
8. To find the surface tension of a liquid with a stalagmometer.
9. To perform electrolysis of water to produce Hydrogen and Oxygen.
10. To determine the chemical equivalent of copper by electrolysis of Cu SO.
11. To get introduction with the scheme of analysis of salts for basic radicals.
12. To analyse 1st group radicals (Ag^+ - Pb^{++} - Hg^+).
13. To make practice for detection 1st group radicals.
14. To get introduction with the scheme of II group radicals.
15. To detect and confirm II-A radicals (Hg^{++} , Pb^{++++} , Cu^+ , Cd^{++} , Bi^{+++}).
16. To detect and confirm II-B radicals Sn^{+++} , Sb^{+++} , As^{+++}).
17. To get introduction with the scheme of III group radicals (Fe^{+++} - Al^{+++} , Cr^{+++}).
18. To detect and confirm Fe^{+++} , Al^{+++} and Cr^{+++} .
19. To get introduction with the scheme of IV group radicals.
20. To detect and confirm An^{++} and Mn^{++} radicals of IV group.
21. To detect and confirm Co^{++} and Ni^{++} radicals of IV group.
22. To get introduction with the Acid Radical Scheme.
23. To detect dilute acid group.
24. To detect and confirm $\text{CO}_3^{''}$ and HCO_3' radicals.
25. To get introduction with the methods/apparatus of conducting volumetric estimations.
26. To prepare standard solution of a substance.
27. To find the strength of a given alkali solution.
28. To estimate HCO_3' contents in water.
29. To find out the %age composition of a mixture solution of KNO_3 and KOH volumetrically.
30. To find the amount of chloride ions (Cl') in water volumetrically.

Computer Tool Software Application

Course Code: BDT 121

Total Contact Hours:96

Theory: 0

Practical: 96

T	P	C
0	3	1

COURSE OBJECTIVES

This course aims to achieve the following training objectives:

1. Popularize new computer skills, and explain in detail the application of commonly used computer tools;
2. Master basic computer operation skills, and can also draw inferences from one instance, extending to the application of other related skills;
3. Understand the knowledge system of commonly used computer software, Form an overall understanding of computers;
4. Familiar with various computer-related tools to lay the foundation for subsequent in-depth study of related computer technologies;

PRACTICAL CONTENTS

1. OVERVIEW OF COMPUTER SOFTWARE

09 Hours

- 1.1 Basic knowledge of computer software
 - 1.1.1 System software Knowledge instruction: UNIX system
 - 1.1.2 Application software
 - 1.2 Overview of Common Tools and Software
 - 1.2.1 Common tool software types
 - 1.2.2 Installation version software and green version software
 - 1.3 Installation and uninstallation of computer software
 - 1.3.1 Software Download
 - 1.3.2 Software installation
 - Note: Why do we modify the installation path
 - 1.3.3 Software Uninstallation 13
 - Note: How to use the uninstaller program
- Knowledge Instruction: Comparison of Uninstallation Methods
 - Hands-on practice: Using third-party tools for software management
 - Knowledge Instruction: What is Rogue Software
 - Knowledge Extension: What is BIOS System

2. COMPUTER HARDWARE TESTING SOFTWARE

09 Hours

- 2.1 Viewing Computer Configuration Information Using Tools Native to Windows System
 - 2.1.1 Viewing Hardware Information Using Device Manager
 - 2.1.2 Viewing Hardware Information Using Task Manager
- 2.2 Viewing Hardware Information Software
 - 2.2.1 Understanding AIDA64
 - 2.2.2 Viewing Computer Information
 - Hands-on practice: Real-time monitoring of computer performance
- 2.3 CPU detection software

- 2.3.1 Introduction to CPU-Z
- 2.3.2 Viewing CPU Information
- Hands-on practice: CPU performance
- 2.4 Memory detection software
 - Note: The particularity of memory detection
- 2.5 Hard disk detection software
 - 2.5.1 Overview of Hard Disk Status
 - 2.5.2 Solid State Drive Read and Write Detection
 - 2.5.3 Bad Block Detection of Hard Disk
 - 2.5.4 Detection of hard disk read/write speed
 - Hands-on practice: Hard drive faults
 - Knowledge Instruction: logical and physical evils
- 2.6 Graphics card detection software
 - 2.6.1 Understanding GPU-Z
 - 2.6.2 Using GPU-Z
 - Knowledge Instruction: Verifying Bus Speed Using GPU-Z
- 2.7 Temperature monitoring software
- 2.8 Real time performance monitoring software
 - 2.8.1 Understanding MSI Afterburner
 - 2.8.2 Using MSI Afterburner
 - Hands-on practice: Real-time performance monitoring
- 2.9 Computer scoring software
 - Hands-on practice: The application of Master Lu
 - Knowledge extension: viewing information related to Windows systems

3. COMMON COMPUTER SECURITY SOFTWARE

09 Hours

- 3.1 Main risks faced by computers
 - 3.1.1 Current Situation of Computer Network Security
 - 3.1.2 Main threats and manifestations faced by computers
- 3.2 Common antivirus software
 - 3.2.1 Huorong Internet Security Software introduction
 - 3.2.2 Download and installation of Huorong Internet Security Software
 - Knowledge instruction: homepage download tips
 - Knowledge instruction: Install using the 'Open Directly' feature
 - Knowledge instruction: Fast installation
 - 3.2.3 Usage of Huorong Internet Security Software
 - Hands-on practice: Detect and kill viruses
 - Attention: Selection of antivirus mode
 - Knowledge extension: Windows' own security protection components

4. COMPUTER MANAGEMENT OPTIMIZATION SOFTWARE

09 Hours

- 4.1 Common Computer Comprehensive Management Optimization Software
 - 4.1.1 Meet Tencent Computer Manager
 - 4.1.2 Using a computer butler
 - Knowledge instruction: system acceleration optimization
 - 4.1.3 Computer butler special function
 - Hands-on Practice: Network Management
- 4.2 Common Computer Single Item Management Optimization Software

4.2.1 Computer Garbage Cleaning Software

Knowledge instruction: Managing new content storage location

4.2.2 Registry management software

Hands on Practice: Backup and Restore Registry

4.3 Driver detection and automatic installation of drivers

4.3.1 Software Download and Installation

4.3.2 Automatic installation drive

Hands on practice: Backup and restore drivers

Knowledge Extension: Fully Understanding the Ports of Computers

Knowledge instruction: URL parsing and port mapping

5. HARD DISK MANAGEMENT OPTIMIZATION SOFTWARE

09 Hours

5.1 Hard Disk Partition Software

5.1.1 What is hard disk partition

5.1.2 Understanding DiskGenius

Knowledge Instruction: Precautions for creating partitions in MBR

Note: DiskGenius execution mode

Knowledge Instruction: How to Determine the Partition Type of the Current Disk

Hands on practice: Non-destructive resizing of partitions

5.2 Data restoration software

5.2.1 Principle of data restoration

5.2.2 Use of R-STUDIO Network

Hands on practice: Data restoration operations

5.3 Disk Defragmentation Software

5.3.1 Causes and Effects of Disk Fragmentation

5.3.2 Principle of Disk Defragmentation

Hands-on practice: Using Windows built-in software for defragmentation

Knowledge Extension: A Method of Directly Adjusting Partition Capacity

6. FILE MANAGEMENT SOFTWARE

09 Hours

6.1 File compression software

6.1.1 File compression principle

Precautions: Precautions for using compressed files

6.1.2 Use of WinRAR

Knowledge Instruction: A Quick Decompression Method

Knowledge Instruction: techniques for decompression

Knowledge Instruction: Encrypted File Name

Hands-on practice: Creating self extracting compressed files

6.2 Partition and file backup and restore software

6.2.1 Using Ghost to Back Up Partitions

6.2.2 Using Ghost to Restore Partitions

Hands-on practice: Using the system's built-in functions to backup and restore files

Note: Why cannot I add a drive

Knowledge Instruction: operations of automatic backup of file

6.3 Application of File Encryption Software

6.3.1 Overview of File Encryption

6.3.2 Using encryption software to encrypt and decrypt files

Hands-on practice: Set the expiration date of the password

6.4 Network Backup and Sharing

6.4.1 Understanding Baidu Netdisk

6.4.2 Use of Baidu Netdisk

Note: Only members can extract files online

Hands-on practice: Using Baidu Netdisk client to share files

6.5 File Download Software

6.5.1 Download using a browser

6.5.2 Download using Thunderbolt

Knowledge Extension: Another Backup and Restore Method for Windows 10

7. NETWORK APPLICATION SOFTWARE

09 Hours

7.1 Web browser

7.1.1 Edge Browser

7.1.2 QQ Browser

Hands-on practice: Installing, using, and managing QQ browser plugins

7.2 Instant messaging software

7.2.1 QQ

7.2.2 WeChat

Hands-on practice: Using WeChat to backup chat records

7.3 Remote management software

7.3.1 Understanding TeamViewer

7.3.2 Installing TeamViewer

7.3.3 Using TeamViewer

Hands-on practice: TeamViewer's unattended function

Attention: Use an unattended password to connect

7.4 Email

7.4.1 Understanding email

7.4.2 Use of Foxmail

Hands-on practice: Using web version email to send and receive emails

7.5 Screen projection software

7.6 Local Area Network Sharing

Hands-on practice: Sharing settings

Knowledge instruction: Sharing issues

Knowledge extension: Remotely starting a computer

8. IMAGE BROWSING AND PROCESSING SOFTWARE

06 Hours

8.1 Viewing Software

8.1.1 Windows built-in image viewing software

8.1.2 2345 Picture King

Attention: Use the right-click shortcut menu to select the viewing software

Hands-on practice: Downloading and using ABC Viewing software

8.2 Screenshot software

8.2.1 Understanding SnapIt

8.2.2 Use SnagIt to take screenshots

Precautions: What to do if screenshots are incorrect

Hands-on practice: Delayed screenshot

8.3 Image processing software

8.3.1 Meitu

8.3.2 SnapIt Editor

Knowledge Instruction: Close the 'Properties' settings pane

Hands-on practice: Mosaic processing of partial images

Knowledge Extension: Online Image Processing

9. MULTIMEDIA SOFTWARE

09 Hours

9.1 Playback of audio and video files

9.1.1 StormPlayer

9.1.2 Necessary settings for StormPlayer

Hands on practice: The use of StormPlayer

9.2 Online audio software

9.2.1 Understanding QQ Music Player

Knowledge instruction: Start QQ music software

9.2.2 Using QQ Music Player

Hands-on practice: Creating playlists and adding songs in bulk

9.3 Online video software

9.3.1 Understanding Tencent Video

9.3.2 Using Tencent Video PC

Hands-on Practice: Online Video Download

9.4 Screen recording software

9.4.1 Introduction to oCam (Screen Recorder)

9.4.2 Usage of oCam

Attention: Enable sound recording function

Hands-on practice: using oCam recording software tutorial

9.5 Use of live streaming software

9.5.1 OBS Studio

9.5.2 Usage of OBS Studio

Hands-on practice: Using Douyu live streaming software for live streaming

Knowledge instruction: Douyu live streaming butler

9.6 Video editing software

Hands-on practice: Adding annotations to video

Knowledge extension: zero-distance live streaming

10. COMPUTER OFFICE SOFTWARE

06 Hours

10.1 Microsoft Office Software Family

10.1.1 Introduction to Microsoft Office Components

10.1.2 Microsoft Office Component Collaborative Office

Hands-on practice: Using templates to create invitation letters

10.2 WPS Office series office software

10.2.1 Introduction to WPS Office

10.2.2 Download and Installation of WPS Office

10.2.3 Use of WPS Office

Knowledge instruction: The advantages of WPS Office in creating documents

Hands-on practice: WPS Office multiplayer collaboration

10.3 Translation software

10.3.1 Download and Installation of Youdao Dictionary

10.3.2 The Function of Word Extraction and Marking and Translation in Youdao Dictionary

Hands-on practice: Screenshot translation

10.4 PDF Reader

Hands-on practice: The use of Jinshan PDF Reader

Knowledge Instruction: The Editing Function of Kingsoft PDF Reader

Knowledge Extension: The Use of Microsoft Office Mobile

11. OPERATING SYSTEM INSTALLATION SOFTWARE

06 Hours

11.1 Overview of Operating System Installation

11.1.1 When does the system need to be installed

11.1.2 Preparation for installing the operating system

11.1.3 Introduction to UEFI+GPT and Legacy+MBR

Knowledge instruction: The role of each partition in UEFI+GPT partitioning

11.1.4 Main process of system installation

11.2 Creating a startup USB flash drive

11.2.1 Introduction to PE

11.2.2 U depth

11.2.3 U depth download and installation

Hands-on practice: Making of startup USB drive

11.3 Operating System Installation Process

Attention: Installation matching mode principle

11.3.1 Installing Windows 10 operating system in UEFI mode

11.3.2 Configuring System Parameters

Note: Why do many software installations occur simultaneously after installing a Windows system

Hands-on practice: Using third-party tools to install Windows Server systems

11.4 Creating a portable operating system

11.4.1 Introduction to Windows TO GO

11.4.2 Using WTGA to create a portable Windows 10 operating system

Knowledge Instruction: The Choice of Mirrors

Note: Virtual hard disk mode

Knowledge instruction: setting up partitions

Hands on Practice: Making Pocket Linux System

Knowledge Instruction: Hard Disk Naming for Linux

Knowledge Instruction: Linux partitions

Knowledge extension: Understanding multiple operating systems

12. COMPUTER AND MOBILE VIRTUALIZATION SOFTWARE

06 Hours

12.1 Virtual Machine Software

12.1.1 Introduction to VMware Workstation Pro

12.1.2 Common Functions of VMware Workstation Pro

Knowledge Instruction: Cleaning and Deleting Virtual Machines

Hands-on practice: Installing Windows 10 systems in virtual machines

Note: Setting up virtual machine disks

12.2 Mobile phone simulator software

12.2.1 Blue stack simulator

12.2.2 Download and Installation of Blue Stack Simulator

12.2.3 Usage of Blue Stack Simulator

REFERENCE BOOKS:

1. New Era Education. Office Software from Entry to Proficiency. China Water Resources and Hydropower Publishing House
2. Duan Xin. Common Tool Software (Fifth Edition). Higher Education Press
3. Wenjie Academy, Introduction and Application of Common Computer Tools and Software (Second Edition), Tsinghua University Press

INSTRUCTIONAL OBJECTIVES

1. Overview of Computer Software

1.1 Basic knowledge of computer software

1.1.1 System software

Knowledge instruction: UNIX system

1.1.2 Application software

1.2 Overview of Common Tools and Software

1.2.1 Common tool software types

1.2.2 Installation version software and green version software

1.3 Installation and uninstallation of computer software

1.3.1 Software Download

1.3.2 Software installation

Note: Why do we modify the installation path

1.3.3 Software Uninstallation

Note: How to use the uninstaller program

Knowledge Instruction: Comparison of Uninstallation Methods

Hands-on practice: Using third-party tools for software management

Knowledge Instruction: What is Rogue Software

Knowledge Extension: What is BIOS System

2. Computer Hardware Testing Software

2.1 Viewing Computer Configuration Information Using Tools Native to Windows System

2.1.1 Viewing Hardware Information Using Device Manager

2.1.2 Viewing Hardware Information Using Task Manager

2.2 Viewing Hardware Information Software

2.2.1 Understanding AIDA64

2.2.2 Viewing Computer Information

Hands-on practice: Real-time monitoring of computer performance

2.3 CPU detection software

2.3.1 Introduction to CPU-Z

2.3.2 Viewing CPU Information

Hands-on practice: CPU performance

2.4 Memory detection software

Note: The particularity of memory detection

2.5 Hard disk detection software

2.5.1 Overview of Hard Disk Status

2.5.2 Solid State Drive Read and Write Detection

- 2.5.3 Bad Block Detection of Hard Disk
- 2.5.4 Detection of hard disk read/write speed
- Hands-on practice: Hard drive faults
- Knowledge Instruction: logical and physical evils
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- 2.6.1 Understanding GPU-Z
- 2.6.2 Using GPU-Z
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- 2.8 Real time performance monitoring software
- 2.8.1 Understanding MSI Afterburner
- 2.8.2 Using MSI Afterburner
- Hands-on practice: Real-time performance monitoring
- 2.9 Computer scoring software
- Hands-on practice: The application of Master Lu
- Knowledge extension: viewing information related to Windows systems

3. Common Computer Security Software

- 3.1 Main risks faced by computers
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- 3.1.2 Main threats and manifestations faced by computers
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- 3.2.1 Huorong Internet Security Software introduction
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- Knowledge instruction: homepage download tips
- Knowledge instruction: Install using the 'Open Directly' feature
- Knowledge instruction: Fast installation
- 3.2.3 Usage of Huorong Internet Security Software
- Hands-on practice: Detect and kill viruses
- Attention: Selection of antivirus mode
- Knowledge extension: Windows' own security protection components

4. Computer Management Optimization Software

- 4.1 Common Computer Comprehensive Management Optimization Software
- 4.1.1 Meet Tencent Computer Manager
- 4.1.2 Using a computer butler
- Knowledge instruction: system acceleration optimization
- 4.1.3 Computer butler special function
- Hands-on Practice: Network Management
- 4.2 Common Computer Single Item Management Optimization Software
- 4.2.1 Computer Garbage Cleaning Software
- Knowledge instruction: Managing new content storage location
- 4.2.2 Registry management software
- Hands on Practice: Backup and Restore Registry
- 4.3 Driver detection and automatic installation of drivers
- 4.3.1 Software Download and Installation
- 4.3.2 Automatic installation drive
- Hands on practice: Backup and restore drivers

Knowledge Extension: Fully Understanding the Ports of Computers

Knowledge instruction: URL parsing and port mapping

5. Hard Disk Management Optimization Software

5.1 Hard Disk Partition Software

5.1.1 What is hard disk partition

5.1.2 Understanding DiskGenius

Knowledge Instruction: Precautions for creating partitions in MBR

Note: DiskGenius execution mode

Knowledge Instruction: How to Determine the Partition Type of the Current Disk

Hands on practice: Non-destructive resizing of partitions

5.2 Data restoration software

5.2.1 Principle of data restoration

5.2.2 Use of R-STUDIO Network

Hands on practice: Data restoration operations

5.3 Disk Defragmentation Software

5.3.1 Causes and Effects of Disk Fragmentation

5.3.2 Principle of Disk Defragmentation

Hands-on practice: Using Windows built-in software for defragmentation

Knowledge Extension: A Method of Directly Adjusting Partition Capacity

6. File Management Software

6.1 File compression software

6.1.1 File compression principle

Precautions: Precautions for using compressed files

6.1.2 Use of WinRAR

Knowledge Instruction: A Quick Decompression Method

Knowledge Instruction: techniques for decompression

Knowledge Instruction: Encrypted File Name

Hands-on practice: Creating self extracting compressed files

6.2 Partition and file backup and restore software

6.2.1 Using Ghost to Back Up Partitions

6.2.2 Using Ghost to Restore Partitions

Hands-on practice: Using the system's built-in functions to backup and restore files

Note: Why cannot I add a drive

Knowledge Instruction: operations of automatic backup of file

6.3 Application of File Encryption Software

6.3.1 Overview of File Encryption

6.3.2 Using encryption software to encrypt and decrypt files

Hands-on practice: Set the expiration date of the password

6.4 Network Backup and Sharing

6.4.1 Understanding Baidu Netdisk

6.4.2 Use of Baidu Netdisk

Note: Only members can extract files online

Hands-on practice: Using Baidu Netdisk client to share files

6.5 File Download Software

6.5.1 Download using a browser

6.5.2 Download using Thunderbolt

7. Network Application Software

7.1 Web browser

7.1.1 Edge Browser

7.1.2 QQ Browser

Hands-on practice: Installing, using, and managing QQ browser plugins

7.2 Instant messaging software

7.2.1 QQ

7.2.2 WeChat

Hands-on practice: Using WeChat to backup chat records

7.3 Remote management software

7.3.1 Understanding TeamViewer

7.3.2 Installing TeamViewer

7.3.3 Using TeamViewer

Hands-on practice: TeamViewer's unattended function

Attention: Use an unattended password to connect

7.4 Email

7.4.1 Understanding email

7.4.2 Use of Foxmail

Hands-on practice: Using web version email to send and receive emails

7.5 Screen projection software

7.6 Local Area Network Sharing

Hands-on practice: Sharing settings

Knowledge instruction: Sharing issues

Knowledge extension: Remotely starting a computer

8. Image Browsing and Processing Software

8.1 Viewing Software

8.1.1 Windows built-in image viewing software

8.1.2 2345 Picture King

Attention: Use the right-click shortcut menu to select the viewing software

Hands-on practice: Downloading and using ABC Viewing software

8.2 Screenshot software

8.2.1 Understanding SnapIt

8.2.2 Use SnagIt to take screenshots

Precautions: What to do if screenshots are incorrect

Hands-on practice: Delayed screenshot

8.3 Image processing software

8.3.1 Meitu

8.3.2 SnapIt Editor

Knowledge Instruction: Close the 'Properties' settings pane

Hands-on practice: Mosaic processing of partial images

Knowledge Extension: Online Image Processing

9. Multimedia Software

9.1 Playback of audio and video files

9.1.1 StormPlayer

- 9.1.2 Necessary settings for StormPlayer
 - Hands on practice: The use of StormPlayer
- 9.2 Online audio software
 - 9.2.1 Understanding QQ Music Player
 - Knowledge instruction: Start QQ music software
 - 9.2.2 Using QQ Music Player
 - Hands-on practice: Creating playlists and adding songs in bulk
- 9.3 Online video software
 - 9.3.1 Understanding Tencent Video
 - 9.3.2 Using Tencent Video PC
 - Hands-on Practice: Online Video Download
- 9.4 Screen recording software
 - 9.4.1 Introduction to oCam (Screen Recorder)
 - 9.4.2 Usage of oCam
 - Attention: Enable sound recording function
 - Hands-on practice: using oCam recording software tutorial
- 9.5 Use of live streaming software
 - 9.5.1 OBS Studio
 - 9.5.2 Usage of OBS Studio
 - Hands-on practice: Using Douyu live streaming software for live streaming
 - Knowledge instruction: Douyu live streaming butler
- 9.6 Video editing software
 - Hands-on practice: Adding annotations to videos
 - Knowledge extension: zero-distance live streaming

10. Computer Office Software

- 10.1 Microsoft Office Software Family
 - 10.1.1 Introduction to Microsoft Office Components
 - 10.1.2 Microsoft Office Component Collaborative Office
 - Hands-on practice: Using templates to create invitation letters
- 10.2 WPS Office series office software
 - 10.2.1 Introduction to WPS Office
 - 10.2.2 Download and Installation of WPS Office
 - 10.2.3 Use of WPS Office
 - Knowledge instruction: The advantages of WPS Office in creating documents
 - Hands-on practice: WPS Office multiplayer collaboration
- 10.3 Translation software
 - 10.3.1 Download and Installation of Youdao Dictionary
 - 10.3.2 The Function of Word Extraction and Marking and Translation in Youdao Dictionary
 - Hands-on practice: Screenshot translation
- 10.4 PDF Reader
 - Hands-on practice: The use of Jinshan PDF Reader
 - Knowledge Instruction: The Editing Function of Kingsoft PDF Reader
 - Knowledge Extension: The Use of Microsoft Office Mobile

11. Operating System Installation Software

- 11.1 Overview of Operating System Installation
 - 11.1.1 When does the system need to be installed

11.1.2 Preparation for installing the operating system

11.1.3 Introduction to UEFI+GPT and Legacy+MBR

Knowledge instruction: The role of each partition in UEFI+GPT partitioning

11.1.4 Main process of system installation

11.2 Creating a startup USB flash drive

11.2.1 Introduction to PE

11.2.2 U depth

11.2.3 U depth download and installation

Hands-on practice: Making of startup USB drive

11.3 Operating System Installation Process

Attention: Installation matching mode principle

11.3.1 Installing Windows 10 operating system in UEFI mode

11.3.2 Configuring System Parameters

Note: Why do many software installations occur simultaneously after installing a Windows system

Hands-on practice: Using third-party tools to install Windows Server systems

11.4 Creating a portable operating system

11.4.1 Introduction to Windows TO GO

11.4.2 Using WTGA to create a portable Windows 10 operating system

Knowledge Instruction: The Choice of Mirrors

Note: Virtual hard disk mode

Knowledge instruction: setting up partitions

Hands on Practice: Making Pocket Linux System

Knowledge Instruction: Hard Disk Naming for Linux

Knowledge Instruction: Linux partitions

Knowledge extension: Understanding multiple operating systems

12. Computer and Mobile Virtualization Software

12.1 Virtual Machine Software

12.1.1 Introduction to VMware Workstation Pro

12.1.2 Common Functions of VMware Workstation Pro

Knowledge Instruction: Cleaning and Deleting Virtual Machines

Hands-on practice: Installing Windows 10 systems in virtual machines

Note: Setting up virtual machine disks

12.2 Mobile phone simulator software

12.2.1 Blue stack simulator

12.2.2 Download and Installation of Blue Stack Simulator

12.2.3 Usage of Blue Stack Simulator

Introduction to Computer Programming with JAVA

Course Code: SWT-112

Total Contact Hours: 128

Theory: 32

Practical: 96

T P C

1 3 2

This course is suitable for programming beginners, with a focus on cultivating students' object-oriented programming (OOP) ability. OOP-related analysis will run through the whole course, laying a solid foundation for subsequent courses such as Android programming. With OOP being the core, the course adopts the idea of proceeding from the real world problems to computer programs to give students gradual and in-depth explanation over the knowledge covered in this course, preparing students for subsequent courses

COURSE OBJECTIVES

1. Obtain the ability to design and document business logic according to the actual needs of users
2. Obtain the ability to use JDK for basic Java programming
3. Obtain the ability to program with Java branching statements
4. Obtain the ability to program with Java looping statements
5. On the basis of mastering arrays, expand the understanding of two-dimensional to three-dimensional arrays
6. Obtain the ability to program basic operations on arrays
7. Obtain the ability to program basic operations to write strings
8. Obtain the ability to program to catch exceptions
9. Obtain the ability to define your own exception classes
10. Obtain the ability to understand the basic structure of a graphical interface
11. Obtain the ability to program basic graphical user interfaces with AWT and Swing

COURSE CONTENTS

- | | |
|--|-----------------|
| 1. PROJECT REQUIREMENTS ANALYSIS AND DESIGN | 2 Hours |
| 1.1 Write "Project Requirements Analysis" | |
| 2. ECLIPSE INTEGRATED DEVELOPMENT ENVIRONMENT | 2 Hours |
| 2.1 Create an App project | |
| 2.2 Create a Java App program in Eclipse | |
| 2.3 Power-off tracking for the Java App program | |
| 3. BASIC STRUCTURE OF JAVA PROGRAMS | 16 Hours |
| 3.1 Basic structure of Java programs | |
| 3.2 Loops and branches | |

3.3 Arrays and strings

3.4 Design of OOP

4. EXCEPTION HANDLING

8 Hours

4.1 The meaning of exceptions and how to catch them

4.2 Custom exception and its handling

5. GRAPHIC INTERFACE

4 Hours

5.1 AWT Graphical user interface

5.2 Develop Applets programs

5.3 Swing Graphical user interface

5.4 Develop Applets programs

5.5 Inner classes

5.6 Develop SWT/JFace Programs

REFERENCES:

1. Head First Java, 2nd Edition 2nd Edition by Kathy Sierra, Bert Bates
2. Java: Learn Java in One Day and Learn It Well. Java for Beginners with Hands-on Project by LCF Publishing, Jamie Chan

LIST OF PRACTICALS

96 Hours

1. Project requirements analysis and design
2. Modular design of the project
3. Project interface design and implementation
4. Code design and implementation of project functions
5. Project test
6. Project joint debugging
7. Project design description

INSTRUCTIONAL OBJECTIVES

1. Proficiency in functional modeling
2. Proficient in drawing data flow diagrams
3. Proficient in the basic writing format of the software "Requirements Analysis"
4. Proficient in developing Java projects with Eclipse
5. Proficient in the program structure of Java App
6. Understand the concepts of class encapsulation, inheritance, and polymorphism in OOP
7. Proficient in programming abstract classes and interfaces
8. Familiar with the basic concepts of exceptions
9. Proficient in the basic program framework and capture of exceptions
10. Proficient in writing custom exception programs
11. Proficient in AWT, Swing, SWT/JFace and other graphical interface technologies
12. Understand inner classes and become proficient in using inner classes in graphical user interfaces

Introduce Database Concepts and SQL Programming

Course Code: SWT-122

Total Contact Hours: 128

Theory: 32

Practical: 96

T	P	C
1	3	2

The course mainly covers the use, design, management and maintenance of database, with an aim to train programmers, system administrators and system operators to develop, manage and maintain database. After learning MySQL database, students will master the basic knowledge and skills of MySQL database management and maintenance, with the proficient ability to complete the basic operation of the database. They'll have a preliminary understanding of database programming methods such as stored procedures, stored functions, triggers, etc., and have strong hands-on abilities, competencies to adapt to career change, as well as the ability of continued learning.

COURSE OBJECTIVES

1. Master the installation, configuration and daily management of MySQL
2. Understand the language structure of MySQL
3. Obtain the basic understanding of the design and use of MySQL database
4. Master the installation and configuration of MySQL and third-party graphics management software
5. Familiar with the use of MySQL graphical management tools for daily management of database users, logs, backups, etc.
6. Proficient in using tools and commands to achieve basic operations on databases, tables, queries, views, and indexes

COURSE CONTENTS

- | | |
|--|----------------|
| 1. BASIC KNOWLEDGE OF DATABASE | 4 Hours |
| 1.1 Understand the basics of databases | |
| 1.2 Install and configure MySQL database | |
| 2. DATABASE DESIGN | 4 Hours |
| 2.1 Relational database design | |
| 2.2 Standardization of database design | |
| 2.3 Practice: PetStore DB design | |
| 3. DEFINITION OF DATA | 4 Hours |
| 3.1 Create and manage databases | |
| 3.2 Create and manage database tables | |
| 3.3 Integrity constraints of data | |
| 3.4 Create databases and tables with graphical interface tools | |
| 3.5 Practice: PetStore DB creation | |

4. DATA OPERATION	4 Hours
4.1 Insert table data	
4.2 Modify table data	
4.3 Delete table data	
4.4 Practice: Data entry in PetStore DB	
5. DATA QUERY	4 Hours
5.1 Single table query	
5.2 multi-table query	
5.3 Sorting and Subtotals	
5.4 Practice: Data query in PetStore DB	
6. VIEW	4 Hours
6.1 Creating views	
6.2 View operation	
5.4 Practice: View of PetStore DB	
7. INDEXING AND PARTITIONING	4 Hours
7.1 Indexes and their applications	
7.2 Database partitioning	
7.3 Practice: Index and partition of PetStore DB	
8. DATA SECURITY	4 Hours
8.1 User and data security	
8.2 Backup and restore	
8.3 Database transactions and multiple users	
8.4 Practice: Management of PetStore DB	

REFERENCE BOOKS:

1. Fundamentals of Database Systems, Ramez Elmasri, Shamkant Navathe, 5th Edition 2009
ISBN: 9788131716250
2. Database Management Systems, C. J. Dates, 8th Edition, 2001 ISBN 0-901-543432-8
3. Database System Concept, Peter Rob, Carlos Coronel, ISBN: 9788131509708
4. Introduction to PL\SQL by Oracle Press

1. Install MySQL database
 - (1) Install MySQL server
 - (2) Install Navicat
 - (3) Connect and disconnect the server
2. Database design
 - (1) Database design of a teaching management system
 - (2) Database design of an employee management system
3. Create database and tables
 - (1) Reader classification table
 - (2) Reader table
 - (3) Inventory table
 - (4) Borrowing form
 - (5) Book List
4. Data operation
 - (1) Reader classification table
 - (2) Reader table
 - (3) Inventory table
 - (4) Borrowing form
 - (5) Book List
5. Data query
 - (1) Basic use of the SELECT statement
 - (2) Use of subquery
 - (3) Use of join query
 - (4) Use of GROUP BY, ORDER BY and LIMIT
6. View
 - (1) Create a view
 - (2) Query a view
 - (3) Update a view
 - (4) Delete a view
7. Index
 - (1) Create an index
 - (2) Create an index with the CREATE INDEX statement
 - (3) Create an index with the ALTER TABLE statement
 - (5) Delete an index
 - (6) Creation and management of partitions
8. Data security
 - (1) Database user
 - (2) Grant and revoke access

- (3) Create users and grant access using the graphical interface
- (4) Data backup and recovery
- (5) Database transactions and multiple users

INSTRUCTIONAL OBJECTIVES

1. Understand the basic concepts of database, database management system, data model and database applications;
2. Master the installation and configuration of MySQL database;
3. Familiar with MySQL environment
4. Master the basic skills of designing relational databases;
5. Master the basic methods of standardized database design.
6. Familiar with two MySQL database operation methods: command line and graphical interface;
7. Master the creation, modification and deletion of databases and tables;
8. Understand integrity constraints of data and master the methods of creating various data integrity constraints;
9. Familiar with the operation of data in database tables by command line and graphical interface;
10. Master the insertion, modification and deletion of table data;
11. Master the use of SHOW and DESCRIBE statements.
12. Familiar with the basic structure of the SELECT statement;
13. Master the application of each clause of the SELECT statement;
14. Proficient in using the SELECT statement to achieve data query, subtotal and sorting.
15. Understand the basic concepts of views;
16. Familiar with the basic operations of views;
17. Master the use of views to insert, modify, and delete data.
18. Understand the classification of indexes, and master the methods of creating and deleting indexes;
19. Understand the pros and cons of indexing;
20. Understand the types of partitions, and master the methods of creating and deleting partitions;
21. Master the basic operations of managing partitions;
22. Master the various methods of adding, modifying and deleting users;
23. Master the basic operations of granting and revoking access.
24. Master the various methods of data backup and recovery;
25. Understand how transactions and multi-users are handled.

Fundamentals and Ethics of Artificial Intelligence

Course Code: AIT-112

Total Contact Hours:64

Theory: 64

Practical: 0

T	P	C
2	0	2

Aims:

The students will be able to understand the fundamental principles and concepts of Artificial Intelligence, its ethical implications, and use these to analyze and solve real-world ethical challenges in AI applications while developing a critical understanding of AI systems and their impact on society.

COURSE OBJECTIVES

1. Explain the definition, scope, history, and evolution of artificial intelligence and its applications in various domains.
2. Identify the concept of intelligent agents, rationality, and task environments using the PEAS framework.
3. Describe problem-solving agents, represent problems, and apply uninformed and informed search strategies.
4. Demonstrate advanced search techniques, including hill climbing, simulated annealing, genetic algorithms, and adversarial search.
5. Understand fundamentals of knowledge representation and reasoning, including propositional logic, first-order logic, and description logic.
6. Examine logical agents, planning, and reasoning under uncertainty, using probabilistic approaches.
7. Discuss the importance of ethical considerations in AI, key ethical principles, and global ethical guidelines.
8. Learn about international laws, regulations, corporate guidelines, and the role of ethical boards in AI governance.
9. Analyze ethical challenges in AI applications such as healthcare, criminal justice, and autonomous vehicles.
10. Explore current trends, future prospects, and the role of stakeholders in ethical and responsible AI development.

COURSE CONTENTS

1. INTRODUCTION TO ARTIFICIAL INTELLIGENCE

9 Hours

- 1.1. Definition and scope of AI
- 1.2. History and evolution of AI
- 1.3. Intelligent behavior and artificial intelligence
- 1.4. Applications and examples of AI
- 1.5. Major branches of AI
- 1.6. Current state and future prospects

2. INTELLIGENT AGENTS AND RATIONALITY

9 Hours

- 2.1. Schools of thought in AI
- 2.2. Concept of intelligent agents
- 2.3. Rationality in agents
- 2.4. PEAS framework (Performance, Environment, Actuators, Sensors)

2.5. Types of task environments	
2.6. Agent functions and programs	
3. PROBLEM SOLVING AND SEARCH	8 Hours
3.1. Problem-solving agents	
3.2. Goal formulation and problem representation	
3.3. Uninformed search strategies	
3.4. Informed search strategies	
3.5. Heuristic functions	
3.6. Complex problem solving	
3.7. Local search and optimization	
4. ADVANCED SEARCH TECHNIQUES	9 Hours
4.1. Hill climbing and simulated annealing	
4.2. Genetic algorithms	
4.3. Game theory and adversarial search	
4.4. Alpha-Beta pruning	
4.5. Stochastic games	
5. KNOWLEDGE REPRESENTATION AND REASONING	9 Hours
5.1. Fundamentals of knowledge representation	
5.2. Propositional logic	
5.3. First-order logic (FOL)	
5.4. Horn clauses and logical reasoning	
5.5. Description logic	
5.6. Advanced reasoning techniques	
6. LOGICAL AGENTS AND UNCERTAINTY	8 Hours
6.1. Logical agents in AI systems	
6.2. Planning fundamentals	
6.3. Logical frameworks for agent-based systems	
6.4. Reasoning under uncertainty	
6.5. Probabilistic knowledge representation	
7. FUNDAMENTALS OF AI ETHICS	4 Hours
7.1. Introduction to AI ethics	
7.2. Need for ethical considerations in AI	
7.3. Key ethical principles	
7.4. Examples of ethical failures	
7.5. Global ethical guidelines	
8. REGULATORY FRAMEWORKS AND GUIDELINES	4 Hours
8.1. International AI principles	
8.2. Laws and regulations (GDPR, AI Act)	
8.3. Corporate ethical guidelines	
8.4. Role of ethical boards	
8.5. Compliance and accountability	
9. ETHICAL CHALLENGES IN AI APPLICATIONS	4 Hours
9.1. Autonomous vehicles	
9.2. Healthcare AI systems	
9.3. AI in criminal justice	
9.4. Military applications	
9.5. Employment and hiring	
9.6. Role of stakeholders	

REFERENCE BOOKS:

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd edition, Prentice Hall, Inc., 2010.
2. Mark Coeckelbergh, *AI Ethics*
3. Shannon Vallor, *Technology and the Virtues*
4. Luciano Floridi, *The Ethics of Information*

Application Technology of Artificial Intelligence

Course Code: AIT-122

Total Contact Hours:128

Theory: 32

T P C

Practical: 96

1 3 2

This course aims to equip students with basic knowledge and application of technologies of artificial intelligent and stimulate their interests in research and development of intelligent systems. It covers mainstream technologies applied in neural network, machine learning, deep learning, image recognition, computer vision, voice recognition and processing, natural language processing and AIGC models.

COURSE OBJECTIVES

At the end of the course, the students are expected to be able to:

1. Understand the concept, history, development, and trend of artificial intelligence.
2. Familiar with the development environment supporting Python and common libraries.
3. Master basic programming skills of Python.
4. Understand the operating principles of neural networks.
5. Familiar with common algorithms in machine learning.
6. Understand the operating principles of deep learning.
7. Familiar with common algorithms in deep learning.
8. Understand the principles of computer vision.
9. Master the process steps of facial recognition.
10. Master the process steps of license plate recognition.
11. Understand the concepts of natural language processing.
12. Master the process steps of emotional analysis.
13. Master the process steps of handwritten number recognition.
14. Familiar with other typical application cases of artificial intelligence.

COURSE CONTENTS

1. OVERVIEW OF ARTIFICIAL INTELLIGENCE

2 Hours

- 1.1 Concept of artificial intelligence
- 1.2 History and development of artificial intelligence
- 1.3 Artificial intelligence application scenarios

2. ARTIFICIAL INTELLIGENCE SYSTEM DEVELOPMENT ENVIRONMENT **2 Hours**

- 2.1 PyCharm Integrated Development Environment
- 2.2 Anaconda Library Management Tool
- 2.3 Common third-party libraries

3. PYTHON FUNDAMENTALS

4 Hours

- 3.1 Basic Python Knowledge
- 3.2 Module
- 3.3 Data Structure
- 3.4 Dictionary
- 3.5 Conditional and looping statements
- 3.6 Function

3.7 Python Object Oriented Programming

3.8 Visualization

4. MACHINE LEARNING

4 Hours

4.1 What is machine learning

4.2 Types of Machine Learning

4.3 Common Algorithms in Machine Learning

4.4 Application of Machine Learning

5. DEEP LEARNING

4 Hours

5.1 What is Deep Learning

5.2 Deep Learning Framework

5.3 Neural network

5.4 Deep Learning Algorithm Cases

6. COMPUTER VISION TECHNOLOGY

3 Hours

6.1 Fundamentals of Image Processing

6.2 Image Classification

6.3 Object Detection

6.4 Image Segmentation

7. FACIAL RECOGNITION

3 Hours

7.1 The process of facial recognition

7.2 Facial Detection

7.3 Facial alignment

7.4 Facial Representation

7.5 Facial Attribute Recognition

8. LICENSE PLATE RECOGNITION

3 Hours

8.1 Image recognition and preprocessing

8.2 License Plate Detection and Recognition

9. NATURAL LANGUAGE PROCESSING TECHNOLOGY

2 Hours

9.1 Natural Language Processing Task Level

9.2 Natural Language Processing Technology System

9.3 Natural Language Processing Applications

10. EMOTIONAL ANALYSIS

3 Hours

10.1 Data Preparation

10.2 Data preprocessing

10.3 Product sentiment recognition

11. HANDWRITTEN NUMBER RECOGNITION

2 Hours

11.1 Dataset decompression

11.2 Loading Datasets and Identifying

REFERENCE BOOKS

1. Introduction to artificial intelligence Technology”, edited by Wang Xiaoling, Yang Weiwen, Li Weilong. Publishing House of Electronics Industry, June, 2023.
2. “Python And artificial intelligence application technology”, edited by Guo Xin, Ren Hongwei. Publishing House of Electronics Industry, February, 2023.
3. “Introduction to Artificial Intelligence (General Edition) ”, edited by Xu Chunyan. Publishing House of Electronics Industry, September, 2022.

LIST OF PRACTICALS

96 Hours

1. Collecting data and annotating data
2. Facial recognition (face detect, face contrast, face retrieval)
3. Emotional analysis of commodity evaluation
4. License plate recognition and detection
5. Handwritten digit recognition
6. Iris classification
7. Insurance fee prediction
8. Product recommendations

INSTRUCTIONAL OBJECTIVES

1. Master how to prepare validate data for model training
2. Master how to detect faces on image or video and attributes of faces
3. Master how to define relationship between words and emotional inclination
4. Master methods of image segmentation extraction
5. Develop the ability to classify objects using neural networks
6. Develop the ability to predict with linear regression
7. Develop the ability to perform cluster analysis
8. Develop the ability to implement personalized recommendations

2ND YEAR

اسلامیات / مطالعہ پاکستان

نصاب سال دوئم

حصہ اول اسلامیات

حصہ دوئم مطالعہ پاکستان

موضوعات:

GEN201

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کل وقت 20 گھنٹے:

1- سورۃ المؤمنون ایک تا گیارہ آیات کا ترجمہ مع تشریح

2- دس منتخب احادیث مع ترجمہ و تشریح

() خیر کم من تعلم القرآن و علمه

() لا ایمان لمن لا امانته له ولا دین لا من لا اعهد له

() و یا کم و الظن ان الظن اکرب الحدیث

() من احدث فی امرنا هذا ما لیس منه فہو رد

() من حمل علینا السلاح فلیس منا

() انا و کافل الیتیم فی الجنہ

() لا ضرور ولا ضرار فی السلام

() کلکم راع و کلکم راع و کلکم مسول عن رعیتہ

3- سیرۃ طیبہ

() مکی زندگی۔ ولادت۔ بعثت۔ ہجرت

() مدنی زندگی۔ مواخات۔ میثاق مدینہ۔ فتح مکہ (سباب و نتائج)

4- حضور ﷺ بحیثیت

() خطبہ حجۃ الوداع۔ انسانی حقوق کا اعلامیہ / حقوق انسانی پالیسی 2018

() معلم کامل۔ سربراہ خاندان

5- اسلامی معاشرہ

نظام تعلیم اور اس کے مقاصد۔ عدل و انصاف۔ امر بالمعروف۔ نہی عن المنکر۔ انسانی حقوق کا معاشرتی اور معاشی ترقی میں کردار

جہاد۔ کسب حلال۔ مسجد (اہمیت و فضیلت)

6- اسلامی ریاست کی تعریف۔ اسلامی ریاست کی خصوصیات۔ اسلامی حکومت کے فرائض۔ اسلامی طرز حکومت۔

حقوق آگاہی / معلومات تک رسائی

۔ ملازم پیشہ خواتین کا تحفظ

اسلامیات

تدریس مقاصد:

عمومی مقاصد: طالب علم یہ جان سکے کہ آیات قرآنی کی روشنی میں مومن کے اوصاف کیا ہیں

() قرآن مجید () منتخب آیات قرآنی

خصوصی مقاصد:

() قرآنی آیات کا ترجمہ

() قرآنی آیات کی تشریح

() قرآنی آیات کی روشنی میں ایک مومن کے اوصاف بیان کر سکے

() قرآنی آیات میں بیان کردہ مومن کے اوصاف اپنے اندر پیدا کر سکے

احادیث نبوی:

عمومی مقاصد:

() احادیث کی روشنی میں اسلامی اخلاقی اقدار (انفرادی و اجتماعی) سے آگاہ ہو سکے

خصوصی مقاصد:

() احادیث کا ترجمہ بیان کر سکے

() احادیث کی تشریح کر سکے

() احادیث کی روشنی میں اسلام کی اخلاقی اقدار کی وضاحت کر سکے

() احادیث کی دی گئی تعلیمات کے مطابق اپنی زندگی گزار سکے

سیرت طیبہ:

() عمومی مقاصد: حضور ﷺ کی سیرت طیبہ کے بارے میں جان سکے

خصوصی مقاصد:

() حضور ﷺ کی ابتدائی زندگی اختصار کے ساتھ بیان کر سکے

() حضور ﷺ کی ہجرت کا واقعہ بیان کر سکے

() حضور ﷺ کی مدنی زندگی اختصار سے بیان کر سکے

() حضور ﷺ کی بطور معلم خصوصیات بیان کر سکے

() حضور ﷺ کی بطور سربراہ بیان کر سکے

حضور ﷺ بحیثیت

() خطبہ حجۃ الوداع۔ انسانی حقوق کا اعلامیہ حقوق انسانی پالیسی 2018 کے بارے جان سکے

اسلامی معاشرہ:

عمومی مقاصد: اسلامی معاشرہ کی خصوصیات سے آگاہی حاصل کر سکے

خصوصی مقاصد:

() اسلامی معاشرہ کا معنی و مفہوم کر سکے

() اسلامی معاشرہ کی امتیازی خصوصیات بیان کر سکے

() اسلامی معاشرہ میں عدل و احسان کی اہمیت بیان کر سکے

() تبلیغ کے لغوی معنی بیان کر سکے

() تبلیغ کی اہمیت اور ضرورت بیان کر سکے

() جہاد کے لفظی و اصطلاحی معنی بیان کر سکے

() جہاد کی اہمیت بیان کر سکے

() جہاد اور قتل میں فرق بیان کر سکے

() جہاد کی مختلف اقسام بیان کر سکے

() لفظ مسجد کی تعریف بیان کر سکے

() مسجد کی سابقہ حیثیت کو بحال کرنے کے بارے میں اقدامات کو مان سکے

() انسانی حقوق کی معاشی اور معاشرتی ترقی میں اہمیت اور کردار بیان کر سکے

اسلامی ریاست:

عمومی مقاصد:

() اسلامی ریاست کی خصوصیات بیان کر سکے

خصوصی مقاصد:

() ریاست کی تعریف بیان کر سکے

() اسلامی ریاست میں طرز حکومت سے آگاہی حاصل کر سکے

() اسلامی ریاست کی خصوصیات بیان کر سکے

- () اسلامی ریاست کے اغراض و مقاصد بیان کر سکے
- () اسلامی ریاست کے قیام کی لیے جدوجہد کر سکے
- () حقوق آگاہی / معلومات تک رسائی کا قانون جان سکے
- () ملازمت پیشہ خواتین کے حقوق کا تحفظ جان سکے اور
- () معاشرے میں خواتین کے حقوق کا تحفظ یقینی بنائے

نصاب مطالعہ پاکستان

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کل وقت 12 گھنٹے

سال دوم

حصہ دوم

موضوعات:

- () دو قومی نظریہ
- () تحریک پاکستان
- () انڈین کانگریس
- () مسلم لیگ
- () تقسیم بنگال
- () بیناق لکھنؤ
- () تحریک خلافت
- () سندھو تحریک
- () تہاویز دہلی
- () نمبر ورر رپورٹ
- () قائد اعظم کے چودہ نکات
- () خطبہ آلہ آباد
- () انتخابات 1938 اور انتقال اقتدار
- () قرارداد پاکستان

حصہ دوم
مطالعہ پاکستان

تدریس مقاصد:

تحریک پاکستان:

عمومی مقاصد:

() قیام پاکستان کے اسباب و تحریک کو بیان کر سکے

خصوصی مقاصد:

() قومیت کے مفہوم کو بیان کر سکے

() دو قومی نظریہ کی تعریف و توضیح کر سکے

() دو قومی نظریہ کی اہمیت بیان کر سکے

() ہندوستانی مسلمانوں کی محرومیوں کو بیان کر سکے

() قومی تشخص کو بحال رکھنے کے لیے مسلمانان ہند کی مساعی بیان کر سکے

() آزادی ہند اور قیام پاکستان علامہ اقبال اور قائد اعظم کی مسایم کریں

() قیام پاکستان سے مستقبل اسلامی مملکت کے قیام کے لیے مسلم عوام کی کوششوں کو بیان کر سکے

() مسلم لیگ کے قیام پاکستان کے لیے جدو جہد بیان کر سکے

(غیر مسلم طلباء کے لیے)

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کل وقت 20 گھنٹے

نصاب اخلاقیات

سال دوم

موضوعات:

معاشرتی اقدار بلحاظ ہمسایہ۔ قوم۔ قومی سطح۔ شہری سطح۔ صنعتی اداروں کی سطح۔ ضروریات۔ ورثہ

() حقوق و فرائض

() قوت برداشت

() قوت ارادی

() لگن و جذبہ

() وسیع النظری

() بے غرضی

() انسانی دوستی

() حفاظتی شعور

() پاس آزادی

() کامل آگاہی

() تغیرات کو قبول کرنا

() خود شناسی

() انسانی حقوق کا اعلامیہ حقوق انسانی پالیسی 2018

() انسانی حقوق کا معاشرتی اور معاشی ترقی میں کردار

() حقوق آگاہی معلومات تک رسائی۔ ملازم پیشہ خواتین کا تحفظ

نصاب اخلاقیات

سال دوم

تدریس مقاصد:

طالب علم اخلاقیات کی اہمیت و ضرورت سے آگاہ ہو سکے اور بیان کر سکے

خصوصی مقاصد: طالب علم اس قابل ہو کہ

- () موضوعات کا مطلب بیان کر سکے
- () عملی زندگی سے مثالوں کی نشاندہی کر سکے
- () اپنی شخصیت اور معاشرے پر موضوعات کے مطابق اثرات پیدا کرنے کے طریقے بیان کر سکے
- () اعلیٰ اخلاقی اقدار میں سے قوت برداشت۔ قوت ارادی۔ لگن و جذبہ۔ وسیع النظری۔ بے غرض۔ انسانی دوستی شعور۔ پاس آزادی۔ کامل آگاہی اور خود شناسی کی اہمیت
- () اخلاقیات سے متصف ہو کر قومی خدمت بہتر طور پر انجام دے سکے
- () انسانی حقوق کا اعلامیہ / حقوق انسانی کی پالیسی 2018 کے بارے میں جان سکے
- () انسانی حقوق کا معاشرتی اور معاشی ترقی میں اہمیت اور کردار بیان کر سکے
- () حقوق آگاہی / معلومات تک رسائی کے قانون کو جان سکے
- () ملازم پیشہ خواتین کا تحفظ کو اخلاقیات کا حصہ تصور کرے

Tarjuma Tul Quran/CIVICS

Course Code: TTQ/CIVICS - 211

Total Contact Hrs. 32

Theory: 32

Practical: 0

T P C

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As per Syllabus of BISE from PCTB Book

صفحہ نمبر	عنوانات	نمبر شمار	صفحہ نمبر	عنوانات	نمبر شمار
136	سُورَةُ الْحَشْرِ	13	1	تلاوت قرآن مجید کے آداب	1
144	سُورَةُ الْمُنتَحِجَةِ	14	2	عمومی ہدایات	2
151	سُورَةُ الصَّفِّ	15	3	حاصلاتِ تعلیم	3
156	سُورَةُ الْجُمُعَةِ	16	4	سُورَةُ النِّسَاءِ	4
160	سُورَةُ الْمُنْفِقُونَ	17	38	سُورَةُ الْمَائِدَةِ	5
165	سُورَةُ التَّغَابُنِ	18	66	سُورَةُ النُّورِ	6
170	سُورَةُ الطَّلَاقِ	19	81	سُورَةُ الْأَحْزَابِ	7
175	سُورَةُ التَّحْرِيمِ	20	97	سُورَةُ مُحَمَّدٍ	8
180	ماڈل پیپر	21	106	سُورَةُ الْفَتْحِ	9
183	رموزِ اوقاف	22	115	سُورَةُ الْحُجُرَاتِ	10
184	سرٹیفکیٹ	23	121	سُورَةُ الْحَدِيدِ	11
			129	سُورَةُ الْمُجَادَلَةِ	12

عمومی ہدایات برائے اساتذہ کرام

- تدریس قرآن مجید کا مقصد طلبہ کی کردار سازی ہونا چاہیے۔
- طلبہ کو قرآن مجید عام فہم انداز میں پڑھایا جائے۔
- ترجمۃ القرآن المجید کی تدریس کے دوران میں عربی متن کی درست ادائی کا خیال رکھا جائے۔
- با وضو ہو کر تدریس کا اہتمام کیا جائے۔
- طلبہ کو قرآن مجید کے آداب سے آگاہ کیا جائے۔
- ترجمۃ القرآن المجید کے نصاب میں شامل سورتوں کے تعارف اور بنیادی مضامین پر خصوصی توجہ دی جائے۔
- نصاب میں شامل سورتوں میں موجود قرآنی دُعاؤں کی ترجمہ کے ساتھ تدریس کا خصوصی اہتمام کیا جائے۔
- نصاب میں مختص آیات پر خصوصی توجہ دی جائے۔
- کوئز پروگرام، آن لائن ایپ اور سمعی و بصری معاونات سے استفادہ کرتے ہوئے تدریس کا اہتمام کیا جائے۔
- نصاب میں موجود سورتوں میں بنیادی عقائد، اوامر و نواہی اور معاشرتی احکام کو آسان طریقہ سے طلبہ کو سمجھایا جائے۔
- بارہویں جماعت کے لیے مقررہ حصہ قرآن مجید کی تمام سورتوں کا تعارف اور مرکزی مضامین پر مشتمل تفصیلی، مختصر اور کثیر الانتخابی سوالات کے ذریعے سے امتحان لیا جائے۔
- بارہویں جماعت کے لیے مختص ذخیرہ قرآنی الفاظ میں سے ہی ماڈل پیپر کی طرز پر امتحان لیا جائے۔

Applied Mathematics-II

Course Code: MATH-233

Total Contact Hrs. 96

Theory: 96

Practical: 0

T	P	C
3	0	3

AIMS & OBJECTIVES

After completing the course the students will be able to:

Solve the problems of calculus and analytical Geometry.

COURSE CONTENTS

- | | |
|--|-----------------|
| 1. FUNCTIONS & LIMITS. | 6 Hours |
| 1.1 Constants and variables | |
| 1.2 Functions & their types | |
| 1.3 The concept of limit | |
| 1.4 Limit of a function | |
| 1.5 Fundamental theorems on limit | |
| 1.6 Some important limits | |
| 1.7 Continuous function | |
| 1.8 Problems | |
| 2. DIFFERENTIATION. | 6 Hours |
| 2.1 Increments | |
| 2.2 Geometrical interpret | |
| 2.3 Differentiation ab-initio by first principle. | |
| 2.4 Geometrical interpretation of differential coeff. | |
| 2.5 Differentiation coefficient of X^n and $(a+b)^n$ | |
| 2.6 Problems. | |
| 3. DIFFERENTIATION OF ALGEBRAIC FUNCTIONS | 9 Hours |
| 3.1 Explicit Functions | |
| 3.2 Implicit Functions | |
| 3.3 Parametric Forms | |
| 3.4 Problems | |
| 4. DIFFERENTIATION OF TRIGONOMETRIC FUNCTIONS | 6 Hours |
| 4.1 Differential Coefficient of $\sin x$, $\cos x$, $\tan x$ from first principle. | |
| 4.2 Differential Coefficient of $\operatorname{cosec} x$, $\sec x$, $\cot x$. | |
| 4.3 Differential Coefficient of Inverse Trigonometric Functions | |
| 4.4 Problems | |
| 5. DIFFERENTIATION OF LOGARITHMIC & EXPONENTIAL FUNCTION | 15 Hours |
| 5.1 Differentiation of $\ln x$ | |
| 5.2 Differentiation of $\log a^x$ | |
| 5.3 Differentiation of a^x | |

5.4 Differentiation of e^x

5.5 Problems

6. RATE OF CHANGE OF VARIABLES.

6 Hours

6.1 Increasing and decreasing functions

6.2 Maxima and Minima

6.3 Criteria for maximum & minimum values

6.4 Methods of finding maximum & minimum

6.5 Rate measure

6.6 Slope of a line

6.7 Velocity and acceleration

6.8 Problems

7. INTEGRATION (SIMPLE BASIC RULES)

9 Hours

7.1 Concept

7.2 Fundamental Formulae

7.3 Important Rules

7.4 Problems

8. METHODS OF INTEGRATION

9 Hours

8.1 Integration by substitution

8.2 Integration by parts

8.3 Problems

9. DEFINITE INTEGRALS.

6 Hours

9.1 Properties

9.2 Application to area

9.3 Problems.

10. DIFFERENTIAL EQUATION.

6 Hours

10.1 Introduction

10.2 Order and Degree

10.3 First Order Differential Equation of 1st Degree

10.4 Solution of Problems

10.5 Problems

11. LAPLACE TRANSFORMATION.

9 Hours

11.1 Laplace Transformations

11.2 Inverse Laplace Transformations

11.3 Problems

12. FOURIER SERIES

9 Hours

12.1 Introduction

12.2 Periodic Functions

12.3 Even and Odd Functions

12.4 Problems

13. STATISTICS

6 Hours

- 13.1 Concept of mean, median and mode
- 13.2 Standard Deviation
- 13.3 Laws of probability
- 13.4 Problems

REFERENCE BOOKS

1. Thomas Finny, Calculus and Analytic Geometry
2. Ghulam Yasin Minhas, Technical Mathematics Vol – I & II, Ilmi Kitab Khana, Lahore
3. Riaz Ali Khan, Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad.
4. Sana Ullah Bhatti, Calculus and Analytic Geometry, Punjab Text Book Board, Lahore.

Business Communication

Course Code: Mgm 211

Total Contact Hours: 32

Theory: 32

Practical: 0

T	P	C
1	0	1

Second course on English language focusing on business communication. It aims to develop communication skills as applied in business and commerce such as the writing and business correspondence. It covers oral communication and art of listening, interviewing, and report writing among others. It is a pure class discussion.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the basic principles of good and effective business writing in commercial and industrial fields.
2. Use the English language effectively for communication in business
3. Apply knowledge and skill to write business communication with confidence and ease.
4. Write legibly in handwriting and compose communication documents with correct formats.
5. Appreciate the usefulness of written language

COURSE CONTENTS

1. COMMUNICATION PROCESS

6 Hours

- 1.1. Purposes of communication
- 1.2. Communication process
- 1.3. Distortions in communication
- 1.4. Consolidation of communication
- 1.5. Communication flow
- 1.6. Communication for self development

2. ORAL COMMUNICATION SKILLS

6 Hours

- 2.1. Significance of Speaking
- 2.2. Verbal and Non-verbal Messages
- 2.3. Strategic Steps of Speaking
- 2.4. Characteristics of Effective Oral Messages
- 2.5. Communication Trafficking
- 2.6. Oral Presentation

3. QUESTIONING SKILLS

4 Hours

- 3.1. Nature and Types of Questions
- 3.2. Characteristics of a Good Questions
- 3.3. Questioning Strategy

4. LISTENING SKILLS

4 Hours

- 4.1. Principles of Active Listening
- 4.2. Skills of Active Listening

- 4.3. Barriers to Listening
- 4.4. Reasons of Poor Listening.
- 4.5. Giving Feedback.

5. INTERVIEWING SKILLS

3 Hours

- 5.1. Significance of Interviews
- 5.2. Characteristics of Interviews
- 5.3. Activities in an Interviewing Situation
- 5.4. Types of Interviews.
- 5.5. Interviewing Strategy.

6. REPORT WRITING

3 Hours

- 6.1. Goals of Report Writing
- 6.2. Report Format
- 6.3. Types of Reports
- 6.4. Report Writing Strategy.

7. READING COMPREHENSION

3 Hours

- 7.1. Reading Problems
- 7.2. Four Reading Skills

8. GROUP COMMUNICATION

3 Hours

- 8.1. Purposes of Conducting Meetings
- 8.2. Planning a Meeting
- 8.3. Types of Meetings
- 8.4. Selection of a Group for Meeting
- 8.5. Group Leadership Skills
- 8.6. Running a Successful Meeting
- 8.7. Active Participation Techniques

REFERENCE BOOKS

- 1. Effective Business Communication and Report Writing, Sh. Ata-ur-Rehman.
- 2. Technical Reporting, Ulman J.N. Could JR..

INSTRUCTIONAL OBJECTIVES

1. Communication Process

- 1.1. Understand the communication process
- 1.2. State the benefits of two way communication
- 1.3. Describe a model of communication process.
- 1.4. Explain the major communication methods used in organization
- 1.5. Identify the barriers to communication and methods of overcoming these barriers
- 1.6. Identify misconceptions about communication

2. Oral Communication Skills

- 2.1. Understand the process of oral communication
- 2.2. Identify speaking situations with other peoples.

- 2.3. Identify the strategy steps of speaking.
- 2.4. Identify the characteristics of effective speaking.
- 2.5. State the principles of one-way communication.
- 2.6. State the principles of two-way communication.
- 2.7. Identify the elements of oral presentation skills.
- 2.8. Determine the impact of non-verbal communication on oral communication.

3. Questioning Skills

- 3.1. Determine the uses of questioning skills and clarify information in the oral communication process
- 3.2. Identify different types of questions.
- 3.3. Determine the purpose of each type of question and its application.
- 3.4. Identify the hazards to be avoided when asking questions.
- 3.5. Demonstrate questioning skills.

4. Listening Skills

- 4.1. Demonstrate the use of active listening skill in the oral communication process
- 4.2. State the principles of active listening.
- 4.3. Identify skills of active listening.
- 4.4. Identify barriers to active listening.
- 4.5. State the benefits of active listening.
- 4.6. Demonstrate listening skills.
- 4.7. Explain the importance of giving and receiving feedback.

5. Interview Skills

- 5.1. Determine the appropriate interview type for the specific work-related situation and conduct a work-related interview.
- 5.2. State the significance of interviews.
- 5.3. State the characteristics of interviews.
- 5.4. Explain the activities in an interviewing situation.
- 5.5. Describe the types of interviews
- 5.6. Explain the interviewing strategy
- 5.7. Prepare instrument for a structured interview

6. Report Writing

- 6.1. Prepare a report out-line, based on subject matter and audience
- 6.2. Identify the different types of reports
- 6.3. Determine when to use an informal or formal report presentation
- 6.4. Identify the stages of planning a report
- 6.5. Identify the parts of a report and choose the parts appropriate for each type of report
- 6.6. Draft a report outline

7. Reading Comprehension

- 7.1. Demonstrate reading comprehension
- 7.2. Identify major reading problems
- 7.3. Identify basic reading skills.
- 7.4. State methods of previewing written material
- 7.5. Identify methods of concentration when reading.

7.6. Demonstrate reading comprehension.

8. Group Communication

8.1. Understand the principles of group communications

8.2. State the purpose and characteristics of major types of meeting.

8.3. Explain responsibilities of a meeting/committee.

8.4. Identify problems likely to be faced at meeting and means to overcome these problems.

8.5. Distinguish between content and process at meetings.

8.6. Explain the key characteristics of a good group facilitator.

Chinese Language-2

Course Code: GenC 212

Total Contact Hours: 64

Theory: 64

Practical: 0

T	P	C
2	0	2

AIMS

There are 20 lessons (including 4-unit reviews) in this course. It is recommended to complete 8 lessons and the unit reviews in 32 class hours. After completing this course, students can master the advanced-basic Chinese language knowledge in the content of the course, and be able to reach and exceed HSK level THREE.

COURSE CONTENTS

1. LESSON 1 PICKUP INTERNATIONAL STUDENTS AT THE AIRPORT 3 Hours

This lesson introduces grammatical knowledge such as "flexible use of interrogative pronouns" and "basic forms of clitch words", which requires students to use sequential words correctly and understand the contextual meaning of some special words.

2. LESSON 2 WHAT WOULD YOU LIKE TO DRINK 3 Hours

This lesson introduces the rhetorical question form "can...?" and the related words "not only... but also...", and learn to express your needs correctly in communication.

3. LESSON 3 I'M KIDDING YOU 4 Hours

This lesson explains the fixed structures "more and more", "more A, more B", etc., and understands how to praise in Chinese and how to deal with others' praise.

4. LESSON 4 I LIKE WINTER BEST 4 Hours

Through the description of weather, students can learn the usage of adverbs such as "often" and "always", which express frequency, and compare and describe similar phenomena.

UNIT REVIEW 1 (INCLUDING TESTS) 2 hours

Summarize the contents of Lesson 1-4, review key words and grammar knowledge, and help learners really consolidate their mastery. There are tests designed, which can detect what has been learned before, so as to check for leaks and fill gaps.

5. LESSON 5 I CAUGHT A COLD 3 Hours

This lesson learns the basic usage of "active" sentence, understands the expressions related to illness and medical treatment, and learns the language communication in hospital scenes.

6. LESSON 6 YOU ARE REALLY CARELESS 3 Hours

Learn and summarize the usage of simple directional complements "V come" and "V leave", and master the basic expression of request and evaluation functions in daily communication.

7. LESSON 7 ENGLISH BLACK TEA IS HEALTHY AND DELICIOUS 4 Hours

Understand how to express approximate numbers in Chinese, how to persuade others and how to express their basic attitude.

8. LESSON 8 I'M NOT A SHOPAHOLIC 4 Hours

This lesson is related to online shopping. Learn the expression "A is A, that is" and learn how to express your views from different angles.

UNIT REVIEW 2 (INCLUDING TESTS)**2 Hours**

This section leads students to review the knowledge points they have learned in the past, and conduct mid-term tests to test students' learning effect.

9. LESSON 9 WHY DID GRANDPARENTS MOVE**3 Hours**

This lesson introduces a life event related to "moving house", the expression of learning conditions and the extended meaning of directional complement through events.

10. LESSON 10 EAT HOT POT FOR THE FIRST TIME**3 Hours**

This lesson introduces the way of having dinner in China through "hot pot" and some basic situations of Chinese restaurants, so as to help learners get a preliminary understanding of Chinese dining customs.

11. LESSON 11 TEACHER WANG IS GOING TO CHANGE THE HOUSE**4 Hours**

This lesson is related to "housing" in "food, clothing, housing and transportation". While understanding the story, students can learn language knowledge such as hypothetical relationship and overlapping of disyllabic verbs.

12. LESSON 12 SINGLE LI WENCHAO**4 Hours**

This lesson introduces emotional problems, learn about young people's concepts of marriage and love, and learn how to compare them in Chinese.

UNIT REVIEW 3 (INCLUDING TESTS)**2 Hours**

Review the previous knowledge, students answer questions through the platform, check the learning situation, and help teachers and students analyze their learning situation.

13. LESSON 13 THIS IS HER NEW HOME**3 Hours**

This lesson introduces the living conditions of young people at present, and understands how to describe the living environment, learn the Chinese expression of concepts such as location and existence.

14. LESSON 14 ALLEN'S WEEKEND**3 Hours**

This lesson introduces school life, understand the sentence structure expressing complete negation, and summarize the usage of three auxiliary words "adjective", "adverb" and "should".

15. LESSON 15 FALL IN LOVE WITH PUBLIC SQUARE DANCING**4 Hours**

By introducing the living conditions of the elderly in China, students can learn Chinese comparative structure, enumerating relations and various usages of complements.

16. LESSON 16 TASTE ENGLISH AFTERNOON TEA**4 Hours**

This lesson introduces grammatical knowledge such as "passive" sentence and "adjective reduplication". Through the study of this lesson, students can understand the dining habits of restaurant ordering and national dishes.

17. UNIT REVIEW 4 (INCLUDING TESTS)**2 Hours**

This section is a review test class, leading students to review the knowledge points learned in the past for final tests to test students' learning effect.

INSTRUCTION OBJECTIVE

Through this course, learners can systematically learn the language knowledge at this stage and cope with general communication, and can communicate on familiar topics and meet the basic communication needs of daily life and study, and gradually understand and be familiar with Chinese communication etiquette, cultural customs, etc.

REFERENCE BOOKS

1. Tang Chinese Course 3

Understanding China

Course Code: MgmC 212

Total Contact Hours: 64

Theory: 64

Practical: 0

T	P	C
2	0	2

A course about understanding Chinese culture and introducing China's national conditions. It aims to enable international students in China to better understand China, learn Chinese language and culture, enhance understanding of different cultures, and learn about China's geographical history, philosophy, religion, political economy, etc. It covers Chinese geography and history, philosophy and religion, politics and economy, literature and art, science and technology education, medicine, and sports, etc.

COURSE OBJECTIVES

At the end of the course, the students are expected to be able to:

1. Master the basic overview of China
2. Enhance knowledge of Chinese language
3. Broaden horizon
4. Learn the integration and communication between different cultures

COURSE CONTENTS

1. GEOGRAPHY

2 Hours

- 1.1 China from the perspective of the world
- 1.2 China's natural environment
- 1.3 China's mountains and rivers (1)
- 1.4 China's mountains and rivers (2)
- 1.5 City Highlight - Beijing
- 1.6 City Highlight - Shanghai
- 1.7 City Highlight - Hongkong
- 1.8 Natural Landscape (1) Five Mountains, Jiuzhaigou Valley and Zhangjiajie
- 1.9 Natural Landscape (2) Xinjiang
- 1.10 Natural Landscape (3) Tibet
- 1.11 Cultural Tour

2. HISTORY

8 Hours

- 2.1 Chinese Ancestors
- 2.2 Emperor Qin Shihuang
- 2.3 Emperor Wu in Han Dynasty
- 2.4 Silk Road in Western Han Dynasty
- 2.5 Prosperous Period of Tang Dynasty
- 2.6 Riverside Scene at Qingming Festival
- 2.7 Genghis Khan and Kublai Khan
- 2.8 Ming Taizu (the First Emperor of the Ming Dynasty)
- 2.9 The Great Voyages of Zheng He

- 2.10 Prosperous Period of Qing dynasty (from Kangxi to Qianlong)
- 2.11 Opium War
- 2.12 Sun Yat-sen and Kuomintang
- 2.13 The Communist Party of China (CPC)
- 2.14 Mukden Incident (9.18 Incident)
- 2.15 Mao Zedong and the Founding of the PRC
- 2.16 Diplomatic Relations of the PRC
- 2.17 Deng Xiaoping and Reform and Opening-up
- 2.18 New Era of Socialism with Chinese Characteristics

3. PHILOSOPHY

4 Hours

- 3.1 The representative figure of Confucianism - Confucius
- 3.2 The representative figure of Confucianism - Mencius
- 3.3 The core concept of Confucianism - ritual
- 3.4 The core concept of Confucianism - benevolence and benevolent governance
- 3.5 The core concept of Confucianism - Taoism, reason, and knowledge acquirement by investigation
- 3.6 Taoism - Lao Tzu's Tao and inaction
- 3.7 Taoism - Chuang Tzu's equality of things and unfettered
- 3.8 Other schools of thought - Legalism
- 3.9 Other schools of thought - Military Strategist

4. RELIGION

4 Hours

- 4.1 Folk Beliefs and Ancestor Worship
- 4.2 Taoism
- 4.3 Buddhism in China
- 4.4 Buddhist Doctrine, Zen, and Buddhist scenic spots
- 4.5 Other Religions and China's Religious Policies

5. NATIONAL GOVERNANCE

4 Hours

- 5.1 National Flag, National Anthem, and National Emblem
- 5.2 Administrative divisions
- 5.3 National Institutions (1)
- 5.4 National Institutions (2)
- 5.5 Political Parties (1)
- 5.6 Political Parties (2)
- 5.7 Foreign policy

6. LITERATURE AND ART

4 Hours

- 6.1 Stages and Genres of Chinese literature
- 6.2 Pre-Qin Literature
- 6.3 Tang Poetry
- 6.4 Song Ci
- 6.5 Four Great Classical Novels
- 6.6 Modern Chinese Contemporary Literature (1)
- 6.7 Modern Chinese Contemporary Literature (2)
- 6.8 Chinese Opera (1)
- 6.9 Chinese Opera (2)

- 6.10 Chinese Opera (3)
- 6.11 Concept of Chinese Traditional Music
- 6.12 Characteristics of Chinese Traditional Music and Music Appreciation
- 6.13 Diversified Modern Chinese Music

7. LANGUAGE AND LITERATURE

4 Hours

- 7.1 Mandarin and Dialect
- 7.2 Ancient Chinese and Modern Chinese
- 7.3 Idioms
- 7.4 Origin and Development of Chinese Characters
- 7.5 Six Categories of Chinese Characters
- 7.6 Simplified and Traditional Chinese Characters

8. CALLIGRAPHY AND PAINTING

4 Hours

- 8.1 Definition of Calligraphy
- 8.2 The Evolution of Chinese Calligraphy - Bone inscriptions and bronze inscriptions
- 8.3 The Evolution of Chinese Calligraphy - Regular script
- 8.4 The Evolution of Chinese Calligraphy - Cursive script
- 8.5 The Evolution of Chinese Calligraphy - Running script
- 8.6 Calligraphy Creation and the Charm of Calligraphy
- 8.7 Four Treasures of the Study
- 8.8 Calligraphy and Other Arts
- 8.9 Basic Knowledge of Chinese Painting
- 8.10 Artistic Features of Chinese Painting
- 8.11 Appreciation of Three Major Themes and Representative Works of Chinese Painting

9. ECONOMY

4 Hours

- 9.1 Agriculture
- 9.2 Industry
- 9.3 Three Major Industries in China
- 9.4 “Internet plus” - New engine of the Chinese economy
- 9.5 Digital Economy 2.0
- 9.6 Belt and Road Initiative

10. SCIENCE AND TECHNOLOGY

4 Hours

- 10.1 Four Great Ancient Inventions
- 10.2 Bronze Ware
- 10.3 Seismograph
- 10.4 Ceramics
- 10.5 Hybrid Rice
- 10.6 Five-hundred-meter Aperture Spherical Radio Telescope (FAST)
- 10.7 China High Speed Rail
- 10.8 Jiaolong Manned Submersible
- 10.9 Supercomputer Sunway TaihuLight
- 10.10 Aerospace Science and Technology
- 10.11 Internet Payment

11. EDUCATION	4 Hours
11.1 Imperial Examination System	
11.2 Chinese Literature	
11.3 China's Examination	
11.4 Teaching Chinese to Speakers of Other Languages	
12. MEDICAL AND HEALTH	4 Hours
12.1 Medical and Health Service System in China	
12.2 Traditional Chinese Medicine (TCM)	
12.3 History of TCM	
12.4 Core Concept of TCM	
12.5 Acupuncture and Massage	
12.6 TCM and Life (1)	
12.7 TCM and Life (2)	
12.8 Understanding Chinese Medicine	
12.9 Mystery of TCM Treatment	
12.10 International Communication of TCM	
13. SPORTS AND WUSHU (CHINESE MARTIAL ART)	4 Hours
13.1 Traditional Sports - Kite	
13.2 Traditional Sports - Archery	
13.3 Chinese Women and the Olympic Games	
13.4 Taiji Boxing	
13.5 Overview of Wushu Films and Dramas	
13.6 Wushu Elements in Wushu Films and Dramas	
13.7 Cultural Connotation of Chinese Wushu	
14. TRADITIONAL FESTIVALS AND CHINESE CUISINE	4 Hours
14.1 Chinese Traditional Festivals	
14.2 Chinese Traditional Festivals-The Spring Festival&The Lantern Festival	
14.3 Chinese Traditional Festivals-The Dragon Boat Festival&The Mid-Autumn Festival	
14.4	
14.5 Chinese Cuisine	
15. HISTORICAL AND CULTURAL HERITAGE	4 Hours
15.1 Human Civilization: "Peking Man" Site at Zhoukoudian	
15.2 Dunhuang Mogao Grottoes	
15.3 Great Engineering: Great Wall and Dujiangyan Irrigation System	
15.4 Royal Tombs: Xiaoling Mausoleum and Imperial Tombs of the Ming and Qing Dynasties	
15.5 The Largest Bronze Ware: Simuwu Great Tripod	
15.6 Warring States Court Musical Instrument: Chime-Bells of Marquis Yi of the Zeng State	
15.7 Types of Chinese Ancient Buildings	
15.8 Royal Architecture: The Forbidden City	
15.9 Ancient Residential Buildings: Quadrangles	
15.10 Chinese Gardens	

16. INTANGIBLE CULTURAL HERITAGE

4 Hours

- 16.1. Current Status of Intangible Cultural Heritage
- 16.2 Gesar
- 16.3 Guqin
- 16.4 Rural Music and Dance
- 16.5 Shadow Play
- 16.6 Cantonese Opera
- 16.7 Chinese Seal Cutting
- 16.8 Nanjing Yunjin Brocade
- 16.9 Twenty-four Solar Terms
- 16.10 Crosstalk
- 16.11 Acrobatics
- 16.12. Protection of Intangible Cultural Heritage

REFERENCE BOOKS

1. Understanding China (Digital and Paper format), edited by Cheng Aimin, jointly developed by Peking University, Beijing Normal University, Zhejiang University, Tianjin University, Harbin Institute of Technology, Xi'an Jiaotong University, Wuhan University, Chongqing University, Shanghai International Studies University, Dalian Medical University, South China Normal University, Jiangsu Normal University and Tang International Education Group, published by Shanghai Foreign Language Education Press, Recommended by China Association for International Education (CAFSA)

INSTRUCTIONAL OBJECTIVES

1. Understand the basic geography of China and some famous Chinese cities
2. Understand the unique natural and cultural landscape
3. Master basic knowledge of Chinese history and important historical figures
4. Understand the basic context and major issues in the development of Chinese history
5. Understand the main schools of Chinese traditional philosophy and their representatives
6. Understand the relevant core concepts
7. Master the influence of Chinese philosophy on the mindset and lifestyle of Chinese people
8. Understand the development and spread of Taoism, Buddhism, Islamism and Christianity
9. Understand the current status and policies of religious in China
10. Master the basic knowledge in seven videos
11. Describe the main contents of China's political system in Chinese
12. Compare the similarities and differences between China's political system and home country
13. Correct and comprehensive understanding of China's political system
14. Understand knowledge related to Chinese literature
15. Understand the inheritance and absorption of Chinese contemporary music to traditional music culture
16. Experience the characteristics of Chinese language
18. Understand the language and text of China as a whole
- 19 Understand the evolution of Chinese calligraphy
20. Understand the basic knowledge of Chinese painting and appreciation of representative works

21. Learn knowledge and information in related fields
22. Understand the logic and reasons behind the development of China's economy
23. Understand the ancient and modern Chinese scientific and technological civilization
24. Understand the unique and long-standing Chinese education
25. Master the core concepts of harmony between man and nature, five elements of qi, yin and yang and the basic principles of health preserving in four seasons
26. 5. Familiarize with the efficacy of acupuncture and massage and the nature and function of traditional Chinese medicine
27. Understand the Chinese medical service system; Characteristics of Tibetan medicine, Mongolian medicine, Hui medicine and Zhuang medicine
28. Understand the development history of TCM
- 29 International communication of traditional Chinese medicine science
30. Learn the development history of Chinese traditional sports
31. Master Chinese traditional sports such as kite and archery and their related cultural connotations
32. Understand the characteristics and advantages of modern competitive sports in China
33. Understand the spiritual connotation of Chinese Wushu
34. Understand the diet of traditional Chinese festivals
35. Understand the basic situation of Chinese historical and cultural heritage
36. Know important ancient sites and cultural relics: Peking Man Site Zhoukoudian, Dunhuang Mogao Grottoes, Great Wall, Dujiangyan Irrigation System, 37. Imperial Tombs of the Ming and Qing Dynasties, Simuwu Great Tripod, Chime-Bells of Marquis Yi of the Zeng State, etc.
38. Understand the historical and cultural value of cultural heritage
39. Master the basic situation, basic characteristics, and main types of Chinese ancient buildings
40. Familiarize with representative ancient buildings, and know important ancient sites and cultural relics: Peking Man Site Zhoukoudian, 41. Dunhuang Mogao Grottoes, Great Wall, Dujiangyan Irrigation System, Imperial Tombs of the Ming and Qing Dynasties, Simuwu Great Tripod, Chime-Bells of Marquis Yi of the Zeng State, etc.
42. Understand the historical and cultural value of ancient buildings
43. Able to distinguish different architectural and garden styles and features
44. Able to read and explain relevant key words
45. Understand the development, current situation, and protection of China's intangible cultural heritage

Computer Networks

Course Code: CIT-223

Total Contact Hours: 256

Theory: 64

Practical 96

T P C

2 3 3

Introductory course on data communication and computer networks. It aims to provide the students conceptual tools to understand the design and implementation of data communication as applied to computer networks. It discusses the layered model. It covers communication, media, WAN, LAN, Internetworking, protocols, network management and troubleshooting. This comes with practical component to complement classroom discussion.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand basic concepts and principles of data communication as applied to computer networking
2. Synthesize the different approaches of data communication in networking and assess their effectiveness in implementation
3. Troubleshoot and diagnose network faults and correct them
4. Assemble cabling system of a network
5. Recognize the inherent problems in networking and appreciate the solutions of the problems

COURSE CONTENTS

- | | |
|---|-----------------|
| 1. PRINCIPLES OF DATA COMMUNICATION AND NETWORKING | 8 Hours |
| 1.1 Development of Communication and Data Communication | |
| 1.2 Overview of OSI and TCP/IP model | |
| 1.3 Data Transmission | |
| 1.3.1 Analog Transmission | |
| 1.3.2 Digital Transmission | |
| 1.3.3 Signal Impairment | |
| 1.4 Transmission Media | |
| 1.4.1 Types of Cables and Connectors | |
| 1.4.2 Telephony and Wireless Communication | |
| 2. DATA LINK CONTROL | 4 Hours |
| 2.1 Addressing scheme (Mac addresses) | |
| 2.2 Error detection and correction | |
| 3. MULTIPLEXING | 4 Hours |
| 3.1 Frequency-Division Multiplexing | |
| 3.2 Time-Division Multiplexing | |
| 4. LOCAL AREA NETWORK (LAN) | 12 Hours |
| 4.1 LAN Architecture | |
| 4.2 Topologies | |

4.3 LAN Systems

4.3.1 Ethernet and Fast Ethernet (CSMA/CD)

4.3.2 Token Ring and FDDI

5. CONNECTIVITY DEVICES

4 Hours

5.1 Modems

5.2 Hubs and Repeaters

5.3 Bridges, Routers and Gateways

6. INTERNETWORKING

20 Hours

6.1 Principles of Internetworking

6.2 Protocols

6.2.1 OSI Model

6.2.2 TCP/IP Suite

6.3 Internet Protocol (IP) and

6.4 Addressing scheme at NW layer (IP address classes)

6.5 Routing Protocol

6.6 Transport Protocols and Transport Services

6.7 Addressing scheme at Transport layer (Port addresses)

6.8 Application Layer protocols

6.9 Addressing scheme at Application layer (DNS)

7. NETWORK ADMINISTRATION AND MANAGEMENT

8 Hours

7.1 Types of Servers

7.2 Managing Accounts

7.3 Performance Monitoring

8. NETWORK TROUBLESHOOTING

4 Hours

8.1 Structured Cabling

8.2 Network Testing Tools

8.3 Fault Diagnosis: Troubleshooting Connectivity and Communication

REFERENCE BOOKS

1. Networking Essentials, Joe Casad and Dan Newland, Techmedia
2. Computer Networks, 2Ed, Andrew S. Tanenbaum, Prentice Hall
3. Data and Computer Communications, 4Ed., William Stallings, MacMillan
4. Local Area Networks, 2Ed, Peter Hodos
5. An introduction to Local Area Networks, Greg Nunemacher
6. Networking Explained, Gallo
7. Networking Essentials, 2Ed, Microsoft Press

LIST OF PRACTICALS

96 Hours

1. Identifying various hardware components of a network
2. Studying network card
3. Splicing a coaxial cable

4. Terminating twisted pair cable
5. Terminating coaxial cable
6. Using Cable Testers
7. Configuring Mac address on Windows / Linux OS
8. Configuring IP addresses on Windows / Linux OS
9. Design of a Local Area NW of computers
10. Troubleshooting NW connectivity.
11. Installing and configuring a NW printer
12. Using Network Tools and Analyzers
13. Using Network Monitors

INSTRUCTIONAL OBJECTIVES

1. Principles of Data Communication and Networking

- 1.1. Discuss the development of communication
- 1.2. State the principles of data communication
- 1.3. Describe methods of data transmission
- 1.4. Differentiate analog signal from digital signal
- 1.5. Explain causes of transmission error
- 1.6. List transmission media
- 1.7. Describe each transmission media
- 1.8. State the advantage and disadvantage of each transmission media

2. Data Link Control

- 2.1. Protocols at data link layer
- 2.2. Understand importance of Mac address
- 2.3. Describe methods of error detection and correction

3. Multiplexing

- 3.1. Explain the need for multiplexing
- 3.2. Describe Frequency-division multiplexing
- 3.3. Describe Synchronous Time-division Multiplexing

4. Local Area Network (LAN)

- 4.1. Describe LAN architecture
- 4.2. Identify different topologies of LAN
- 4.3. Describe different topologies of LAN
- 4.4. Illustrate different topologies
- 4.5. State the advantage and disadvantages of each topology
- 4.6. Describe different LAN systems like Ethernet
- 4.7. Explain the advantage and disadvantage of different LAN systems
- 4.8. Describe bridges

5. Connectivity Devices

- 5.1. Explain the need for connectivity devices
- 5.2. State the operational principle of Modems
- 5.3. Describe Modem
- 5.4. Describe hubs and repeaters
- 5.5. Describe bridges, routers and gateways
- 5.6. Illustrate the relationships of this devices in networking

6. Internetworking

- 6.1. Explain the principles in Internetworking
- 6.2. Explain the need for protocols in Internetworking
- 6.3. Describe each layer of OSI model of network
- 6.4. Differentiate connectionless and connection-oriented internetworking
- 6.5. Describe the Internet Protocol
- 6.6. Discuss the development of Internet Protocol
- 6.7. Describe routing protocols
- 6.8. Explain transport protocol
- 6.9. Describe Transmission Control Protocol (TCP)
- 6.10. Explain the advantage of TCP/IP from OSI

7. Network Administration and Management

- 7.1. Describe different types of servers
- 7.2. Create and manage user accounts
- 7.3. Use software to conduct performance monitoring of network
- 7.4. Explain the data protection and security
- 7.5. Describe means to protect data and secure its integrity in network system.

8. Network Trouble shooting

- 8.1. Describe structured cabling
- 8.2. Identify network testing tools
- 8.3. Use network testing tools to diagnose network fault
- 8.4. Perform network fault diagnoses
- 8.5. Troubleshoot network connectivity and communication faults

Digital Logic Design

Course Code: MTR-272

Total Contact Hours: 128

Theory: 32

Practical 96

T	P	C
1	3	2

AIMS

At the end of the course the students are expected to be able to

1. Understand the fundamentals of digital electronics
2. Understand the applications of digital electronic devices in the industry

COURSE CONTENTS

1. INTRODUCTION

2 Hours

- 1.1 Digital & analogy quantities
- 1.2 Number systems, BIT, BYTE, NIBBLE
- 1.3 Elements of digital electronics

2. LOGIC GATES

3 Hours

- 2.1 AND Gate
- 2.2 OR Gate
- 2.3 NOT Gate
- 2.4 NAND Gate
- 2.5 NOR Gate
- 2.6 XOR Gates

3. BOOLEAN ALGEBRA

2 Hours

- 3.1 Laws of Boolean algebra
- 3.2 De Morgans Laws
- 3.3 Boolean Function Generation from truth tables

4. ARITHMENTIC LOGIC CURCUITS

3 Hours

- 4.1 Half adders
- 4.2 Full adders
- 4.3 Adder-subtractor
- 4.4 Comparators

5. COMBINATIONAL LOGIC AND DATA PROCESSING CURCUITS

3 Hours

- 5.1 Multiplexers & logic (IC's such as 74150)
- 5.2 Demultiplexers (IC's such as 74154)
- 5.3 Decoders
- 5.4 BCD-to-Decimal Decoders (such as 7445)
- 5.5 Seven-Segment Decoders & Displays
- 5.6 Encoders (IC's such as 74147)
- 5.7 Read-only memories
- 5.8 Diode ROM

5.9 Commercially available ROM

6. FLIP- FLOP	4 Hours
6.1 RS Flip-Flop	
6.2 Clocked RS Flip-Flop	
6.3 D Flip-Flop	
6.4 Edge-triggered D Flip-Flop	
6.5 JK Flip-Flop	
7. CLOCKS & TIMERS	4 Hours
7.1 TTL clock	
7.2 555—astable, monostable	
7.3 Applications	
8. SHIFT REGISTERS	3 Hours
8.1 Introduction, shift-Right & shift-Left	
8.2 Serial in-serial out	
8.3 Serial-in parallel-out	
8.4 Parallel-on serial-out	
9. COUNTERS	1 Hour
9.1 Introduction, types	
9.2 Ripple counter	
9.3 Synchronous counter	
9.4 Presentable counter	
9.5 Digital clock	
10. MEMORIES	2 Hours
10.1 Introduction, volatile, non-volatile	
10.2 Memory Addressing	
10.3 ROM, PROM, EPROM, capacity	
10.4 RAM, Static & dynamic, capacity	
11. APPLICATION OF DIGITAL ELECTRONICS	2 Hours
11.1 Digital clock	
11.2 Frequency & time counter	
11.3 Moving Message Display	

REFERENCE BOOKS

1. Industrial Electronics: James A. Rehg and Glenn J. Sartori (2005)
2. Digital Electronics: A Practical Approach William Kleitz (8th Edition) (2007)
3. Power Electronics: B.W. Williams

LIST OF PRACTICALS	96 Hours
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1. Identify and verify truth tables for AND, OR, NOT Gates ICs

2. Identify and verify truth tables for NOR, NAND, XOR Gates ICs
3. Construct and verify truth tables of half adder, full adder
4. Connect and study an adder & subtractor circuits
5. To perform and study the function of Decoder & demultiplexer through related IC
6. To perform and study the function of Encoder & Multiplexer through related IC
7. Identify and verify the functions of RS Flip-Flop
8. Identify and verify the functions of Clocked RS Flip-Flop
9. Identify and verify the functions of D Flip-Flop
10. Identify and verify the functions of JK Flip-Flop
11. Connect a 555 IC as
 - 11.1 A-stable multivibrator
 - 11.2 Monostable multivibrator
 - 11.3 Bistable multivibrator
12. Connect and observe the working of shift registers (SISO, SIP, PISO, PIPO)
13. Identify, connect and observe working of ripple and synchronous counters
14. Select components, assemble and observe working of a digital clock
15. Study the working of memory devices
16. Assemble and observe working of frequency counter (Project – 2)
17. Assemble and observe working of moving message display (Project – 3)

INSTRUCTIONAL OBJECTIVES

1. Know The Basic Terms Related To Digital Electronics

- 1.1. State in a tabulated form the merits & demerits of analog & digital quantities
- 1.2. Define basic terms related to digital electronics

2. Understand The Working Of Various Logic Gates

- 2.1. Describe the working of AND Gate
- 2.2. Describe the working of OR Gate
- 2.3. Describe the working of NOT Gate
- 2.4. Describe the working of NAND Gate
- 2.5. Describe the working of NOR Gate
- 2.6. Describe the working of XOR Gates
- 2.7. Understand the configurations formed by combining gates

3. Introduction To Boolean Algebra & Its Laws

- 3.1. Study the laws of boolean algebra
- 3.2. Study the De Morgans Laws

3.3. Understand the boolean function generation from truth tables

4. Detailed Description Of Arithmetic Logic Circuits

- 4.1. Describe the working of Half adders
- 4.2. Describe the working of Full adders
- 4.3. Describe the working of Adder-subtractor
- 4.4. Describe the working of comparators

5. Understand The Working And Uses Of Combinational Logic Circuits, Including Data Processing Circuits

- 5.1. Define the terms multiplexer, demultiplexers, decoder, encoders, BDC converters
- 5.2. Explain multiplexers, using logic circuits & block-diagrams (multiplexers using IC's such as 74150)
- 5.3. Explain demultiplexers, using block-diagrams (using IC's such as 74154)
- 5.4. Explain using block-diagram <BDC& its conversion to Decimals, using IC's, such as 7445
- 5.5. Explain seven segments decoders, showing block diagrams, giving examples for letters & digits.
- 5.6. Describe the operation of combinational logic circuits as applied to data processing circuits
- 5.7. Explain the working of 7-segment display circuit

6. Detailed Description Of Flip-Flops

- 6.1. Describe the working of RS Flip-Flop
- 6.2. Describe the working of Clocked RS Flip-Flop
- 6.3. Describe the working of D Flip-Flop
- 6.4. Describe the working of Edge-triggered D Flip-Flop
- 6.5. Describe the working of JK Flip-Flop

7. Understand The Working Of Clocks & Timers

- 7.1. Study the function of a TTL clock
- 7.2. Study the Timer 555 – astable, monostable
- 7.3. Identify the applications of clock and timers.

8. Know About Shift Registers

- 8.1. Study the basic concepts of shift-right & shift-left registers
- 8.2. Understanding the serial in-serial out configuration
- 8.3. Understand the serial-in parallel-out configuration
- 8.4. Understand the parallel-on serial-out configuration

9. Understand The Working Of Counters

- 9.1. Study the basics and the types of counters
- 9.2. Describe the working of the ripple counter
- 9.3. Describe the working of synchronous counter
- 9.4. Describe the working of presentable counter
- 9.5. Understand the working of digital clock

10. Knows Various Types Of Memories

- 10.1. Define various types of memories: ROM, PRM, EPROM, RAM
- 10.2. State memory of common memory devices in KB, MB

10.3. Know the system of memory addressing

11. Apply The Concepts Of Digital Electronics For Project(S)

11.1. Explain the use of digital electronic circuits as elements of a chosen system

11.2. Describe the use of digital electronic circuits for the following:-

11.2.1. Moving display

11.2.2. Frequency counters

11.2.3. Digital clock

Web Development with JAVA

Course Code: SWT 223

Total Contact Hours: 224

Theory: 32

Practical: 192

T	P	C
1	6	3

A course introducing the design and development of a Web page with JAVA. It intends to provide the trainees with working knowledge on creating a Web page using JAVA programming language. It covers the discussion on the WWW and the Internet, HTML and CSS basics, JAVA Script, JQuery, JAVA Servlets, JSP, Session Management, JDBC Programming, tools, linking, FrontPage basics, formatting, multimedia, and site creation and maintenance. Java has strong support for web development. While Java on the desktop, with the notable exception of Eclipse RCP based application was never a huge success, Java is frequently used at the server side. This has a laboratory component to enhance learning.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Describe Web development technologies
2. Describe the concepts and methods of designing a Web page for the World Wide Web.
3. Use any text editor to create an HTML code.
4. Use the elements of the HTML to format a Web page
5. Install necessary software for Setting up development Environment
6. Explain and apply HTML and CSS tags
7. Apply Java Script in webpages
8. Apply JQuery within webpages
9. Describe and use Java servlets
10. Explain and apply Java Server Pages elements
11. Explain and use Session Management applications and techniques
12. Explain JDBC, configure MySQL and use its methods
13. Customize Tags
14. Explain and apply use Java Server Faces

COURSE CONTENTS

1. INTRODUCTION TO WEB DEVELOPMENT

2 Hours

- 1.1 What is a Web Application?
- 1.2 HTTP Basics
- 1.3 Types of HTTP Requests
- 1.4 Server Side Programming
- 1.5 Client Side Programming
- 1.6 Web Application Layers

2. SETTING UP DEVELOPMENT ENVIRONMENT

2 Hours

- 2.1 Installation of Apache Tomcat Server
- 2.2 Installation of IDE (Eclipse / NetBeans)

2.3 Standard Directory Structure of Java Web Application

2.4 Development of Web Application

- | | |
|---|--------------------|
| 3. HTML AND CSS | 2 Hours |
| 3.1 Describe Html Document Structure and Tags | |
| 3.2 Describe CSS Styles | |
| 3.3 Designing Tables | |
| 3.4 Designing Forms | |
| 3.5 Advance Page Layout | |
|
4. JAVASCRIPT |
4 Hours |
| 4.1 Introduction to Javascript | |
| 4.2 Hiding and Showing Elements | |
| 4.3 Styling Elements | |
| 4.4 Using JQuery | |
| 4.5 JQuery Selectors | |
| 4.6 Validating Forms | |
|
5. JAVA SERVLETS |
4 Hours |
| 5.1 What is a Servlet? | |
| 5.2 Advantages of Servlet | |
| 5.3 Servlet Types | |
| 5.4 Writing Basic Hello World Servlet | |
| 5.5 Servlet Life Cycle | |
| 5.6 Servlet and Forms | |
| 5.7 Servlet and Input Validation | |
|
6. JAVA SERVER PAGES |
3 Hours |
| 6.1 Introduction | |
| 6.2 Life Cycle of JSP | |
| 6.3 JSP Elements | |
| 6.4 JSP Standard Actions | |
|
7. SESSION MANAGEMENT |
4 Hours |
| 7.1 What is a Session? | |
| 7.2 What is a Cookie? | |
| 7.3 URL Rewriting | |
| 7.4 Hidden Field | |
| 7.5 Working with HTTP Session | |
|
8. JDBC PROGRAMMING |
8 Hours |
| 8.1 Introduction | |
| 8.2 Configure MySQL | |
| 8.3 Connecting to the Database | |
| 8.4 Accessing Data | |
| 8.5 The execute Query Method | |
| 8.6 The execute Update Method | |

9. Custom Tags

3 Hours

- 9.1 Custom Tags Overview
- 9.2 Custom Tag Handlers
- 9.3 Customizing Tag behavior with attributes

REFERENCE BOOKS

- 1. Learning Web Design: A Beginner's Guide to (X)HTML, Stylesheet and Web by Jennifer Niederst Robbins
- 2. Beginning JSP, and Tomcat by Giulio Zambon

LIST OF PRACTICALS

192 Hours

- 1. Installation of Apache Tomcat Server
- 2. Installation of IDE (NetBean)
- 3. Deploy simple website in Apache Tomcat Server
- 4. Design a Page Layout using Html and CSS
- 5. Install ODBC Driver
- 6. Install and Configure MySQL
- 7. Design User Registration Form and Store User in Database
- 8. Design Login User Form and Validate User
- 9. Show All Registered Users in a grid
- 10. Search users by name and show in grid.
- 11. Update User Profile
- 12. Form Validation using JQuery
- 13. Create a form using Java Servlet
- 14. Store and Retrieve data from Session
- 15. Create address book application

INSTRUCTIONAL OBJECTIVES

1. Introduction to Web Development

- 1.1. Define Web Application
- 1.2. Explain HTTP Basic
- 1.3. Describe Types of HTTP Request
- 1.4. Discuss Server Side Programming Languages
- 1.5. Describe Client Side Programming Languages
- 1.6. Explain Web Application Layers

2. Setting up Development Enviroment

- 2.1. Install of Apache Tomcat Server
- 2.2. Install of IDE (Eclipse / NetBeans)
- 2.3. Explain the Standard Directory Structure of Web Application
- 2.4. Develop a Web Application

3. HTML and CSS

- 3.1. Describe Html document structure
- 3.2. Describe Html Elements
- 3.3. Implement CSS styles
- 3.4. Design Tables
- 3.5. Design Forms
- 3.6. Use Page Layout

4. Javascript

- 4.1. Explain what is Javascript
- 4.2. Hide and Show Elements
- 4.3. Apply styles on elements
- 4.4. Define JQUERY
- 4.5. Explain the JQUERY Selectors
- 4.6. Apply validation on HTML form

5. Java Servlets

- 5.1. Define Servlets
- 5.2. Describe the advantages of Servlets
- 5.3. Describe different types of a Servlets
- 5.4. Describe Servlet Life Cycle
- 5.5. Create Forms using Servlet
- 5.6. Add Validation on Form

6. Java Server Pages

- 6.1. Define JSP
- 6.2. Describe Life Cycle of JSP
- 6.3. Explain JSP Elements
- 6.4. Explain JSP Standard Actions

7. Session Management

- 7.1. Define a 'Session'
- 7.2. Define a 'Cookie'
- 7.3. Explain URL Rewriting
- 7.4. Explain Hidden Field
- 7.5. Use HTTP Session

8. JDBC Management

- 8.1. Define JDBC
- 8.2. Configure MySQL
- 8.3. Connect the Database

- 8.4. Access Data
- 8.5. Implement execute Query Method
- 8.6. Implement execute Update Method

9. Custom Tags

- 9.1. Explain Custom Tags
- 9.2. Describe Custom Tag Handlers
- 9.3. Customize Tag behavior with attributes

Basics of Machine Learning

Course Code: AIT 212

Total Contact Hours: 128

Theory: 32

Practical: 96

T	P	C
1	3	2

Aims:

The course aims to provide students with a comprehensive understanding of Machine Learning and Deep Learning fundamentals. Students will learn the theoretical foundations and practical applications of various ML algorithms, neural network architectures, and deep learning techniques.

COURSE CONTENTS

1. MACHINE LEARNING FUNDAMENTALS

2 Hours

1.1. Introduction to Machine Learning

- 1.1.1 Definition and types of machine learning
- 1.1.2 Historical development of AI and ML
- 1.1.3 Current applications and use cases

1.2. Data Management

- 1.2.1 Data collection and privacy concerns
- 1.2.2 Bias identification and mitigation
- 1.2.3 Data preprocessing techniques

2. SUPERVISED LEARNING FUNDAMENTALS

5 Hours

2.1. Basic Classification Methods

- 2.1.1 Binary and multi-class classification
- 2.1.2 Decision trees and rule-based systems
- 2.1.3 k-Nearest Neighbors algorithm
- 2.1.4 Naïve Bayes classifiers

2.2. Model Evaluation and Validation

- 2.2.1 Performance metrics and evaluation criteria
- 2.2.2 Cross-validation techniques
- 2.2.3 Overfitting and underfitting
- 2.2.4 Bias-variance tradeoff

2.3. Advanced Supervised Learning

- 2.3.1 Support Vector Machines SVM
- 2.3.2 Linear and nonlinear SVM
- 2.3.3 Kernel methods and applications
- 2.3.4 Ethical implications in classification

3. UNSUPERVISED LEARNING FUNDAMENTALS

7 Hours

3.1. Clustering Fundamentals

- 3.1.1 Types of clustering algorithms

- 3.1.2 K-means clustering
- 3.1.3 Hierarchical clustering
- 3.1.4 Density-based clustering
- 3.2. Dimensionality Reduction
 - 3.2.1 Principal Component Analysis PCA
 - 3.2.2 Feature selection methods
 - 3.2.3 Feature extraction techniques
 - 3.2.4 Data visualization approaches
- 3.3. Advanced Unsupervised Learning
 - 3.3.1 Anomaly detection
 - 3.3.2 Association rule learning
 - 3.3.3 Gaussian mixture models
 - 3.3.4 Applications and ethical considerations

4. NEURAL NETWORKS FUNDAMENTALS

6 Hours

- 4.1. Biological Neural Networks
 - 4.1.1 Human brain structure
 - 4.1.2 Neural circuits and signaling
 - 4.1.3 Cognitive systems overview
 - 4.1.4 Brain-inspired computing
- 4.2. Artificial Neural Networks
 - 4.2.1 Perceptron architecture
 - 4.2.2 Activation functions
 - 4.2.3 Multi-layer networks
 - 4.2.4 Training methodologies
- 4.3. Learning Algorithms
 - 4.3.1 Backpropagation
 - 4.3.2 Gradient descent
 - 4.3.3 Optimization techniques
 - 4.3.4 Generalization theory

5. DEEP LEARNING FUNDAMENTALS

12 Hours

- 5.1. Basic Deep Learning Concepts
 - 5.1.1 Deep vs shallow architectures
 - 5.1.2 Building blocks of deep networks
 - 5.1.3 Training deep networks
 - 5.1.4 Regularization techniques
- 5.2. Convolutional Neural Networks
 - 5.2.1 CNN architecture
 - 5.2.2 Convolution and pooling operations
 - 5.2.3 Feature hierarchies
 - 5.2.4 Computer vision applications

- 5.3. Advanced Deep Architectures
 - 5.3.1 Recurrent Neural Networks RNN
 - 5.3.2 Long Short-Term Memory LSTM
 - 5.3.3 Autoencoders and VAEs

REFERENCE BOOKS:

1. Machine Learning, Tom, M., McGraw Hill, 1997.
2. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, MIT Press, 2012
3. Neural Network Design, 2nd Edition, Martin T. Hagan, Howard, B. Demuth, Mark Hudson Beale and Orlando De Jesus, Publisher: Martin Hagan; 2 edition September 1, 2014, ISBN-10: 0971732116
4. An Introduction to Neural Networks, James A Anderson, Publisher: A Bradford Book March 16, 1995, ISBN-10: 0262011441
5. Fundamentals of Artificial Neural Networks, Mohammad Hassoun, Publisher: A Bradford Book January 1, 2003, ISBN-10: 0262514672
6. Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville
<http://www.deeplearningbook.org/>
7. Deep learning with python by Françoise Chollet, ISBN-10: 9781617294433, 2017

LIST OF PRACTICALS

96 Hours

1. Introductory to Anaconda, Jupyter Notebook and Colab
2. Data Preprocessing and Machine Learning
3. Supervised Learning Decision Trees and kNN
4. Supervised Learning Bayesian Networks
5. Evaluation of Classifiers
6. Support Vector Machines; Hard and Soft Margin Linear SVM
7. Neural Networks and Regression in Machine Learning
8. Clustering Techniques
9. Implementation of Boolean Gates using Perceptron
10. Synthetic Data Generation and Linear Regression using ANN from scratch
11. Implementing Logistic Regression using ANN from scratch
12. Gradient Descent Techniques and Learning Rate Strategies
13. Image Classification using Basic Convolutional Neural Networks CNNs
14. Transfer Learning and Advanced CNN Architectures
15. Autoencoders: Image Generation, Denoising, and Classification
16. Introduction to Recurrent Neural Networks RNNs and LSTMs

Data Collection and Processing Technology

Course Code: AIT 223

Total Contact Hours: 160

Theory: 64

Practical: 96

T	P	C
2	3	3

This course covers the basic knowledge and practical skills of data collection, analysis, and processing, aiming to provide students with the fundamental knowledge and skills of acquiring, processing, and analyzing data through theoretical knowledge and project practice. The content includes the foundation of Python language, web data scraping, and the entire process of data analysis and processing, laying a solid foundation for subsequent data applications and scientific research.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Review the basic syntax of the Python language and the usage of composite data types.
2. Master the definition and invocation methods of functions.
3. Master the handling of file and data formatting.
4. Grasp the concept of web scraping, understand its uses and classifications.
5. Be aware of legal issues in web scraping development and comprehend the provisions of the Robots Exclusion Standard (Robots.txt).
6. Grasp the implementation principles of web scraping and understand the detailed process of data scraping.
7. Master the usage of libraries such as requests, lxml, regular expressions (re), CSS selectors, XPath, and BeautifulSoup for acquiring and parsing web data.
8. Master the scrapy web scraping framework and write scraping programs.
9. Grasp anti-anti-scraping strategies such as browserCookie, IP proxy, and managing cookie information.
10. Master data storage methods, including txt, csv, json files, as well as MySQL and MongoDB databases.
11. Master the basic usage of NumPy, including array creation, manipulation, data type conversion, and mathematical operations.
12. Grasp the basic usage of Pandas, including the creation of Series and DataFrame, data reading and writing, data cleaning, data transformation, and data aggregation.
13. Understand the importance of data preprocessing and grasp common preprocessing methods such as handling missing values, outliers, data standardization, and normalization.
14. Be able to use NumPy and Pandas libraries for basic data analysis and data visualization.
15. Cultivate students' abilities in data analysis and problem-solving, as well as improve their practical and innovative skills.

COURSE CONTENTS

1. PYTHON LANGUAGE FUNDAMENTALS-PYTHON

1 Hour

- 1.1 Overview of Python Language
- 1.2 Basic Syntax of Python
- 1.3 Basic Data types

2. COMPOSITE DATA TYPES	2 Hours
2.1 Overview of Composite Data Types	
2.2 List Types and Their Operations	
2.3 Creating Tuples and Tuple Assignment Methods	
2.4 Dictionaries and Common Dictionary Operations	
2.5 Sets and Basic Set Operations	
3. FUNCTIONS	3 Hours
3.1 Definition and Invocation of Functions	
3.2 Parameter Passing in Functions	
3.3 Variable Scope: Local and Global Variables	
3.4 Recursion in Functions	
3.5 Usage of Anonymous Functions (Lambda Functions)	
4. FILES AND DATA FORMATING	4 Hours
4.1 Usage of Files	
4.2 Formatting and Processing of One- and Two-Dimensional Data	
4.3 Formatting of High-Dimensional Data	
4.4 Conversion Between CSV and JSON Formats	
5. UNDERSTANDING WEB SCRAPERS	2 Hours
5.1 Web Scraper Concepts	
5.2 Application Scenarios of Web Scrapers	
5.3 Exploring the Legality of Web Scraping	
5.4 Working Principles and Processes of Web Scrapers	
5.5 Exploring the Implementation Technologies of Web Scrapers	
6. PRINCIPLES OF SCRAPER REQUESTS	2 Hours
6.1 The Process of Browser Loading a Webpage	
6.2 Fundamentals of HTTP	
6.3 Basics of Webpages	
7. CAPTURING WEBPAGE DATA AND ANTI-SCRAPING STRATEGIES	4 Hours
7.1 Sending GET Requests	
7.2 Sending POST Requests	
7.3 Handling Responses	
7.4 Customizing Request Headers	
7.5 Validating Cookies	
7.6 Setting Proxy Servers	
8. PARSING WEBPAGE DATA	4 Hours
8.1 Regular Expression Syntax	
8.2 Using the re Module	
8.3 XPath Syntax	
8.4 Introduction to the xml Library	
8.5 Creating a BeautifulSoup Object	
8.6 Selecting Nodes with Find Methods	
8.7 Selecting Nodes with CSS Selectorsethethod	

- 9. DATA STORAGE** **4 Hours**
- 9.1 Storing data to txt, csv, and JSON files
 - 9.2 Storing data to MySQL
 - 9.3 Storing data to MongoDB database
- 10. WEB SCRAPING FRAMEWORK–SCRAPY** **4 Hours**
- 10.1 Scrapy framework architecture and operation process
 - 10.2 Creating a new Scrapy project
 - 10.3 Developing a scraping spider
 - 10.4 Persistently storing the scraped data
- 11. NUMPY FUNDAMENTALS** **8 Hours**
- 11.1 . Introduction and Importing NumPy
 - 11.2 Creating and Operating NumPy Arrays
 - 11.3 NumPy Data Types and Array Attributes
 - 11.4 Common NumPy Functions (e.g., Sorting, Unique Values, Conditional Filtering)
 - 11.5 NumPy Array Operations and Random Number Generation
- 12. PANDAS FUNDAMENTALS** **16 Hours**
- 12.1 Introduction and Importing Pandas
 - 12.2 Pandas Data Structures (Series and DataFrame)
 - 12.3 Data Reading and Writing (CSV, Excel, SQL, etc.)
 - 12.4 Data Cleaning and Preprocessing (Handling Missing Values, Outliers, Duplicates, etc.)
 - 12.5 Data Transformation and Aggregation (Grouping, Sorting, Pivot Tables, etc.)
 - 12.6 Data Visualization (Using Matplotlib, etc.)
- 13. DATA ANALYSIS** **10 Hours**
- 13.1 Descriptive Statistical Analysis
 - 13.2 Correlation Analysis and Regression Analysis
 - 13.3 Cluster Analysis and Classification Algorithms
 - 13.4 Time Series Analysis and Forecasting

REFERENCE BOOKS

1. "Python Fundamentals" edited by Magnus Lie Hetland, People's Posts and Telecommunications Publishing House, April 2020,3st edition.
2. “Data Analysis and Mining with Python” edited by Deng Liguu, Tsinghua University Press, May 2021,1st edition.

LIST OF PRACTICALS **96 Hours**

1. List Item Practice.
2. Ancestor Project Practice.
3. Dictionary Project Practice.

4. Set Project Practice.
5. Seven-Segment Display Drawing.
6. Koch Snowflake Curve Drawing.
7. File Opening Operation.
8. File Closing Operation.
9. File Reading and Writing Operations.
10. Bus Stop Detailed Information Scraping.
11. Movie Information Scraping.
12. Book Website Data Scraping.
13. Online Shopping Mall Data Scraping.
14. Scenic Area Website Information Scraping.
15. Student Grade Analysis.
16. Sales Data Analysis.
17. Comprehensive Case: User Behavior Analysis of an E-commerce Platform.

3RD YEAR

ٹی پی سی

1 0 1

کل وقت 20 گھنٹے

نصاب سال سوئم

حصہ اول اسلامیات

حصہ دوم مطالعہ پاکستان

موضوعات:

1۔ قرآن مجید:

سورۃ الفاتحہ، آیت الکرسی، سورۃ البقرہ کی آخری آیات از امن الرسول ﷺ تا آخر اور سورۃ اخلاق مع ترجمہ و تشریح

2۔ دس منتخب احادیث کا ترجمہ (تشریح)

() بنی الاسلام علی خمس شہادت انا لا اله الا الله لا لمراقلم الصلوٰۃ و ایتا الزکوٰۃ و حج البيت و صوم

رمضان

() الدین النصیحتہ

() المنشاء موتمن

() للمومن علی المومن سنت خصال یعود ماذا مرض و تڑھدہ اذا مات و یحییہ اذا دعا

() لیسلم علیہ اذا لقیہ و لیثمتہ اذا عطس و فصیحلہ اذا غاب او شہد

() لا تخن من خانک

() لا یدخل الجنۃ قاتع

() ان الله حرم علیکم عقوق المہات و اضاعته المال

() لیسر اولاً تعسر اولاً تنفر

() ذاق طعم الايمان من مرضی باللہ و با الا سلام دینا بمحمد نبیا

() افضل الذکر لا اله الا الله

3۔ حقوق و فرائض:

حصول تعلیم بطور فرض، والدین اور اولاد کے حقوق و فرائض، ہمسایہ کے حقوق، بچوں کے حقوق، غورتوں کے حقوق، بزرگ

شہریوں کے حقوق، محنت افراد کے حقوق۔

4۔ اسلام کی اخلاقی اقدار:

صبر و استقلال، غفور و درگزر، ایفائے عہد، اخوت، ایثار و قربانی۔

سال سوئم

حصہ اول اسلامیات

تدریس مقاصد

قرآن حکیم:

عمومی مقاصد: منتخب سورتوں اور آیات کی روشنی میں اسلام کے بنیادی مقاصد اور عبادات جان سکے

خصوصی مقاصد: طالب علم اس قابل ہو جائے گا کہ۔

سورۃ الفاتحہ، آیت لکھری، سورۃ بقرہ کی آخری آیات ازمن الرسول سے اور سورۃ اخلاق کا ترجمہ و تشریح کر سکے

طالب علم درج ذیل کا مفہوم بیان کر سکے

() رب العالمین صرف اللہ تعالیٰ ہے

() اللہ رحم کرنے والا ہے

() قیامت کے دن بادشاہی اللہ کی ہوگی

() عبادات اور استغانت کا حقدار صرف اللہ ہے

() طالب علم درج ذیل کا مفہوم بیان کر سکے

() اللہ پاک ہر عیب سے پاک ہے

() اللہ کے اسمائے حسنہ حق اور قیوم ہیں

() تمام انبیاء پر ایمان لانا ضروری ہے

() رسول، ملائکہ، کتب، سماویہ، پر ایمان لانا فرض ہے

() اطاعت حقیقی صرف اللہ کے لیے ہے

() اسلامی احکامات پر عمل کرنا انسانی بساط میں ہے

() کفر کو اللہ کی مدد کے بغیر شکست نہیں دی جاسکتی

() اللہ ایک ہے

() اللہ کسی کا محتاج نہیں نہ اس کا کوئی شریک ہے

منتخب احادیث:

عمومی مقصد: احادیث کی روشنی میں اسلامی تعلیمات پر عمل پیرا ہو سکے

خصوصی مقاصد:

- () احادیث کا ترجمہ بیان کر سکے
 - () احادیث کی تشریح کر سکے
 - () معاشرتی اور انفرادی زندگی میں احادیث سے رہنمائی حاصل کر سکے
- حقوق و فرائض:

عمومی مقاصد:

- () اسلامی معاشرے کا ایک اچھا فرد بن سکے
- خصوصی مقاصد:

- () والدین کے حقوق و فرائض بیان کر سکے
- () مسائیوں کے حقوق بیان کر سکے
- () بچوں کے حقوق بیان کر سکے
- () عورتوں کے حقوق کی پاسداری کر سکے
- () بزرگ شہریوں کے حقوق کا خیال رکھ سکے
- () منہٹ حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جاسکے
- () اسلام میں حقوق و فرائض کی آگاہی کی صورت میں اپنے اندر خدمت خلق کا جذبہ پیدا کر سکے

اسلامی اقدار:

عمومی مقاصد:

- () طالب علم جان سکے گا کہ تعلیم کا مقصد حسن اخلاق سے متصف ہونا ہے
- خصوصی مقاصد:

- () اخلاق کے معنی و مفہوم کو بیان کر سکے
- () اسلام میں حسن و اخلاق کی اہمیت بیان کر سکے
- () قرآن و سنت کی روشنی میں صبر و استقلال کی اہمیت بیان کر سکے
- () ایقائے عہد کی اہمیت بیان کر سکے
- () اخوت کے معنی و مفہوم بیان کر سکے
- () اخوت اسلامی کی اہمیت بیان کر سکے

() اسلام کی اعلیٰ اقدار کو اپنا کر مثالی معاشرہ پیدا کر سکے

نصاب (سال سوئم)

GEN 301

ٹی پی سی
1 0 1
کل وقت 12 گھنٹے

مطالعہ پاکستان

حصہ دوم

موضوعات:

- () قیام پاکستان
- () باؤنڈری کمیشن
- () ریڈ کلف ایوارڈ
- () تقسیم بنگال
- () تقسیم پنجاب
- () مسئلہ مہاجرین
- () ریاست کا الحاق
- () ریاست جموں کشمیر
- () نہری پانی کا تنازعہ
- () قرارداد پاکستان
- () علماء کے بائیس نکات
- () 1956-1962 اور 1973 کے دساتیر کی اسلامی انسانی حقوق کی دفعات (8-28)۔
- () اقلیتوں کے حقوق۔ دیگر محروم طبقات کے حقوق
- () پاکستان کا محل وقوع اور اسکی جغرافیائی اہمیت۔ GSP+ کا تعارف اور عملی طریقہ کار
- () قدرتی وسائل (تیل، گیس، کوئلہ)

مطالعہ پاکستان (حصہ دوم)
قیام پاکستان

تدریس مقاصد:

عمومی مقاصد:

() قیام پاکستان کے بعد درپیش مسائل سے آگاہی حاصل کرے اور بیان کرے

خصوصی مقاصد:

() باؤنڈری کمیشن تشکیل اور اس کے فرائض بیان کر سکے

() ریڈ کلف اور اس کے ایوارڈ کے بارے میں بیان کر سکے

() بنگال اور کلکتہ کی تقسیم کی وجوہات بیان کر سکے

() پنجاب کی تقسیم کی تفصیل بیان کر سکے

() مہاجرین کی آمد سے جو مسائل پیدا ہوئے انہیں بیان کر سکے

() ریاستوں کے الحاق کے بارے میں تفصیل بیان کر سکے

() ریاست جموں کشمیر کے بارے میں بیان کر سکے

() نہری پانی کے تنازعہ کو بیان کر سکے

() قرارداد مقاصد کی تفصیلات بیان کر سکے

() 22 علماء کے متفقہ اسلامی نکات بیان کر سکے

() 1973 کے آئین میں انسانی حقوق کی دفعات (28-8)۔ اقلیتوں کے حقوق اور دیگر محروم طبقات کے حقوق کے بارے میں

جان سکے

() قیام پاکستان کے بعد نفاذ اسلام کی کوششوں کو بیان کر سکے

() پاکستان کے محل وقوع اور اس کی جغرافیائی اہمیت بیان کر سکے اور GSP+ کے تعارف اور عملی طریقہ کار بیان کر سکے

() پاکستان میں قدرتی وسائل (تیل، گیس، کوئلہ) کے بارے میں بیان کر سکے

غیر مسلم طلباء کے لیے

GEN301

نصاب اخلاقیات

سال سوئم

ٹی پی سی
1 0 1
کل وقت 20 گھنٹے

موضوعات:

- () احساس ذمہ داری
- () مثبت ذہن
- () عدل و انصاف
- () قومی خدمت کا جذبہ
- () ذکر و نظر کی پاکیزگی
- () احترام آدمیت
- () شائستگی
- () عفو و درگزر
- () بردباری
- () خود انحصاری
- () اثر و نفوذ
- () جامعیت
- () اپنی ذات کی معرفت (بذریعہ ہم عمر طلباء، اساتذہ، اہم شخصیات)
- () بچوں کے حقوق
- () عورتوں کے حقوق
- () بزرگ شہریوں کے حقوق
- () منٹ حضرات کے حقوق

غیر مسلم طلباء کے لیے
نصاب اخلاقیات (سال سوئم)

تدریس مقاصد:

عمومی مقاصد:

- () ملکی ترقی کے لیے اعلیٰ اوصاف کے ساتھ بہتر طور پر ملک و ملت کی خدمت کر سکے
- خصوصی مقاصد: طالب علم اس قابل ہو سکے کہ
- () موضوعات کا مطلب بیان کر سکے
- () عملی زندگی سے مثالوں کی نشاندہی کر سکے
- () موضوعات کی اہمیت بیان کر سکے
- () اپنی شخصیت اور معاشرے پر موضوعات کے مطابق اثرات پیدا کرنے کے طریقے بیان کر سکے
- () مثبت ذہن کے ساتھ کام کر سکے
- () عدل و انصاف سے ادارہ میں، دفتر میں بہتر ماحول پیدا کر سکے
- () ماحول کو اخلاقی طور پر پاکیزہ بنائے
- () کارکنوں کی بہتر طور پر دل جوئی کر سکے
- () کارکردگی میں اضافہ کر سکے
- () باہمی احترام کی برکات سے استفادہ کر سکے
- () بچوں کے حقوق بیان کر سکے
- () عورتوں کے حقوق کی پاسداری کر سکے
- () بزرگ شہریوں کے حقوق کا خیال رکھ سکے
- () منٹ حضرات کے حقوق جان سکے اور ان کے حقوق کی پاسداری کر کے انہیں معاشرے کا ایک مفید فرد بنایا جاسکے

Basics of Graphic Designing

Course Code: AIT-312

Total Contact Hours: 128

Theory: 32

Practical 96

T P C

1 3 2

Course on Basics of Graphic Designing using Adobe Photoshop, Adobe Illustrator, AutoCAD and Wilcom. It aims to provide students with practical exercise and knowledge on designing graphics, designing websites and drawing computer embroidery. It covers all major topics of Graphic layers. This comes with practical components to complement classroom discussion.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand basic concepts to design websites and embroidery industry design.
2. What tools or knowledge will help you get to the next phase in your career?
3. Moving beyond branding and starting our own businesses.
4. Building our own brand.
5. How to design in a broader sense than fonts and paper (i.e., traditional graphic design)
6. Seeking employment as a Graphic Designer to use skills with computers and the visual arts.
7. More experience and more learning

COURSE CONTENTS

1. INTRODUCTION

1 Hour

- 1.1 Thinking Design
- 1.2 The Concept of Graphic Designing
- 1.3 What does a designer do?
- 1.4 What is the difference between a graphic designer and an illustrator?
- 1.5 What is it like being a graphic designer?
- 1.6 What are the applications of graphic design?

2. INTRODUCTION TO ADOBE PHOTOSHOP

2 Hours

- 2.1 Adobe Photoshop Tools Overview
- 2.2 What are pixels?
- 2.3 Why Use Adobe Photoshop Layers?
- 2.4 What is a Layer?
- 2.5 Layers Panel
- 2.6 Types of Layers
- 2.7 Layers Short Keys

3. ADOBE PHOTOSHOP

2 Hours

- 3.1 Use Magic Wand tool.
- 3.2 Use Polygonal Lasso Tool.
- 3.3 Quick Mask Mode

3.4 Photo Retouching

- | | |
|--|----------------|
| 4. ADVANCED ADOBE PHOTOSHOP | 2 Hours |
| 4.1 Use Brush tool | |
| 4.2 Filter | |
| 4.3 Use pen tool | |
| 4.4 Layer Style | |
| 4.5 Type Text Action | |
| 5. ADOBE PHOTOSHOP_ DESIGNING WEBSITE | 1 Hour |
| 5.1 Web site Design | |
| 5.2 Project Web site Design | |
| 6. INTRODUCTION TO ADOBE ILLUSTRATOR | 3 Hours |
| 6.1 What is Adobe Illustrator | |
| 6.2 The application areas of Adobe Illustrator | |
| 6.3 Bitmaps and Vector Graphs | |
| 6.4 Color mode | |
| 6.5 File format | |
| 6.6 Adobe Illustrator's user interface | |
| 6.7 Basic operations of files | |
| 6.8 The display effect of graphics | |
| 6.9 The use of rulers, reference lines, and grids | |
| 7. ADVANCE ADOBE ILLUSTRATOR | 5 Hours |
| 7.1 Selection Tool | |
| 7.2 Rectangle Tool, Ellipse Tool, Polygon Tool, Star Tool, Line Segment Tool | |
| 7.3 Paintbrush Tool, Pencil Tool | |
| 7.4 Gradient Tool | |
| 7.5 Eyedropper Tool | |
| 7.6 Eraser Tool | |
| 7.7 Type Tool | |
| 7.8 Rotate Tool, Scale Tool, Reflect Tool | |
| 7.9 Pen Tool, Direct Selection Tool | |
| 8. INTRODUCTION TO AUTOCAD | 2 Hours |
| 8.1 Introduction to Systems | |
| 8.2 Startup Command | |
| 8.3 Unit Set Command | |
| 8.4 Drawing Commands | |
| 8.5 Basic Commands | |
| 9. AUTOCAD 2D | 3 Hours |
| 9.1 Drawing aids | |
| 9.2 Draw lines | |
| 9.3 Draw points | |
| 9.4 Draw circles and arcs | |

- 9.5 Draw rectangles and regular polygons
- 9.6 Layers
- 9.7 Hatch and Blocks Commands
- 9.8 Elevation Drawing

10. AUTOCAD 3D

3 Hours

- 10.1 3D coordinate system
- 10.2 3D View Operations
- 10.3 3D Drawing
- 10.4 3D Editing

11. COMPUTERIZED EMBROIDERY

4 Hours

- 11.1 Introduction to Toolbars
- 11.2 View, Outline and Control Points
- 11.3 Vectors & Images Sketching Designing
- 11.4 Input Tools
- 11.5 Pointer Tools
- 11.6 Shaping Tools

12. ADVANCED COMPUTER EMBROIDERY

4 Hours

- 12.1 Duplicating Designs
- 12.2 Stitches Types
- 12.3 Travel
- 12.4 Generate
- 12.5 Automatic Digitizing
- 12.6 Creating Embroidery Lettering

REFERENCE BOOKS

1. Adobe Photoshop CC Classroom in a Book (2015 release), Andrew Faulkner and Conrad Chavez
2. Photoshop Elements 14 For Dummies, Barbara Obermeier and Ted Padova
3. Adobe Illustrator Classroom in a Book (2022 release), Brian Wood
4. Adobe Illustrator CC For Dummies, David Karlins
5. AutoCAD 2016 For Beginners, CADFolks
6. Mastering AutoCAD 2016 and AutoCAD LT 2016, George Omura and Brian C. Benton, Autodesk Official Press
7. AutoCAD 2016 Instructor, James Leach
8. Digitizing Made Easy: Create Custom Embroidery Designs Like a Pro, John Deer
9. Fashion Design for Living, Alison Gwilt

LIST OF PRACTICALS

96 Hours

1. Adobe Photoshop
 - 1.1 Basic Clipping Tool Application
 - 1.2 Creating Cartoon Special Effect Text

- 1.3 Applying Filters to Create Painting Effects
- 1.4 Application of Layer Tools
- 1.5 Image Cropping
- 1.6 Noise Reduction and Sharpening
- 1.7 Portrait Color Correction
- 1.8 Portrait Beautification
- 1.9 Landscape Color Correction
- 1.10 Application of Pen Tool for Clipping
- 1.11 Application of Channel Clipping Tool
- 1.12 Icon Design and Drawing
- 1.13 Interface Design and Drawing
- 1.14 Typography and Layout
- 1.15 Website Advertisement Design
- 2. Adobe Illustrator
 - 2.1 Draw a Radio Button
 - 2.2 Draw a Check Button
 - 2.3 Draw a Play Button
 - 2.4 Draw a Pause Button
 - 2.5 Draw a Stop Button
 - 2.6 Design a house or a building
 - 2.7 Design a heart shape
 - 2.8 Design a flower
 - 2.9 Draw an apple
 - 2.10 Draw a cloud
 - 2.11 Draw an umbrella
 - 2.12 Draw a leaf
 - 2.13 Draw a starry sky
 - 2.14 Design a bus
 - 2.15 Design a logo
 - 2.16 Design a children's illustration
 - 2.17 Design a visiting card
 - 2.18 Design a smart phone

3. AutoCAD

- 3.1 Set up coordinate system
- 3.2 Set the color, linetype, and lineweight of layersConvert a line to Polyline
- 3.3 Create a smooth curve that passes through specific points
- 3.4 Draw a circle based on a center point, radius and three point circle
- 3.5 Draw an arc using three points
- 3.6 Draw window and door blocks
- 3.7 Draw a Bauhinia Flower
- 3.8 Draw a door
- 3.9 Create and angled corner between two lines
- 3.10Create repeating pattern of an object
- 3.11Building a wall showing bricks
- 3.12Create and ellipse or an elliptical arc
- 3.13Draw a table with 4 chairs
- 3.14Draw three-dimensional graphics

Operating System

Course Code: CIT 333

Total Contact Hours: 160

Theory: 64

Practical: 96

T	P	C
2	3	3

Operating System is a course on the main system software that manages the resources of the computer system. It aims to provide students with the understanding and operational principles of operating system. The course covers the issues of managing the resources of a computer by an operating and the implementation and techniques used by Unix/Linux system to address the issues. This comes with laboratory to enhance the classroom discussion.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the concepts and issues of managing the resources of a computer by an operating system.
2. Understand the operational principles and implementation of Unix/Linux/Linux operating system
3. Use shell commands to administer the system.
4. Run application programs in Unix/Linux/Linux environment
5. Perform system administer
6. Demonstrate motivation to use and administer systems in Unix/Linux/Linux platform.

COURSE CONTENTS

- | | |
|---|-----------------|
| 1. COMPUTER SYSTEM STRUCTURES | 4 Hours |
| 1.1 Computer System Operation | |
| 1.2 I/O Structure | |
| 1.3 Storage Structure and Hierarchy | |
| 1.4 Hardware Protection | |
| 2. OPERATING SYSTEM STRUCTURES | 10 Hours |
| 2.1 System Components | |
| 2.1.1 Process Management | |
| 2.1.2 Memory Management | |
| 2.1.3 Disk and Storage Management | |
| 2.1.4 File System | |
| 2.2 OS Services and System Calls | |
| 2.3 System Programs and Structure | |
| 2.4 System Design and Implementation | |
| 3. UNIX / LINUX IMPLEMENTATION | 6 Hours |
| 3.1 Logging In and Logging Out to the System | |
| 3.2 Configuring the Environment and Managing the Password | |
| 3.3 Unix/Linux Manual System | |

- 3.4 Unix/Linux File System and File System Organization
- 3.5 File Types, Names and Directories
- 3.6 Managing Directories: File and Directory Permissions

4. UNIX / LINUX COMMANDS

16 Hours

- 4.1 User-Related, Locating and Search
- 4.2 Usage Determination and Process-related Commands
- 4.3 File and Directory Manipulation
- 4.4 File Content and File Content Search
- 4.5 Printing and Scheduling
- 4.6 Storage and Status
- 4.7 Miscellaneous Commands

5. TEXT PROCESSING

6 Hours

6. BOURNE SHELLS

6 Hours

- 6.1 Introduction
- 6.2 Bourne Shell Basics

7. SYSTEM ADMINISTRATION

16 Hours

- 7.1 System Administration Tasks
- 7.2 Unix/Linux Installation Basics
- 7.3 Resource and User Administration
- 7.4 File System and Disk Administration
- 7.5 System Accounting and Performance Monitoring
- 7.6 Device and Mail Administration
- 7.7 UCP and FTP Services Administration
- 7.8 Backing Up and Restoring the System

REFERENCE BOOKS

1. Operating System Concepts, 5Ed., A. Silverschatz and P. Galvin, Addison-Wesley Publishing Co.
2. Unix/Linux Unleashed, 3Ed, Robin Burk, et al., Sams Publishing
3. The Linux User's Guide, Larry Greenfield
4. Unix System Management, Robert King Ables
5. Red Hat Linux 6.0, Red Hat Software, Inc.
6. Hand-on Unix: A Practical Guide with the Essentials, Sobell
7. The Linux Users' Guide, Larry Greefield
8. UNIX-The Text Book by Mansoor Sarwar.

LIST OF PRACTICALS

96 Hours

1. Logging On and Logging Out in Unix/Linux System
2. Setting the password
3. Configuration of Own Environment

4. Using Manual Pages
5. Using User-related Commands login, rlogin, telnet, passwd, exit, which, whence, where, man
6. Using Process-related Commands: kill, nice, ps, jobs, wait, nonup, sleep,
7. Using File and Directory Commands: touch, chmod, chgrp, chown, rm, mv, cp, cat, rcp, ln, mkdir, rmdir, ls, find, file
8. Using File Content and Search Commands: more, less, tail, head, wc, read, od, pg, tee, vi, egrep, fgrep, strings
9. Using Printing and Scheduling Commands: cancel, lp, pr, lpstat, at, atq, crontab
10. Using Storage and Status Commands: compress, cpio, dd, pack, pcat, tar, uncompress, unpack, zcat, date, env, iostat, sar, uname, uptime, vmstat
11. Using Text Processing Commands: cut, ex, fmt, fold, join, paste, sort, tr, uniq, sed
12. Using Miscellaneous Commands: banner, bc, cal, clear, time
13. Text Editing Using vi
14. Installing Unix/Linux
15. Adding New User
16. Mounting and Unmounting File System
17. Creating and Repairing File System
18. Manual System Accounting Setup
19. System Accounting Report Generation
20. Connecting and Setting Up Printers
21. Backing up and Restoring System Platform.

INSTRUCTIONAL OBJECTIVES

1. Computer System Structures

- 1.1. Describe the general operations of computer
- 1.2. Describe interrupts
- 1.3. Identify different I/O devices
- 1.4. Describe the structure of input/output system
- 1.5. Describe different storage devices
- 1.6. Explain the hierarchy of storage devices
- 1.7. Identify the protection issues encountered in a computer system
- 1.8. Describe protection methods of computer operation

2. Operating System Structures

- 2.1. List functions of an operating system

- 2.2. Describe the functions of an operating system
- 2.3. Explain memory management techniques.
- 2.4. Describe virtual memory
- 2.5. Describe hierarchical directory system.
- 2.6. Describe UNIX file system
- 2.7. Explain disk management system
- 2.8. Explain how the operating system manages the resources of a computer
- 2.9. Enumerate OS services and explain the service
- 2.10. Define system calls
- 2.11. Identify system programs that come with the operating system
- 2.12. Describe the functions of these system programs
- 2.13. Describe the general structure and architecture of an operating system
- 2.14. Illustrate the structure by diagrams
- 2.15. Discuss design goals of the operating system

3. Unix /Linux Implementation

- 3.1. Discuss the development of Unix/Linux development
- 3.2. Explain the design principles of Unix/Linux
- 3.3. Log in and log out in the system
- 3.4. Configure the user own environment
- 3.5. Change and manage own password
- 3.6. Use Unix/Linux help system (Manual System)
- 3.7. Characterize Unix/Linux file system and its organization
- 3.8. Name correctly file and directory
- 3.9. Create and delete files and directories
- 3.10. Set the permissions of files and directories

4. Unix / Linux Basic Commands

- 4.1. Invoke correctly Unix/Linux commands used in user and user-determination and file search
- 4.2. Invoke correctly Unix/Linux commands used in administration of own environment and process-related job
- 4.3. Use correctly Unix/Linux commands to manipulate files and directories
- 4.4. Use correctly Unix/Linux commands to search and view at contents of files
- 4.5. Print files using Unix/Linux commands
- 4.6. Use correctly Unix/Linux scheduling commands
- 4.7. Use correctly Unix/Linux storage and status commands
- 4.8. Invoke correctly text processing command
- 4.9. Use other miscellaneous commands available to Unix/Linux

5. Text Processing

- 5.1. Invoke vi editor
- 5.2. Compose text using vi editor
- 5.3. Describe different mode of vi editor

6. Unix / Linux Shells

- 6.1. Define Unix/Linux shells
- 6.2. Explain the functions of shell

6.3. Describe Bourne Shell of Unix/Linux

6.4. Use Bourne shell in Unix/Linux

7. System Administration

7.1. Describe Unix/Linux system administration

7.2. Describe tasks of Unix/Linux system administration

7.3. Identify hardware requirements of Unix/Linux system

7.4. Plan and Install Unix/Linux

7.5. Start up and shutdown Unix/Linux

7.6. Add and maintain new users in the system

7.7. Set permission to users

7.8. Manage and repair file systems

7.9. Create file systems

7.10. Describe Unix/Linux system basic accounting

7.11. Set up accounting system in Unix/Linux

7.12. Describe performance monitoring in Unix/Linux

7.13. Use tools for monitoring performance of the system

7.14. Describe services facility provided by Unix/Linux

7.15. Describe device administrative tasks

7.16. Install printer to Unix/Linux system

7.17. Describe email facility of Unix/Linux

7.18. Describe mail transfer agents

7.19. Explain UUCP and FTP services

7.20. Describe FTP protocol

7.21. Setup and administer FTP services

7.22. Explain purpose of backup

7.23. Back -up and restore Unix/Linux system

Machine Learning Applications

Course Code: SWT 332

Total Contact Hours: 128

Theory: 32

Practical: 96

T	P	C
1	3	2

This course introduces the knowledge, development process, model selection and tuning of machine learning development and applications, and how to use relevant technology in the actual environment. It aims to enable students to understand the basic knowledge of machine learning, master the applications of machine learning and familiarize with python mathematical tools. It covers introduction to the knowledge, development process, model selection and tuning, and how to use relevant technology in the actual environment.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the fundamentals and development of machine learning
2. Master the working principle, process, and applications of machine learning
3. Logical analysis, development and solution to issues related to machine learning
4. Familiarize with the use of Python and other mathematical tools, and data analysis and preprocessing
5. Master the methods of serialization and deserialization models with pickle and jolib
6. Master the machine learning model tuning methods and generating model skills
7. Master the evaluation methods of machine learning algorithm
8. Models applications in different scenes.

COURSE CONTENTS

1. INTRODUCTION

2 Hours

- 1.1 Concept of machine learning
- 1.2 History of machine learning
- 1.3 Application and significance of machine learning
- 1.4 Process and applications of machine learning
- 1.5 Analysis and solution to issues related to machine learning

2. PYTHON MATHEMATICAL TOOLS

4 Hours

- 2.1 Build Python development environment
- 2.2 Use NumPy, SciPy array operation
- 2.3 Use Pandas operating data
- 2.4 Plot graphics using Matplotlib

3. DATA UNDERSTANDING

4 Hours

- 3.1 Build Python development environment
- 3.2 Use NumPy, SciPy array operation
- 3.3 Use Pandas operating data
- 3.4 Plot graphics using Matplotlib

4. DATA PREPARATION	4 Hours
4.1 Data preprocessing	
4.2 Data characteristics selection	
5. MODEL SELECTION	4 Hours
5.1 Evaluation method of model	
5.2 Introduce algorithm evaluation matrix	
5.3 Machine learning models	
5.4 Comparison of machine learning algorithms	
6. MODEL OPTIMIZATION	4 Hours
6.1 Ensemble Learning	
6.2 Model parameter tuning	
7. DEPLOYMENT	2 Hours
7.1 Serialization and deserialization of models	
8. PROJECT PRACTICE	8 Hours
8.1 Python template for machine learning	
8.2 Regression project	
8.3 Binary classification project	
8.4 Text classification project	

REFERENCE BOOKS

1. "Machine Learning: Python Practice", edited by Wei Zhenyuan, Publishing House of Electronics Industry, January 2018, 1st edition.
2. "Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido
3. "Machine Learning in Action" by Peter HarringtonSarwar.

LIST OF PRACTICALS	96 Hours
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1. General process of machine learning
2. Establishment of IDE for machine learning
3. Python class library, NumPy, Pandas and Matplotlib
4. Data visualization with Matplotlib
5. Evaluation and measurement of machine learning algorithms
6. Tuning of machine learning models
7. Serialization and deserialization models with pickle and jolib
8. Iris classification

9. House price analysis
10. News classification prediction.

INSTRUCTIONAL OBJECTIVES

1. Understand the concept of machine learning
2. Master the concepts of basic terminologies
3. Master the general process of machine learning
4. Master the establishment of IDE for machine learning
5. Proficient in machine learning programming using Python
6. Learn to use Python libraries
7. Understand csv file format
8. Master the methods of importing data using Python class library, NumPy, Pandas
9. Able to view and describe data
10. Able to briefly analyze data
11. Master the methods of data visualization using Matplotlib
12. Understand the necessity of data preprocessing
13. Master the methods of formatting data, adjusting data scale, normalizing data, and standardizing data
14. Understand the methods of feature selection
15. Understand the significance of features
16. Master the evaluation and measurement of machine learning algorithms
17. Understand the basic algorithm ideas of different models
18. Able to choose the appropriate model for different scenarios
19. Master the methods of comparison of machine learning algorithms
20. Understand the idea of ensemble method and its applications for model performance enhancement
21. Master the methods of tuning machine learning models
22. Understand the necessity of model persistence
23. Master the methods of serialization and deserialization models with pickle and jolib
24. Master the skills of generating model
25. Master the Python template for machine learning and its applications
26. Complete the whole process of machine learning based on specific

Digital Image Process Technology

Course Code: AIT 323

Total Contact Hours: 160

Theory: 64

Practical: 96

T	P	C
2	3	3

This course is based on the Python language, with the OpenCV library as the main focus. It involves other libraries such as Numpy and Matplotlib, and focuses on basic operations of image processing, basic operations of image data (arithmetic and logic), geometric transformation, smoothing processing (filtering), threshold processing, edge detection, contour detection, morphological processing, histogram drawing, and other image processing related knowledge. In the teaching process, from simple to profound, small cases are combined with theoretical explanations to create task contexts to promote learners' thinking and practice, and to better understand algorithm and principle knowledge. Through learning, help learners get started with the basics of computer vision!

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the relationship between digital images and arrays
2. Familiar with various common color models
3. Master the main arithmetic operations and bit operation rules of arrays
4. Proficient in using library methods to achieve various basic operations such as image reading, display, and saving
5. Familiar with professional terms such as filtering, gradient, convolution, contour, histogram, etc
6. Proficient in image geometric transformations and morphological mathematical operations
7. Proficient in using masks to achieve various image special processing
8. Master the main image thresholding processing methods
9. Master the main image smoothing processing methods and operation rules
10. Master basic image morphology processing methods
11. Master the methods of constructing Gaussian and Laplacian pyramids
12. Master the search and drawing of image contours, and proficiently calculate contour features
13. Familiar with convex hull detection and convex defect detection methods
14. Can draw various contour fitting graphics
15. Master the method of drawing histograms.

COURSE CONTENTS

- 1. BUILDING A DEVELOPMENT ENVIRONMENT FOR ESSENTIAL SKILLS 4 Hrs**
 - 1.1 Selection of Development Environment and Tools
 - 1.2 Precautions during installation
 - 1.3 Management of "Virtual Environment"
 - 1.4 Various methods for installing "libraries"
 - 1.5 Preliminary Experience of Pycharm Programming

2. USE OF NUMPY LIBRARY	4 Hours
2.1 Creating Arrays	
2.2 Array Indexing and Slicing	
2.3 Arithmetic and bitwise operations of arrays	
2.4 Numpy and Matplotlib	
3. IMAGE PROCESSING IN ARTIFICIAL INTELLIGENCE	4 Hours
3.1 Main image file formats	
3.2 Common Image Classification	
3.3 RGB color principles and other color systems	
3.4 Basic operations of image processing	
3.5 Basic attributes of digital images	
3.6 Binary Images and 2D Arrays	
3.7 Grayscale images and two-dimensional arrays	
3.8 BGR color images and 3D arrays	
3.9 Processing Image Data	
3.10 Channel Recognition (Splitting and Merging Channels)	
4. DRAWING AND INTERACTION	4 Hours
4.1 Drawing a straight line	
4.2 Drawing rectangles	
4.3 Draw a circle	
4.4 Drawing Ellipses	
4.5 Drawing Polygons	
4.6 Drawing Text	
4.7 Mouse interaction	
4.8 Scrollbar Trackbar	
5. BASIC OPERATIONS OF DIGITAL IMAGES	6 Hours
5.1 Addition operation - "+"	
5.2 Addition operation - add function	
5.3 Addition - Weighted Sum	
5.4 Bitwise operation of logical operations	
5.5 Gray level image bitplane decomposition	
5.6 Mask initial application	
6. BASIC OPERATIONS OF VIDEO	4 Hours
6.1 Video Reading, Playing, and Saving	
6.2 Color Space Type Conversion	
6.3 HSV color space	
7. IMAGE GEOMETRIC TRANSFORMATION	4 Hours
7.1 Similarity, Linear Transformation - Scaling	
7.2 Rigidity transformation - translation	
7.3 Linear and rigid transformations - plane rotation	
7.4 Linear and rigid transformations - mirror (flip)	
7.5 Linear transformation+translation affine transformation	
7.6 Nonlinear Transformation - Perspective Transformation	

- 8. IMAGE THERSHOLDING PROCESSING** **6 Hours**
- 8.1 Global fixed threshold - binarization threshold processing
 - 8.2 Global fixed threshold - anti binarization threshold processing
 - 8.3 Global Fixed Thresholds - Truncation Thresholding Processing
 - 8.4 Global fixed threshold - low threshold zero processing
 - 8.5 Global Fixed Thresholds - Zero processing beyond threshold
 - 8.6 Local adaptive threshold processing
 - 8.7 Global Otsu Binarization Algorithm
- 9. IMAGE SMOOTHING PROCESSING** **6 Hours**
- 9.1 Linear operations - mean convolution (mean filtering)
 - 9.2 Linear Operations - Box Convolution (Box Filtering)
 - 9.3 Linear operations - Gaussian convolution (Gaussian filtering)
 - 9.4 Nonlinear operations - median convolution (median filtering)
 - 9.5 Nonlinear Operations - Bilateral Convolution (Bilateral Filtering)
 - 9.6 Linear Operations -2D Convolution
- 10. IMAGE MORPHOLOGY PROCESSING** **4 Hours**
- 10.1 Basic Morphology - Corrosion Erosion
 - 10.2 Basic Morphology - Dilation
 - 10.3 Open operations
 - 10.4 Closed operations
 - 10.5 Gradient operation
 - 10.6 Hat operation (top hat operation)
 - 10.7 Bottom hat operation (black hat operation)
- 11. IMAGE SHARPENING AND EDGE DETECTION (GRADIENT DETECTION)** **4 Hrs**
- 11.1 Sobel operator
 - 11.2 Scharr operator
 - 11.3 Laplacian operator
- 12. IMAGE PYRAMID** **4 Hours**
- 12.1 Gaussian Pyramid
 - 12.2 Laplace Pyramid
- 13. IMAGE CONTOUR FEATURE EXTRACTION** **6 Hours**
- 13.1 Find and draw image contours
 - 13.2 Image Contour Features - Moments
 - 13.3 Convex hull detection
 - 13.4 Convex defect detection
 - 13.5 Contour fitting
 - 13.6 Main feature values of contour
- 14. HISTOGRAM PROCESSING** **4 Hours**
- 14.1 Draw a histogram
 - 14.2 Histogram equalization

REFERENCE BOOKS

1. “OpenCV Easy to Get Started: Targeting Python (2nd Edition)” by Lizong Li, June 2023, Electronic Industry Press, 2nd edition.
2. “Digital Image Processing and Machine Vision” by Chunsheng Hu, April 2024, Shanghai Jiao Tong University Press, 1st edition.

LIST OF PRACTICALS

96 Hours

1. Establishment of Anaconda+Pycharm development environment
2. Create, activate, exit, and delete virtual environments
3. Install, uninstall, and update libraries
4. Digital image data processing
5. Regions of interest
6. Image channel splitting and merging
7. Mouse event monitoring
8. Trackbar color palette and its switch function
9. Use bitwise operations to cutout
10. Image encryption and decryption
11. Embedding and Extracting Digital Watermarks
12. Local face coding and restoration
13. Lock color range for grayscale and color images
14. Use HSV color mode to display specified colors
15. Green screen cutout
16. Using perspective transformation for image correction
17. Use Sobel operator to calculate edge gradients in all directions of the image
18. Use Sharr operator to calculate edge gradients in all directions of the image
19. Using Laplacian operator to calculate edge gradients in all directions of the image
20. Use Canny operator to detect the edge gradient of an image
21. Constructing Gaussian Pyramid
22. Use cv2. pyrDown() and cv2. pyrUp() to construct the Laplace Golden Tower
23. Using Laplace Pyramid to Restore High Resolution Images
24. Draw all contours within the image
25. Display the specified contour of an image

26. Use contour drawing function to extract foreground objects
27. Use moment features to calculate contour area, center of gravity coordinates, perimeter, etc
28. Obtain contour convex hull and convex object detection
29. Obtain a set of convex defect points and draw convex defect points
30. Draw a contour rectangle bounding box and a minimum bounding rectangle box
31. Draw the minimum enclosing circle for the contour
32. Draw the best fit ellipse, fit straight lines, and approximate polygons in the image
33. Draw a histogram
34. Implement histogram equalization processing.

Dungeons & Dragons (D&D) of Intelligent Dialogue System

Course Code: AIT -332

Total Contact Hours: 128

Theory: 32

T P C

Practical: 96

1 3 2

This course introduces the foundation knowledge, Speech data processing (SDP), and the Speech recognition (SR), natural language understanding (NLU), dialogue manager (DM), natural language generation (NLG), text to speech (TTS) technology of intelligent dialogue system design and how to use relevant components development in the actual environment. It aims to enable students to understand the basic knowledge of speech recognition and dialogue management, master the applications development technology of intelligence dialogue system, and familiarize with python language tools. It covers introduction to the knowledge, development process, and how to use relevant technology and component in the actual development environment.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the fundamental knowledge of intelligent dialogue system
2. Master the development process, principal component of intelligent dialogue system
3. Familiarize with Analysis and design methods of intelligent dialogue system
4. Familiarize with the use of Python Language, IDE tools, the third-party libraries and the API of AI open platform
5. Master the development process and technology of intelligent dialogue system
6. Master the SDP, SR, NLU, DM, NLG, and TTS development skills.

COURSE CONTENTS

1. INTRODUCTION

2 Hours

- 1.1 Concept of Intelligent human-machine dialogue system
- 1.2 History of dialogue robot
- 1.3 Typical products of human-machine dialogue System
- 1.4 Fundamentals of human-machine dialogue systems
- 1.5 Classification of intelligence dialogue robot

2. PYTHON AND INTEGRATED DEVELOPMENT ENVIRONMENT

4 Hours

- 2.1 Build Python development environment
- 2.2 Fundamentals of Python Grammar
- 2.3 Application of NumPy, List and Json Data type
- 2.4 Python Object Oriented

3. DATA PROCESS OF HUMAN-MACHINE DIALOGUE SYSTEM

4 Hours

- 3.1 Introduction of Speech Data Process
- 3.2 Acquisitions of Speech Data
- 3.3 Pre-process of Speech Data
- 3.4 Annotation of Speech Data

4. SPEECH RECOGNITION	5 Hours
4.1 Introduction of Speech Recognition	
4.2 Classifications of Speech Recognition	
4.3 Principles of Speech Recognition	
4.4 HTTP protocol	
4.5 Speech Recognition Methods	
4.6 Using the API of Speech Recognition	
5. NATURAL LANGUAGE UNDERSTANDING	5 Hours
5.1 Comment extraction	
5.2 Analysis of emotional tendencies	
5.3 Machine learning models	
5.4 Word vector representation	
5.5 Deep Neural Networks-based Language Model	
6. TEXT TO SPEECH (TTS)	4 Hours
6.1 Introduction of TTS	
6.2 The System Framework of TTS	
6.3 Classification of TTS	
6.4 Using the API of TTS	
7. PROJECT PRACTICE	8 Hours
7.1 Python-based Graphical Interface for human-machine dialogue	
7.2 API-based Speech Recognition Module Development	
7.3 API-based TTS Module Development	
7.4 Intelligence Dialogue System project	

REFERENCE BOOKS

1. “Development of human-machine intelligent dialogue”, edited by Wang xinqiang, Liu dongjing, China Machine Press, January 2018, 1st edition.
2. “Hands on Natural Language Processing”, Liu JiDong, Zhou Ming, Qiu XiPeng, Posts and Telecommunications Press, 2025, 1st edition.

LIST OF PRACTICALS	96 Hours
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1. General process of Intelligent Dialogue System
2. Establishment of IDE for Intelligent Dialogue
3. Python class library, NumPy, List and Json
4. Python-based Graphical Interface for human-machine intelligent dialogue
5. Acquisitions, Pre-process and Annotation of Speech Data

6. Comment extraction and Analysis of emotional tendencies
7. Serialization and deserialization models with pickle and jolib
8. Development of TTS Module
9. Development of Intelligence Dialogue System project.

INSTRUCTIONAL OBJECTIVES

1. Understand the concept of human-machine intelligent dialogue
2. Master the concepts of basic terminologies
3. Master the general process of human-machine intelligent dialogue
4. Master the establishment of IDE for human-machine intelligent dialogue
5. Proficient in human-machine intelligent dialogue programming using Python
6. Learn to use Python libraries
7. Master the Json, List, NumPy Data Type by python
8. Master the Orient-Object Programming by python
9. Master the knowledge of HTTP Protocol
10. Master the necessity skill of data preprocessing
11. Master the Acquisitions Methods and tools of Speech Data
12. Master the Pre-process Methods and tools of Speech Data
13. Master the Annotation Methods and tools of Speech Data
14. Master the methods and API of Speech Recognition
15. Understand the methods of Natural Language Understanding
16. Understand the methods of Natural Language Generation
17. Understand the Mainstream Technology Frameworks of Speech Recognition
18. Able to choose the AI open platform for intelligent dialogue System development
19. Master the methods and skill of Dialogue Management
20. Master the development skill and component of TTS
21. Master the Python-based development skill for intelligent dialogue System and its applications
22. Complete the whole process of intelligent dialogue System based on specific scenarios

Computer Vision Technology Application

Course Code: AIT -343

Total Contact Hours: 160

Theory: 64

Practical: 96

T	P	C
2	3	3

This course covers image processing, machine learning and deep learning. It aims to enable students to use computers to process and understand images and videos. It covers the fundamentals of image processing, image morphological processing and contour detection, image filter processing, image segmentation and template matching, image feature extraction and feature matching, machine learning and deep learning.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the basic principles and methods of computer vision
2. Image Contour Extraction and Segmentation
3. Image feature extraction and matching
4. Train supervised machine learning models
5. Recognize the basic convolutional neural networks.

COURSE CONTENTS

- | | |
|---|----------------|
| 1. FUNDEMENTALS OF IMAGE PROCESSING | 8 Hours |
| 1.1 Basic Image Operations | |
| 1.2 Image Computing | |
| 1.3 Encryption and Decryption | |
| 2. IMAGE MORPHOLOGY PROCESSING AND CONTOUR DETECTION | 4 Hours |
| 2.1 Morphological Transformation | |
| 2.2 Contour Detection | |
| 3. IMAGE FILTER PROCESSING | 4 Hours |
| 3.1 Image Filtering | |
| 3.2 Threshold Processing | |
| 4. IMAGE SEGMENTATION AND TEMPLATE MATCHING | 8 Hours |
| 4.1 Image Segmentation | |
| 4.2 Template Matching | |
| 5. CONNECTIVITY DEVICES | 8 Hours |
| 5.1 Modems | |
| 5.2 Hubs and Repeaters | |
| 5.3 Bridges, Routers and Gateways | |

6. MACHINE LEARNING	20 Hours
6.1 K-nearest Neighbors Algorithm	
6.1.1 Feature Extraction	
6.1.2 Constructing KNN classifiers	
6.2 SVM Algorithm	
6.2.1 Feature Extraction	
6.2.2 Constructing SVM Classifiers	
6.3 K-Means Clustering Algorithm	
6.3.1 Feature Extraction	
6.3.2 Constructing K-Mean Classifiers	
7. DEEP LEARNING	12 Hours
7.1 ResNet Model	
7.2 Caffe Model	
7.3 YOLO Model	

REFERENCE BOOKS

1. Computer Vision Models, Learning and Inference, Simon J. D. Prince, Cambridge University
2. Foundations of Computer Vision, Antonio Torralba, The MIT Press
3. Computer Vision, Bhowmik, CRC Press
4. Pattern Recognition, Computer Vision, and Image Processing, Jean-Jacques Rousseau, Springer Berlin Heidelberg

LIST OF PRACTICALS	96 Hours
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1. Image Encryption and Decryption
2. Defect detection
3. Image beautification
4. License plate recognition
5. Fingerprint Recognition
6. KNN-based Character Recognition
7. SVM-based Digit Recognition
8. K-Mean Based Image Segmentation
9. Deep Learning Based Image Recognition
10. Deep Learning Based Target Detection.

INSTRUCTIONAL OBJECTIVES

1. Understand the concept of computer vision
2. Master the operations on images
3. Understand the principles of encryption and decryption
4. Able to transform image morphology
5. Able to detect contours
6. Learn to perform filtering on images
7. Master the methods of image segmentation
8. Master the methods of template matching
9. Able to extract image features
10. Master the methods of feature matching
11. Understand the common machine learning algorithms
12. Understand the basic ideas of different deep learning models

PyTorch-Based AI Application Development

Course Code: AIT -352

Total Contact Hours: 128

Theory: 32

Practical: 96

T	P	C
1	3	2

This course introduces the history and necessary theoretical basis of deep learning first, and then focuses on the programming with PyTorch. It starts with the basic usage with PyTorch and gradually transfers to development of deep learning projects. It aims to enable students to understand the basic knowledge of deep learning, familiarize with programming with PyTorch, and develop simple deep learning projects.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand the fundamentals and development of Deep Learning
2. Master the installation of PyTorch and PyCharm IDE
3. Proficient in the programming of Python
4. Understand the concepts of Tensor, computation graph, data loader, and optimizer
5. Master the methods of building neural networks
6. Master the storage and load of model weights
7. Master the pipe line of training and evaluation of deep learning models
8. Familiarize with classical deep learning architectures
9. Development of deep learning projects in different scenes.

COURSE CONTENTS

1. INDROTUCTION

2 Hours

- 1.1 Concept of Deep Learning
- 1.2 History of Deep Learning
- 1.3 Relationship among Artificial Intelligence, Machine learning and Deep Learning
- 1.4 Applications of Deep Learning
- 1.5 Popular Deep Learning frameworks
- 1.6 Installation of PyTorch and PyCharm

2. TENSOR AND TENSOR OPERATIONS

2 Hours

- 2.1 Tensor and its key properties
- 2.2 Tensor and Numpy ndarray
- 2.3 Tensor operations
- 2.4 Gradient of Tensor operations

3. DATA REPRESENTATION USING TENSORS

2 Hours

- 3.1 Working with images
- 3.2 Working with time series
- 3.3 Representing text
- 3.4 Building self-defined dataset

3.5 Building Dataloader

- | | |
|---|----------------|
| 4. THE MECHANICS OF LEARNING | 2 Hours |
| 4.1 The essence of learning | |
| 4.2 Decreasing the loss | |
| 4.3 Optimizer: down along the gradient | |
| 4.4 Backpropagation | |
| 4.5 PyTorch's autograd | |
| 5. USING A NEURAL NETWORK TO FIT DATA | 4 Hours |
| 5.1 Composing a multilayer network | |
| 5.2 Activation functions | |
| 5.3 Understanding the error function | |
| 5.4 Choosing the optimizer | |
| 5.5 The PyTorch nn module | |
| 5.6 Training and inspection | |
| 6. IMAGE CLASSIFICATION USING A NEURAL NETWORK | 4 Hours |
| 6.1 Building image dataset | |
| 6.2 Building a fully connected model for handwriting classification | |
| 6.3 Understanding the output of a classifier | |
| 6.4 Loss function | |
| 6.5 Training and evaluation | |
| 7. FROM FULLY CONNECTED MODEL TO CONVOLUTIONAL NEURAL NETWORKS | 2 Hours |
| 7.1 What is convolution | |
| 7.2 Pooling | |
| 7.3 Using nn.Module to build a CNN model for handwriting classification | |
| 7.4 Training a CNN model on GPU | |
| 7.5 Saving and loading | |
| 8. CLASSICAL CONVOLUTIONAL NEURAL NETWORKS | 2 Hours |
| 8.1 AlexNet | |
| 8.2 VGGNet | |
| 8.3 ResNet | |
| 8.4 Handwriting Recognition using AlexNet | |
| 8.5 Training ResNet on CIFAR10 dataset | |
| 8.6 Using the Pretrained CNNs in Torchvision | |
| 9. DEEP LEARNING WITH SEQUENCE DATA AND TEXT | 4 Hours |
| 9.1 RNN and LSTM | |
| 9.2 Handwriting Recognition using RNN and LSTM | |
| 9.3 Building dataset from text | |
| 9.4 Training LSTM model for sentiment classification | |

10. GENERATIVE NETWORKS

4 Hours

- 10.1 What is generative learning?
- 10.2 Neural style transfer
- 10.3 Generative Adversarial Network

11. TRANSFORMER

4 Hours

- 11.1 The Structure of Transformer
- 11.2 Self-Attention
- 11.3 Position wise feed forward net and position encoding
- 11.4 Encoder-Decoder
- 11.5 Training a mini-ChatGPT yourself

REFERENCE BOOKS

1. “Deep Learning with PyTorch” by Eli Stevens, Manning Publications Co., 2020, 1st edition.
2. “Deep Learning with PyTorch-A practical approach to building neural network models using PyTorch” by Vishnu Subramanian, Packt Publishing Ltd,
3. “Deep Learning with PyTorch Step-b y-Step: A Beginner ’s Guide” by Daniel Voigt Godoy

LIST OF PRACTICALS

96 Hours

1. Environment preparation for Deep Learning
2. Visualization of training process
3. Handwriting Recognition
4. Cat vs Dog Classification
5. CIFAR10 Image Classification
6. Face Recognition
7. Style transfer
8. Cartoon Image generation
9. Sentimental Classification
10. Mini-ChatGPT

INSTRUCTIONAL OBJECTIVES

1. Understand the concept of machine learning
2. Master the concepts of basic terminologies
3. Master the general process of machine learning
4. Master the establishment of IDE for machine learning

5. Proficient in machine learning programming using Python
6. Learn to use Python libraries
7. Understand csv file format
8. Master the methods of importing data using Python class library, NumPy, Pandas
9. Able to view and describe data
10. Able to briefly analyze data
11. Master the methods of data visualization using Matplotlib
12. Understand the necessity of data preprocessing
13. Master the methods of formatting data, adjusting data scale, normalizing data, and standardizing data
14. Understand the methods of feature selection
15. Understand the significance of features
16. Master the evaluation and measurement of machine learning algorithms
17. Understand the basic algorithm ideas of different models
18. Able to choose the appropriate model for different scenarios
19. Master the methods of comparison of machine learning algorithms
20. Understand the idea of ensemble method and its applications for model performance enhancement
21. Master the methods of tuning machine learning models
22. Understand the necessity of model persistence
23. Master the methods of serialization and deserialization models with pickle and jolib
24. Master the skills of generating model
25. Master the Python template for machine learning and its applications
26. Complete the whole process of machine learning based on specific scenarios

Intelligent Embedded Development Technology

Course Code: AIT -362

Total Contact Hours: 128

Theory: 32

Practical: 96

T	P	C
1	3	2

This course aims to cultivate students' basic theoretical and practical skills in embedded intelligent application development, as well as their ability to solve problems encountered in embedded intelligent application development. It covers embedded Linux architecture, development environment setup, I/O operation principles, device drivers, network applications, multiprocessing and multithreading technology, embedded graphical interface development, BootLoader and kernel principles, Embedded processor development, etc..

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Understand embedded processor architecture;
2. Familiar with the basic characteristics and commonly used commands of embedded Linux systems;
3. Master the I/O principles of Linux and be able to program files, sockets, serial ports, and GPIO;
4. Understand multiprocessing and multithreading techniques;
5. Familiar with the basic principles of developing GUI applications using Qt;
6. Proficient in building embedded development environments, proficient in common Linux system commands and text editing tools Vi;
7. Able to master the use of development tools such as code editors, Makefiles, and GCC;
8. Able to write Makefile files for source code compilation, runtime, and other management;
9. Capable of developing typical applications such as embedded Linux I/O and file systems, network applications, device drivers, etc;
10. Ability to develop GUI applications based on Qt;
11. Capable of migrating Linux systems on different processor platforms based on their characteristics and business requirements;
12. Understand BootLoader and kernel principles.

COURSE CONTENTS

- | | |
|--|----------------|
| 1. EMBEDDED LINUX FUNDAMENTALS | 2 Hours |
| 1.1 Building an embedded Linux development environment | |
| 1.2 Linux Command Line and File Operations | |
| 2. FILE SYSTEM AND I/O PROGRAMMING | 2 Hours |
| 2.1 Code editing and Makefile writing | |
| 2.2 GCC Cross Compilation Tool Usage | |
| 3. MULTI THREADING AND GUI DESIGN | 2 Hours |
| 3.1 Multi process and multi-threaded application development | |

3.2 Qt GUI application development

- | | |
|--|----------------|
| 4. LINUX SYSTEM PORTING AND DRIVER DEVELOPMENT | 2 Hours |
| 4.1 Linux system porting | |
| 4.2 Linux Character Device Driver Development | |
| 5. EMBEDDED LINUX APPLICATION DESIGN | 2 Hours |
| 5.1 Design and Implementation of Temperature Recorder | |
| 5.2 Design and Implementation of Intelligent Voice Storytelling Machine | |
| 6. FUNDAMENTALS OF EMBEDDED PROCESSOR DEVELOPMENT | 2 Hours |
| 6.1 Embedded processor hardware system cognition | |
| 6.2 Embedded processor engineering template creation and debugging | |
| 6.3 Embedded processor driver development method | |
| 7. DEVELOPMENT OF PERIPHERAL APPLICATIONS ON BASIC CHIPS | 2 Hours |
| 7.1 Design and Implementation of Intelligent Lighting Table Lamp | |
| 7.2 Design and Implementation of Electric Vehicle Motion Control System | |
| 8. ADVANCED ON-CHIP PERIPHERAL APPLICATION DEVELOPMENT | 2 Hours |
| 8.1 Design and Implementation of a Life Safety Tracker | |
| 8.2 Design and Implementation of Overtime Weighing Settlement System | |
| 9. BUS INTERFACE APPLICATION DEVELOPMENT | 4 Hours |
| 9.1 Design and Implementation of Intelligent Door Lock System | |
| 9.2 Design and Implementation of Unmanned Meteorological Stations | |
| 10. DEVELOPMENT OF EMBEDDED REAL-TIME OPERATING SYSTEM APPLICATIONS | 4 Hours |
| 10.1 Design and Implementation of Harrow Bicycle Control System | |
| 10.2 Smart Watch Design and Implementation | |
| 11. EMBEDDED MIDDLEWARE APPLICATION DEVELOPMENT | 4 Hours |
| 11.1 Design of Smart Agriculture Greenhouse Monitoring System | |
| 11.2 Design of IoT gateway system | |
| 12. SUMMARY AND REVIEW | 2 Hours |
| 12.1 Consolidate the Embedded software and hardware learned this semester | |
| 12.2 Review the knowledge learned this semester | |

REFERENCE BOOKS

1. "Full Case Combat of STM32 Embedded Technology Application Development", 1th Edition by Li Suguo
2. "Principle and Application Development of Loongson Embedded System", 1th Edition by Sun Dongmeiy

1. Building an embedded development environment

- 1.1 Download and installation of embedded development environment and environment variable configuration
- 1.2 Installing development tools
- 1.3 Configuring environment variables
- 1.4 Installing and configuring target hardware support
- 1.5 Writing and compiling code
- 1.6 Debugging and testing

2. Develop Linux I/O applications

- 2.1 Socket programming
- 2.2 Serial application programming
- 2.3 GPIO programming

3. Develop Developing multiprocessing and multi-threaded applications

- 3.1 Multi process application development
- 3.2 Multi threaded application development

4. Develop temperature recorders

- 4.1 Development of driver program for temperature and humidity sensors
- 4.2 Development of temperature and humidity recorder application program
- 4.3 Comprehensive debugging of temperature and humidity recorders

5. Develop an intelligent voice storytelling machine

- 5.1 Development of serial port driver program
- 5.2 Intelligent voice storytelling machine application development
- 5.3 Integrated debugging of intelligent voice storytelling machine

6. Develop Intelligent lighting desk lamp

- 6.1 Table lamp lighting and control
- 6.2 Table lamp human body induction control

7. Develop electric vehicle motion control system

- 7.1 Automotive motion control
- 7.2 Monitoring of Automobile Sports Status

7.3 Energy monitoring of electric vehicles

8. Develop Life Safety Tracker

8.1 Beidou device positioning

8.2 Human physiological monitoring

8.3 Abnormal state alarm prompt

9. Develop Intelligent door lock system

9.1 Electronic door lock switch control

9.2 Fingerprint recognition and voice prompts

9.3 FID card swiping unlock

9.4 OLED visualization human-computer interaction

10. Develop Smart Agricultural Greenhouse Monitoring System

10.1 RS485 interface industrial sensor driver development

10.2 Persistent storage of data based on file system devices

10.3 Intelligent algorithm environment data intelligent analysis

10.4 Embedded GUI human-computer interaction design

10.5 Remote monitoring of IoT data

INSTRUCTIONAL OBJECTIVES

1. Embedded Linux Fundamentals

1.1. Master building an embedded Linux development environment

1.1.1. Familiarize with embedded processor architecture

1.1.2. Master building an embedded development environment

1.2. Master Linux Command Line and File Operations

1.2.1. Familiar with basic characteristics of Linux system

1.2.2. Master common Linux system commands

1.2.3. Master the use of text editing tools

2. File System and I/O Programming

2.1. Master Code editing and Makefile writing

2.1.1. Familiar with Code Editor

2.1.2. Master using of Code Editor

2.1.3. Master writing makefile file

2.2. Master GCC Cross Compilation Tool Usage

2.2.1. Familiar with GCC development tools

2.2.2. Master the usage of GCC development tools

2.3. Master Linux I/O application development

2.3.1. Familiar with the principle of Linux I/O

2.3.2. Familiar with basic knowledge of file systems

2.3.3. Socket programming

2.3.4. Serial application programming

2.3.5. GPIO programming

3. Multi threading and GUI design

3.1. Multi process and multi-threaded application development

3.1.1. Multi process application development

3.1.2. Multi threaded application development

3.2. Qt GUI application development

3.2.1. Familiar with Qt framework

3.2.2. Design QT UI

3.2.3. Familiar with Qt signals and slots

3.2.4. Familiar with Qt event handling mechanism

4. Linux system porting and driver development

4.1. Linux system porting

4.1.1. Familiar with BootLoader and kernel principles

4.1.2. Understanding Linux System Migration

4.2. Linux Character Device Driver Development

4.2.1. Familiar with fundamentals of Character Device Driver Development

4.2.2. Master loading and unloading of driver modules

4.2.3. Master allocating Linux device number and device number

5. Embedded Linux Application Design

5.1. Design and Implementation of Temperature Recorder

5.1.1. Master development of driver program for temperature and humidity sensors

5.1.2. Master development of Application Program for Temperature and Humidity Recorder

5.1.3. Master comprehensive debugging of temperature and humidity recorders

5.2. Design and Implementation of Intelligent Voice Storytelling Machine

5.2.1. Familiar with Intelligent Voice Module

5.2.2. Master development of intelligent voice storytelling machine application program

6. Fundamentals of Embedded Processor Development

6.1. Embedded processor hardware system cognition

6.1.1. Overview of Embedded System Fundamentals

6.1.2. Familiar with Embedded processor hardware system

6.2. Embedded processor engineering template creation and debugging

6.3. Embedded processor driver development method

7. Development of peripheral applications on basic chips

7.1. Design and Implementation of Intelligent Lighting Table Lamp

7.1.1. Based on GPIO desk lamp lighting and control

7.1.2. Intelligent lighting table lamp architecture design and implementation

7.2. Design and Implementation of Electric Vehicle Motion Control System

7.2.1. Based on PWM automotive motion control

7.2.2. Architecture design and implementation of electric vehicle motion control system

8. Advanced on-chip peripheral application development

8.1. Design and Implementation of a Life Safety Tracker

8.1.1. Based on UART Beidou device positioning

8.1.2. Based on I²C-interface monitoring of human physiological status

8.1.3. Architecture design and implementation of life safety tracker

8.2. Design and Implementation of Overtime Weighing Settlement System

- 8.2.1. Product weight measurement based on ADC collection
- 8.2.2. Based on UART product barcode recognition and ticket printing
- 8.2.3. Architecture design and implementation of timeout weighing settlement system

9. Bus interface application development

9.1. Design and Implementation of Intelligent Door Lock System

- 9.1.1. Based on GPIO electronic door lock switch control
- 9.1.2. Based on UART fingerprint recognition and voice prompts
- 9.1.3. Based on I²C-interface RFID card swiping unlocking
- 9.1.4. Design and implementation of an intelligent door lock system architecture

9.2. Design and Implementation of Unmanned Meteorological Stations

- 9.2.1. Based on single bus environmental temperature and humidity measurement
- 9.2.2. Based on I²C-interface atmospheric pressure measurement
- 9.2.3. Outdoor wind speed measurement based on UART interface
- 9.2.4. NB-IOT module configuration and communication testing
- 9.2.5. Cloud platform device creation and debugging
- 9.2.6. Cloud and visualization of meteorological station data
- 9.2.7. Design and implementation of unmanned meteorological station architecture

10. Development of embedded real-time operating system applications

10.1. Design and Implementation of Harrow Bicycle Control System

- 10.1.1. Embedded real-time operating system porting
- 10.1.2. UART, IO, I²C Device Drivers for C-Bus
- 10.1.3. Development of application program for Harrow bicycle control system
- 10.1.4. Multi task programming design based on RTOS
- 10.1.5. Design and Implementation of Harrow Bike Connected Vehicle Control System Architecture

10.2. Smart Watch Design and Implementation

- 10.2.1. Embedded real-time operating system porting
- 10.2.2. IO, I²C. Device Drivers for SPI Bus
- 10.2.3. Detection of human physiological and motion characteristics
- 10.2.4. Low power system management
- 10.2.5. Multi task programming design based on RTOS
- 10.2.6. Smart watch architecture design and implementation

11. Embedded middleware application development

11.1. Design of Smart Agriculture Greenhouse Monitoring System

- 11.1.1. RS485 interface industrial sensor driver development
- 11.1.2. Persistent storage of data based on file system devices
- 11.1.3. Intelligent algorithm environment data intelligent analysis
- 11.1.4. Design of human-computer interaction based on embedded GUI
- 11.1.5. Remote monitoring of IoT data
- 11.1.6. Architecture design and implementation of smart agricultural greenhouse monitoring system

11.2. Design of IoT gateway system

- 11.2.1. Gateway data collection interface driver development
- 11.2.2. Development of IoT gateway control interface driver
- 11.2.3. Development of human-machine interaction interface application for IoT gateway
- 11.2.4. Integrated debugging of IoT gateway data caching

11.2.5. Development of data processing and transmission module drivers for IoT gateway

11.2.6. Design and implementation of IoT gateway architecture

12. **Summary and Review**

12.1. Consolidate the Embedded software and hardware learned this semester

12.2. Review the knowledge learned this semester

Project Training

Course Code: AIT -371

Total Contact Hours: 96

Theory: 0

Practical: 96

T	P	C
0	3	1

This course uses Python, JAVA, cross-platform development technology, MySQL, Pytorch framework, OpenCV and AI open platform to develop object detection applications, so that students can use cross-platform technology to develop front-end, invoke JAVA back-end interface to invoke Pytorch model, To complete object detection and identification application based on OpenCV. This course covers Java Web development technology, Python application development technology, cross-platform development technology, database call method, back-end interface call method, image recognition technology, machine vision technology.

COURSE OBJECTIVES

At the end of the course the students are expected to be able to

1. Download and install Pycharm, Visual Studio Code, and be familiar with the development environment
2. Use HTML, CSS, JavaScript and other technologies to achieve project effects
3. Master the basic JAVA backend technology
4. Master the basic technology of MySQL
5. Master the AI application development technology of Python
6. Know how to call the server interface in a Python application development project
7. Familiarize Machine learning and Pytorch-based deep learning development framework
8. Master data processing tools and methods of deep learning
9. Master exploratory and Visualization techniques of data analysis
10. Master the human-machine interface technology and skills
11. Master model training, optimization, and prediction.

COURSE CONTENTS

- | | |
|--|-----------------|
| 1. DEVELOPMENT PREPARATION | 6 Hours |
| 1.1 Download and install Pycharm, Visual Studio Code or eclipse | |
| 1.2 Download and install the XAMPP software to start the tomcat server | |
| 1.3 Download and install Pytorch and OpenCV to connect the AI development platform | |
| 2. CROSS-PLATFORM WEB APPLICATION DEVELOPMENT | 12 Hours |
| 2.1 Project requirements analysis | |
| 2.2 Application prototyping system design | |
| 2.3 The general design of the application | |
| 2.4 Implement the layout, style, and effects of the app | |
| 2.5 Implement the back-end interface of the application call | |
| 3. BACK-END DEVELOPMENT | 16 Hours |

3.1 Invoke the Pytorch model and back-end AI algorithms using JAVA	
3.2 Connect to MySQL database	
3.3 Deploy the back-end code and database to the server	
4. AI APPLICATION DEVELOPMENT BY PYTHON	18 Hours
4.1 Develop the intelligent dialogue system and back-end services	
4.2 Use PyTorch-based deep learning development AI application module	
4.3 Use OpenCV for image processing and implementation the services	
4.4 Achieve target detection and recognition application interface	
4.5 Realize data visualization	
5. DATA PREPARATION AND PROCESSING	16 Hours
5.1 Data Acquisition and analysis	
5.2 Data Annotation	
5.3 Loading Data	
5.4 Data Preprocessing	
5.5 Data enhancement	
5.6 Create PyTorch datasets	
6. BUILD THE FULL AI APPLICATION	16 Hours
6.1 Model Training	
6.2 Model prediction	
6.3 Model optimization	
6.4 Integrate the front-end, back-end and AI application	
6.5 System debug and Integration testing	
7. PROJECT DEPLOYMENT AND VERIFICATION	6 Hours
7.1 Build and initialization of database	
7.2 Deploy the server and test the Java backend interface	
7.3 Deploy the front-end and test the interaction between front-end and back-end	
7.4 Test the performance of the project	
8. PROJECT DOCUMENTATION WRITING AND REPORTING	6 Hours
8.1 Write project implementation report and summary	
8.2 Write user manual	
8.3 Report and present project results	

LIST OF PRACTICALS	96 Hours
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1. Prepare the development environment
2. Design a cross-platform WEB front-end
3. Use VUE for front-end application development
4. Implementation of the JAVA backend
5. Python application development

6. Innovative design and development of the dialogue system
7. Process and algorithm design of machine learning
8. Backend development of AI applications and services based on Pytorch
9. Building and performance comparison of multiple models
10. Data visualization
11. Data cleaning and preprocessing
12. Exploratory analysis and understanding of data
13. Model optimization and adjustment
14. System deployment and function verification
15. Project results report and presentation

INSTRUCTIONAL OBJECTIVES

27. Understand the concept of machine learning
28. Master the concepts of basic terminologies
29. Master the general process of machine learning
30. Master the establishment of IDE for machine learning
31. Proficient in machine learning programming using Python
32. Learn to use Python libraries
33. Understand csv file format
34. Master the methods of importing data using Python class library, NumPy, Pandas
35. Able to view and describe data
36. Able to briefly analyze data
37. Master the methods of data visualization using Matplotlib
38. Understand the necessity of data preprocessing
39. Master the methods of formatting data, adjusting data scale, normalizing data, and standardizing data
40. Understand the methods of feature selection
41. Understand the significance of features
42. Master the evaluation and measurement of machine learning algorithms
43. Understand the basic algorithm ideas of different models
44. Able to choose the appropriate model for different scenarios
45. Master the methods of comparison of machine learning algorithms
46. Understand the idea of ensemble method and its applications for model performance enhancement
47. Master the methods of tuning machine learning models
48. Understand the necessity of model persistence
49. Master the methods of serialization and deserialization models with pickle and jolib
50. Master the skills of generating model
51. Master the Python template for machine learning and its applications
52. Complete the whole process of machine learning based on specific scenarios